MASTER OF SOCIAL WORK

MSW

SYLLABUS

CREDIT BASED, CHOICE BASED CONTINUOUS ASSESSMENT PATTERNED EDUCATION SYSTEM

(Regulations, Scheme of Examination and Course Content)

To be effective from the Academic Year 2020-21 onwards

DEPARTMENT OF STUDIES IN SOCIAL WORK
JSS COLLEGE OF ARTS, COMMERCE AND SCIENCE, OOTY ROAD, MYSORE

PRINCIPAL
JSS College of Arts, Commerce & Science
(Autonomous)
Ooty Road, MYSURU-25

JSS College of Arts, Commerce and Science

(Autonomous)

Ooty Road, Mysore

Master of Social Work Programme

DISTRIBUTION OF COURSE CONTENT AND CREDITS

MSW- I Semester

Compulsory additional papers for non BSW students

Sl. No.	Code No.	Paper Title	L	T	P	Credits
1	NSW-1	Social Science Perspectives for Social Work Practice	-	-	-	-
2	NSW-2	Term Project	-	-	-	-

1. A bridge course will be conducted for a period of 5 days covering the required course input. There are no credits allotted to this course and no written examination too. However, attendance of 75% is compulsory.

2. Paper code: NSW2 : **Term project**:

The term project is a team-exercise consisting 3 to 5 students. The team is expected to select a theme relevant to current social issues in consultation with the supervisor and make an exhaustive survey of literature on the chosen theme including empirical studies made on the same.

Further, the group shall also collect the experiences or opinions of people on the issues and make a detailed presentation. Flexibility is accorded in planning and executing the term project. Creative and analytical approaches are to be carried out under the direct supervision of a faculty supervisor.

The report of the term project has to be submitted before the end of theory examination of the first semester. The term project is offered only for the non-BSW students. However, students with BSW background are also encouraged to opt for the term project, as an innovative approach in social work, if they desire so.

DISTRIBUTION OF CREDITS

Sl. No.	Course Type	Credits
1	HARD CORE (HC)	52
2	SOFT CORE (SC)	20
3	OPEN ELECTIVE (OE)	04
	TOTAL	76

Semester- wise Distribution of Course Content and Credits

I Semester

Sl. No.	Course Code	Course Title	L:T:P	Credits
1.	SWA HC-1	Social Work - History and Ideologies	2:1:0	3
2.	SWA HC-2	Work with Individuals and Families	2:1:0	3
3.	SWA HC-3	Work with Groups	2:1:0	3
4.	SWA HC-4	Work with Communities	2:1:0	3
5.	SWA HC-5	Human Growth and Development	2:1:0	3
6.	SWA HC-6	Social Work Practicum – I	0:1:2	3
		Total		**18**

II Semester

Sl. No.	Course Code	Course Title	L:T:P	Credits
1.	SWB HC-7	Management of Developmental and Welfare Services	2:1:0	3
2.	SWB HC-8	Social Work Research and Statistics	2:1:0	3
3.	SWB HC-9	Social Work Practicum – II (Social Work Camp and Summer Placement)	0:0:3	3
4.	SWB HC-10	Social Work Practicum - III	0:1:2	3
5.	SWB SC-1	Communication and Counselling / Gandhian Approach to Welfare and Development	3:1:0	4
6.	SWB SC-2	Personal and Professional Growth/ Population and Environment	2:1:0	3
			Total	**19**

III Semester

Sl. No.	Course Code	Course Title	L:T:P	Credits
1.	SWC HC-11	Human Resource Management	2:1:0	3
2.	SWC HC-12	Social Work Practicum – IV	0:1:2	3
3.	SWC SC-3	Social Work with Tribal and Rural communities/Organizational Behavior and Organizational Development	2:1:0	3
4.	SWC SC-4	Preventive and Social Medicine and Medical Social Work /Rehabilitation and After Care Services	2:1:0	3
5.	SWC SC-5	Social Policy, Planning and Development/ Legal System in India	2:1:0	3
6.	SWC OE	Gerentological Social Work / Social Work Practice with Children	4:0:0	4
			Total	**19**

IV Semester

Sl. No.	Course Code	Course Title	L:T:P	Credits
1	SWD HC-13	Employee Relations and Legislation	2:1:0	3
2	SWD HC-14	Mental Health and Psychiatric Social Work	2:1:0	3
3	SWD HC-15	Major Project	0:2:4	6
4	SWD HC-16	Social Work Practicum – V	0:1:2	3
5	SWD HC-17	Social Work Practicum – VI (Block Placement)	0:0:2	2
6	SWD SC-6	Human Resource Development and Employee Wellness/Case Studies	3:1:0	4
			Total	**21**

Note: In a Semester for only one Soft Core Course, there can be two choices.

Objectives of the Course (Master of Social Work):

1. To provide education and training in social work to those desirous of making a career in social work practice.
2. To provide opportunities through intensive field practicum to work with variety of people in their development and provide service to those who are in need of it.
3. To provide inter-disciplinary collaboration for better understanding of human problems, services and issues related to human development.
4. To link theory with practice in every sphere of human service.
5. To develop requisite knowledge, skills and values in working with people.
6. To promote among learners a sense of responsibility and commitment to work with different sections of people and especially of the vulnerable sections of the society
7. To promote opportunities and to create awareness for personal growth
8. To acquire knowledge and skills in undertaking practice-based research and to administer human service organizations

Name of the Course:

The course shall be called **' Master of Social Work' (MSW)**.

Duration of the Course:

The Course of study **for MSW Degree** shall extend over a period of four semesters spreading over two academic years.

Regulations:

ELIGIBILITY FOR ADMISSION TO MSW COURSE
Candidates who have passed BSW/ BA/ B.Sc. / B.Com. / BBM/ B.C.A / LLB of the University of Mysore or any other university recognized as equivalent there to are eligible for admission to MSW course. Candidates will be selected for admission as per the general guidelines issued from the University of Mysore from time to time. The Department/University shall conduct entrance examination for admission to the course. The examination is of two hour duration and the question paper comprises of 100 objective type questions - 20% questions from general knowledge and current social issues, 60% from science & social sciences, and another 20% questions will be from reasoning and numerical ability. Merit will be assessed on the basis of performance in the entrance examination and performance in the undergraduate examination on equal weightage.

PATTERN OF QUESTION PAPER

Pattern 3

(The Question paper comprising of 3 parts: A,B and C as follows)

PART – A

There are 8 questions and a candidate has to answer any 5 questions. Each question carries 2 marks. This part covers all units of the syllabus.

PART – B

There are 8 questions and a candidate has to answer any 5 questions. Each question carries 5 marks. This part covers all units of the syllabus.

PART –C

There is a single question such as case study (may contain sub questions) covering entire syllabus carrying 15 marks. No choice.

ASSESSMENT OF SOCIAL WORK PRACTICUM

A viva-voce examination shall be conducted for each candidate in all semesters. The performance of the candidate shall be assessed by a committee consisting of three members as follows.

1. Chairperson of the Department
2. One Senior Member of the Faculty
3. One External Examiner

SOCIAL WORK PRACTICUM

The practicum with different learning opportunities is designed to provide scope to develop and enhance professional practice skills. Learning is aided through observation, analysis of social realities and experience of participation in designing and providing social work intervention.

The tasks are organized to help the learner acquire beginning skills, practice those already acquired, and master them from simple to complex. The learner is gradually encouraged to become an independent worker during the course of study.

Objectives

The objectives are met by providing a variety of experiences to learners to:

1. i. Develop the ability to observe and analyze social realities. Understand the
   ii. characteristics of social systems and their dynamics. Appreciate society's
   iii. response to people's needs, problems and social issues.
   iv. Develop critical understanding of the application of legislation, legal process, and social policy.

2. i. Develop the ability to examine the process of programme management and participate in the effort at various levels.
   ii. Develop the ability to recognize the need for newer programs, initiate and Participate in them.
   iii. Use Human Rights tools, understanding of gender justice, and need for equity in all intervention.
   iv. Develop an understanding of organizational structure, resource management, and day-to-day administration for human service programmes - developmental and welfare programmes
   v. Develop the capacity to integrate knowledge and practice-theory by participating in intervention.

3. i. Clarify and imbibe values which sustain positive attitude and professional ethics.
   ii. Develop the capacity for self-direction, growth and change through self awareness.

4. i. Enhance writing skills to document practice appropriately. Recordings to be viewed as an expression of interest, motivation and involvement in practice and as evidence of enrichment in the process of professional growth.

To meet these outcomes, several opportunities with specific objectives are designed. The different sets of opportunities with details of content and related tasks are listed separately.

Odd semester (I Semester)

Paper code: NSW -1

Paper Title: SOCIAL SCIENCE PERSPECTIVES FOR SOCIAL WORK PRACTICE

INTRODUCTION

This course provides the learners basic understanding of relevant concepts from social sciences to help the learners to study and understand social phenomenon. Further, it helps the learner develop skills for social analysis and understand developmental processes.

OBJECTIVES

a. Understand the concepts to examine social phenomenon. b. Develop skills to analyse Indian society and change.
c. Understand change and conflict.
d. Understand the system for economic order.
e. Develop skills for social analysis.
f. Understand the development and its impact.

Course Content

UINIT I

Sociology and its relationship to other disciplines: Meaning, scope and significance - Its relationship with other social sciences such as History, Economics, Politics, Psychology, Anthropology and Social work.

Society and Culture: Society as a system of relationship - Social Structure: Meaning, status and roles - Culture: Meaning and contents-Tradition, customs, values, norms, folklore and mores.

Indian Society: Composition of Indian Society: the concept of unity amidst diversity - Social classification in India: Tribal, rural and urban divisions - Social stratification in India: Meaning, caste, class divisions.
Socialization: Meaning, process of socialisation - The development of self - Agencies of socialisation.

UINIT II

Social Groups, Social Institutions and Social Control - Meaning and types: Primary and Secondary groups, in-groups and out-groups, reference groups - Types of social institutions: Marriage, Family, Religion, State and Law.
Meaning and Functions: Social Control exercised through the social institutions
Social Change: Meaning, characteristics and factors inducing change with reference to India.

Social Movements in India: Meaning, factors essential for a Movement - Dominant social movements in India - Social reform movement and contributions of social reforms - Peasant movement - Trade Union movement - Social movements and social change in India.

UINIT III

Development - A Human Right Perspective: Social Ideals of Indian Constitution - Fundamental Rights - Human Rights.

Socio-economic order and comparative economic system: Capitalism, Socialism and Mixed economy, their features, merits and demerits - Marxian political economy.

Social Analysis: Significance of social analysis: A brief analysis of socioeconomic, political and cultural systems - Inter-linkages in the Indian context.

UINIT IV

Under-development and its causes and Contemporary Development Dynamics: A historical overview with reference to developing countries of Asia, Africa and Latin America - North-south relations, world trades, Multinational corporations and their influences on Third World economics - Trends and counter trends (Paradoxes) in the global, political, economic, military, ecological and socio-cultural spheres.

Theories of Economic Development, Globalisation and its impact on Developing Countries: Stages of growth theory - Structural internationalist theory
Privatization, liberalization and structural adjustment programmes - Role of international financial institutions.

REFERENCES

1. Acuff, F. Gene; Allen, Donald E. and Taylor Lloyd, A. 1973 — From Man to Society, Hinsdale, Illinois, The Dryden Press.

2. Agrawal, A. N. and Lal Kundan 1989 — Economics and Development and Planning, Delhi, New Vikas Publishing House Private Limited

3. Augushine, John S. (Ed.) 1989 — Strategies for Third World Development, New Delhi: Sage Publications.

4. Basu, Durga Das. 1983 — Introduction to the Constitution of India, New Delhi, Prentice-Hall of India Private Ltd.

5. Bert N. Adams. 1975 — A Sociological Interpretation, Chicago: Rang McNally College.

6. Bharadwaj, A. N. 1979 — Problems of SC/ ST in India, New Delhi: Light and Life Publication.

7. Bhushan, Vidya and Sachdev, D.R. 1999 — An Introduction to Sociology, Allhabad, Kitab Mahal

8. Broom, Leonard, Charles M. Bonjean, Dorothy, H. Broom. 1990 — Sociology, Wadsworth Publication Co. Belmount.

9. Chakraborthy, Bimal 1996 — The United Nations and Third World, New Delhi: Tata McGraw Hill Publishing Company Limited.

10. Descrochers, John. 1 77 — Methods of Social Analysis, Bangalore: Centre for Social Action.

11. Deshpande, Srinivasan Narain. 1978 — Society Economy of Polity in India, Mumbai: University of Mumbai.

12. Elsenhans, Hartmut. 1991 — Development and Under Development: The History, Economics and Politics of North South Relations, New Delhi: Sage Publications.

13. Ely Chinoy. 1967 — Society - An Introduction to Sociology, New York: Random House.

14. Haralambos, Michael. 1980 — Sociology, Delhi: Oxford University Press.

15. Jain, P. C. 1991 — Social Movements among Tribals, New Delhi, Rawat Publication.

16. Kapadia, K. M. 1966 — Marriage and Family in India, London: Oxford University Press.

17. Kingsley, David. 1969 — Human Society, New York.

18. Kolenda, Pauline. 1987 — Regional differences in Family Structure in India, Jaipur: Rawat Publication.

19. Maudelbaum, David M. 1970 — Society in India, Vol. I and II, University of California Press.

20. Nagardra, S. P. 1994 — Development and Change, New Delhi: Concert Publishing Company.

21. Nana Poku Lloyd Pettiford (Ed.) 1998 — Rebuilds up the Third World, London: Macmillan Press Limited.

22. Narang, B. S., and Dhawan , R. C. 1983 — Introduction to Social Sciences, Delhi: C.B.S. Publication.

23. Panday Rajendra. 1986 — The Caste System in India-Myth and Reality, New Delhi: Criterion Publication.

24. Pandey, A. K. 1997 — Tribal Society in India, New Delhi: Manak Publishing Ltd.

25. Rao, D. Bhaskar, 1998 — World Summit for Social Development, New Delhi: Discovery Publications.

26. Rao, V. Lakshmana 1994 Ashish — Essays on Indian Economy, New Delhi: Publishing House.

27. Reddy, D. V. 1994 — Development and New International Economic Order, New Delhi: Deep and Deep Publications.

28. Ross, Aileen D. 1961 — The Hindu Family in its Urban Setting, Delhi: Oxford University Press.

29. Rugman, Alan 2000 — The End of Globalization, London: Random House.

30. Sharma, S. L. (Ed.) 1986 — Development: Socio-Cultural Dimensions, Jaipur: Rawat Publications.

31. Sharma, K. L. (Ed.) 1999 — Caste and Race in India, Mumbai: Popular Prakashan.

32. Sharma, R. K. 1997 — Indian Society - Institution and Change, New Delhi: Atlantic Publishers.

33. Singh, K. S. 1985 — Tribal Society in India, New Delhi: Manohar Publishing House.

34. Srinivas, M. N. 1996 — Village, Caste, Gender and Method (Essay in Indian Social Anthropology), Delhi: Oxford University Press.

35. Steveus Smart M., Laura S. Smart. 1976 — Families Developing Relationships, New York: Macmillan Publishing Co.

36. Tandon, B. B., and Tandon, K. K. 1997. — Indian Economy, New Delhi: Tata McGraw-Hill Publishing Company Limited

37. Verghese, K 1992 General Sociology, Delhi: Macmillan Co,

Journals/ Magazines

Sociological Bulletin (Journal of the Indian Sociological Society).

Contribution to Indian Sociology.

Social Change, Issues and Perspectives (Journal of the Council for Social Development).

Economic and Political Weekly, EPW Research Foundations, Mumbai.

Paper code: NSW 2

TERM PROJECT

The term project is a team-exercise consisting 3 to 5 students. The team is expected to select a theme relevant to current social issues in consultation with the supervisor and make an exhaustive survey of literature on the chosen theme including empirical studies made on the same.

Further, the group shall also collect the experiences or opinions of people on the issues and make a detailed presentation.

Flexibility is accorded in planning and executing the term project. Creative and analytical approaches are to be carried out under the direct supervision of a faculty supervisor.

The report of the term project has to be submitted before the end of theory examination of that semester to the Department of Social Work, University of Mysore, Mysore through the supervisor and Chairman/Principal of the college.

The term project is offered only for the non-BSW students. However, students with BSW background are also encouraged to opt for the term project, as an innovative approach in social work, is they desire so.

Evaluation of the term project will be done along with the viva-voce examination by the viva-voce committee, constituted for the assessment of social work practicum or similar committee may be constituted, if required.

Odd semester
Paper code: SWAHC- 1
Paper Title: SOCIAL WORK - HISTORY AND IDEOLOGIES

INTRODUCTION

This course aims at introducing the learners to a critical inquiry into the history and ideologies of social change and professional social work.

OBJECTIVES

a. Understand the history of evolution of social work profession, both in India and the West.
b. Develop insights into the origin and development of ideologies, approaches to social change.
c. Understand rationale, goals, ideals and ethics for social change.
d. Understand the perceptions of people and social problems, the status of benefactors and their motives.
e. Develop skills to understand contemporary reality in its historical context.
f. Understand self as a part of own environment and explore own assumptions, ideals, values to develop sensitivity to marginalization of vulnerable groups.

Course Content:

UNIT I

Indian History of Social Work Profession: Introduction - Beginning of social work education - Welfare versus developmental orientation in social work - Professionalization of social work values, education, knowledge and professional associations - Goals, values, functions/roles and process of social work - Interface between professional and voluntary social work, social work ethics.

UNIT II

Indian History of Ideologies for Social Change -Ancient period: Vedic, Vedantic and non-Vedic Ideologies, Spirituality - Medieval period: Zoroastrianism and Islam in India - Mysticism of Bhakti and Sufi movements and Sikhism.

Modern period: Christianity in India - Hindu reform movements - Dalit movements - Gandhian ideology and Sarvodaya movement – Nationalism - Ideology of the Indian Constitution - Ideology of voluntary organisations and voluntary action.

UNIT III

Contemporary Ideologies for Social Change: Neoliberalism and Globalisation - Post modernism - Multiculturalism - Ideology of action groups and social movements - Ideology of non-governmental organisations.
Role of state in providing social welfare services.

UNIT IV

Western History of Ideologies for Social Change: Organized and scientific charity - Beginning of social work education - Clinical social work - Ecological social work - Attributes of a profession.

Western History of Social Work Profession - Medieval period: Judeo-Christian-ideologies - Secular humanism and Protestantism - Modem period: Rationalism and Welfarism - Liberalism and democracy - Utilitarianism and Social Darwinism - Socialism and human rights - Emerging ideologies of professional social work.

REFERENCES

1. Agarwal, M. M. 1998	Ethics and Spirituality, Shimla: Indian Institute of Advanced Study
2. Alastair, Christie (Ed.) 2001	Men and Social Work: Theories and Practices, New York, Palgrave.
3. Banerjee, G. R.	Papers on Social Work: An Indian Perspective, Bombay, Tata Institute of Social Sciences.
4. Banks, S. 1995	Ethics and Values in Social Work: Practical Social Work Series, London: Macmillan Press Ltd.
5. Borgatta, E. F. (Ed.) 1992	Encyclopedia of Sociology, New York: Macmillan.
6. Brieland, Donald; Costin Lela B.; Atherton, Charles R. and Contributors 1975	Contemporary Social Work - An Introduction to Social Work and Social Welfare, New York, McGraw-Hill Book Company.
7. Butrym, Zofia T. 1976	The Nature of Social Work, London, Macmi1lan Press Ltd.
8. Chatterjee, P. 1996	Approaches to the Welfare State, Washington, D.C.: National Association of Social Workers.
9. Congress, E. P. 1998	**Social Work Values and Ethics, Chicago:** Nelson- Hall Publishers.
10. Desai, Armaity S. 1994	A Study of Social Work Education in India, Bombay, Tata Institute of Social Sciences, Vol. I and II
11. Desai, M. 2000	Curriculum Development on History of Ideologies for Social Change and Social Work, Mumbai: Social Work Education and Practice Cell.
12. Diwakar, V. D. (Ed.) 1991	Social Reform Movements in India: A Historical Perspective, Bombay: Popular Prakashan.

13. Encyclopedia of Social... 1987 — Encyclopedia of Social Work, Silver Spring, Maryland: National Association of Social Workers.

14. Encyclopedia of Social... 1987 — Encyclopedia of Social Work in India, New Delhi: Ministry of Welfare.

15. Feibleman,J. K. 1986 — Understanding Philosophy: A Popular History of Ideas, New York: Souvenir Press.

16. Fink, A. E. 1945 — The Field of Social Work, New York, Henry Holt and Co.

17. Friedlander, Walter A and. Apte, Robert Z. 1982 — Introduction to Social Welfare, New Delhi, Prentice–Hall

18. Ganguli, B. N. 1973 — Gandhi's Social Philosophy, Delhi: Vikas Publishing House.

19. Gore, M. S. 1993 — The Social Context of Ideology: Ambedkar's Social and Political Thought, New Delhi: Sage.

20. Gore, M. S. 1965 — Social Work and Social Work Education, Bombay, Asia Publishing House.

21. Jacob, K. K. (Ed.) 1994 — Social Work Education in India -- Retrospect and Prospect Udaipur, Himansu Publications.

22. Joseph, Sherry (Ed.) 2000 — Social Work: In the Third Millennium (Some Concerns and Challenges), Sriniketan, Department of Social Work, Visva-Bharati.

23. Kappen,S.1994 — Tradition Modernity Counterculture: An Asian Perspective, Bangalore: Visthar

24. Kothari, S. and Sethi, H. (Eds) 1991 — Rethinking Human Rights, New Delhi: Lokayan.

25. Moorthy, M. V. 1974 — Social Work - Philosophy, Methods and Fields, Dharwar, Karnatak University.

26. Noel and Timms, Rita 1977 — Perspectives in Social Work, London, Routledge and Kegan Paul.

27. Nigel Parton and Patrick, O'Byrne 2000 — Constructive Social Work - Towards a New Practie, New York, Palgrave

28. Panikkar, K. N. 1995 — Culture, Ideology Hegemony: Intellectual and Social Consciousness in Colonial India, New Delhi: Tulika.

29. Skidmore, Rex A. and Thackeray, Milton G. 1982 — Introduction to Social Work, New Jersey, Prentice-Hall, Englewood Cliffs

30. Stroup, H. H. 1960 — Social Work - An Introduction to the Field, New Delhi, Eurasia Publishing House.

31. Tata Institute of Social Sciences Social Work Educators Forum (TISSSWEF) 1997 — Declaration of Ethics for Professional Social Workers, The Indian Journal of Social Work, 58(2), 335-341

32. The Cultural Heritage... — The Cultural Heritage of India (Vols. 1-6), Calcutta: The Ramakrishna Mission.

33. United Nations 1992: — HumanRights: Teaching and Learning About Human Rights. UN: New York.

34. University Grants Commission1980, 1990 — Review of Social Work Education in India: Retrospect and Prospect, New Delhi: UGC. Curriculum Development Centre's Report: New Delhi, University Grants Commission.

35. Wadia, A.R. 1968 — History and Philosophy of Social Work in India, Bombay, Allied Publishers.

36. Woodrofe, K. 1962 — From Charity to Social Work, London: Routledge, and Kega Paul.

37. Yelaja, S. A. 1982 — Ethical Issues in Social Work, Springfield, Charles, C. Thomas.

38. Young, Pat 1985 — Mastering Social Welfare, Macmillan Master Series, London, Macmillan Education Ltd.

39. Younghusband, E. 1967 — Social Work and Social Values, Vol. III, London, George Allen and Unwin.

Journals/ Magazines

Economic and Political Weekly, The Indian Journal of Social Work, Lokayan Bulletin and Vikalp.

Odd semester
Paper code: SWAHC- 2
Paper Title: WORK WITH INDIVIDUALS AND FAMILIES

INTRODUCTION

This course aims to develop simple to complex skills of working with individuals and families in various situations like crisis, preventive, facilitative and developmental.

OBJECTIVES

a. Understand casework as a method of social work, and appreciate its place in social work practice.
b. Understand the values and principles of working with individuals and families.
c. Develop the ability to critically analyse problems of individuals and families and factors affecting them.
d. Enhance understanding of the basic concepts, tools and techniques in working with individuals and families, in problem-solving and in developmental work.
e. Develop appropriate skills and attitudes to work with individuals and families.

Course Content

UNIT I

Social case work: Definitions, scope, historical development - Influence of psychoanalysis on casework - Introduction of casework as a method of social work - Concepts of adjustment and maladjustment - Philosophical assumptions and casework values.

Principles of casework: Individualization, acceptance, non-judgmental attitude, participation, relationship, effective communication of feeling, client self-determination, and confidentiality.

Components of social casework: The person, the problem, the place and the process.
Process in casework: Study, assessment, intervention, evaluation, follow-up, and termination.

UNIT II

Types of problems faced by Individuals and families; individual differences and needs - Family assessment in casework practice.

Theories and approaches: Psycho-social approach, Functional approach, Problem-solving approach, Crisis Theory, Family intervention, Behavioural modification, Transactional analysis and Holistic approach.

UNIT III

Tools for Help: Case work tools: Interview, home visit, observation, listening, communication skills, rapport building.
Records: Nature, purpose and principles of recording.

Techniques of casework: Supportive, resource enhancement and counseling.
Self as a professional: Professional self - Conflicts and dilemmas in working with individuals and families.

UNIT IV

Application of Method: Primary and secondary settings - Application of methods in family, women, and child welfare settings, marriage counselling centres, schools settings, medical and psychiatric settings, correctional institutions, and industry.

REFERENCES

1. Banerjee, G. R. 1967 — "Concept of Being and Becoming in the Practice of Social Work", Indian Journal of Social Work, Mumbai: Tata Institute of Social Sciences.
2. Banerjee, G. R. 1971 — "Some Thoughts on Professional Self in Social Work", Indian Journal of Social Work, Mumbai:Tata Institute of Social Sciences.
3. Banerjee, G. R. — Papers on Social Work - An Indian Perspective, Bombay, Tata Institute of Social Sciences.
4. Barba, J. G. 1991 — Beyond Casework; London: Macmillan.
5. Bergh, M. V. 1995 — Feminist Practice in the 21st Century, Washington: National Association of Social Workers.
6. Biestek, F. P. 1957 — The Case Work Relationship, London, George Allen and Unwin.
7. Hamilton, G. 1946 — Principles of Social Case Recording, New York, Columbia University Press.
8. Hamilton, G. 1950 — Theory and Practice in Social Case Work, New York, Columbia University Press
9. Hartman, A. and Laird, J. 1983 — Family Centered Social Work Practice, New York: The Free Press.
10. Hollis, Florence. 1964 — Case Work - A Psychological Therapy, New York: Random House.
11. Joel Fisher. 1978 — Effective Case Work Practice - An Eclectic Approach, New York: McGraw Hill.

12. Mathew, Grace 1992 — An Introduction to Social Case Work, Bombay, Tata Institute of Social Sciences.

13. Nursten, Jean. 1974 — Process of Case Work, G.B: Pitman Publications.

14. Perlman, H. H. 1957 — Social Case Work: A Problem Solving Process, Chicago. The University of Chicago Press.

15. Pippins, J. A. 1980 — Developing Case Work Skills, California: Sage Publications.

16. Richmond, M. E. 1922 — What is Social Case Work? An Introductory Description, New York: Sage Foundation.

17. Richmond, M. E. 1917 — Social Diagnosis, New York, Free Press.

18. Sainsbury,Eric, 1970 — Social Diagnosis in Case Work, London: Routledge and Kegan Paul.

19. Sena F. Fine and Paul H. Glass. 1996 — The First Helping Interview Engaging the Client and building Trust, Sage Publication. '

20. Timms, N. 1964 — Social Case Work: Principles and Practice, London: Routledge and Kegan Paul.

Odd semester
Paper code: SWAHC -3
Paper Title: WORK WITH GROUPS

INTRODUCTION

This course aims at developing the understanding of Group Work as a method, developing skills for intervention, and gaining knowledge of the scope of this method in various settings.

OBJECTIVES

a. Develop awareness about the specific characteristics of Group Work and its contributions as a method of social work intervention,
b. Gain knowledge about group formation and the use of a variety of group approaches.
c. Develop understanding of concepts, dynamics and small group theory in relation to all types of groups, e.g. family, staff, committee, long-term client groups.
d. Identify the various situations and settings where the method could be used in the context of social realities of the country.

Course Content

UNIT I

Introduction and history of Group Work: Understanding of groups - Characteristics and significance of group - Definition of Social Group Work - Characteristics of Social Group Work - Purpose of Social Group Work; Historical evolution of group work with special emphasis on the Indian Context.

Type of Groups: Types and approaches based on objectives and purpose - Type of

membership - Time duration - Social group work in different settings and analysis of group processes.

Values and Principles in group work and Characteristics of Group formation: Values in social group work- Principles in group work - Assumptions underlying social group work - Factors of group formation - Formulation of goals - Identification of problems for work.

Pre-group and Initial Phase: Planning model - Characteristics of pre group phase - Group structures - Facilitation skills and role of worker in pre-group and initial phase.

UNIT II

Group Processes and Group Dynamics: Importance of group processes - Typical patterns - Processes in different type of groups - Worker's skills in identifying and understanding processes - Bond, sub-groups, role.
Leadership - Isolation - Decision making - Conflict – Communication - Relationships.

UNIT III

Middle Phase and Use of Program: Characteristics of middle phase - Group structures - Group dynamics - Facilitation skills - Role of group workers - - Comparison across phases - Concept and principles - Program planning - Skills in program planning

Facilitation: Knowledge of skills and techniques for effective work with groups/problem solving.
Recordings in Group work: Importance of recording in social group work - Principles of recording - Recording structure - Types of recording.

UNIT IV

Evaluation in Groups and Termination Phase : Importance of evaluation - Types of evaluation - Methods of evaluation - Need for termination - Types of termination - Characteristics of termination phase - Worker's skills.

Application of Group Work: Application in health settings, school settings, family welfare settings, industrial settings, women and child welfare settings.

REFERENCES

1. Alissi, A. S. 1980	Perspectives on Social Group Work Practice: A Book of Readings, New York: The Free Press.
2. Balgopal, P. R. and Vassil, T. V. 1983	Groups in Social Work - An Ecological Perspective, New York: Macmillan Publishing Co. Inc.
3. Brandler S. and Roman, C. P. 1999	Group Work: Skills and Strategies for Effective Interventions, New York: The Haworth Press.
4. Davies, Bernard 1975	The Use of Groups in Social Work Practice, London, Routledge and Kegan Paul.
5. Garland, J. A. (Ed.) 1992	Group Work Reaching Out: People, Places and Power, New York: The Haworth Press.
6. Garwin, C. 1987	Contemporary Group Work, New York: Prentice-Hall Inc.
7. Kemp, C. G. 1970	Perspectives on the Group Process, Boston: Houghton Miffiin C.

8. Klein, A. F. 1970 — Social Work through Group Process: School of Social Welfare, Albany: State University of New York.

9. Konopka, G. 1963 — Social Group Work : A Helping Process, Englewood Cliff. N J: Prentice- Hall Inc.

10. Milson, Fred 1973 — An Introduction to Group Work Skills, London, Routledge and Kegan Paul.

11. Northen, H. 1969 — Social Work with Groups. New York: Columbia University Press.

12. Pepell, C.P. and Rothman, B. — Social Work with Groups, New York: The Haworth Press.

13. Sundel, M., Glasser, Sarri, R., and Vinter, R. 1985 — Individual Change through Small Groups, New York: The Free Press.

14. Tom, Douglas 1978 — Basic Group Work, London, Tavistock Publications Ltd.

15. Toselane, R. W. and Rivas, R. F. 1984 — An Introduction to Group Work Practice, New York: Macmillan Publishing Co.

16. Trecker, Harleigh B. 1970 — Social Group Work: Principles and Practice, New Work:Association Press.

17. Wilson, G. and Ryland, G. 1949 — Social Group Work Practice, Boston: Houghton Mifflin, Co,

Odd semester
Paper code:SWAHC-4
Paper Title: WORK WITH COMMUNITIES

INTRODUCTION

Community organization / development, as a method of social work practice, is seen as a means to facilitate communities towards self-directed change. It takes as its basis the inequalities in society manifested through processes of marginalization, discrimination or disempowerment of groups, which have resulted in the loss of control over resources, be they tangible or intangible. The strategies of Community Organisation practice being addressed as part of the course cover a range spanning different ideologies, from those being people-initiated, and those that are initiated by the elite. Community organization is seen as a means as well as an end, where collective processes are to sustain the community's capacity to bring about change.

OBJECTIVES

a. Understand the critical elements of community organisation practice.
b. Enhance critical understanding of the models and strategies for community organisation practice.
c. Make the micro-macro connections between the range of complex issues in practice.
d. Develop attitudes conducive to participatory activities for civil society.

Course Content

UNIT I

Community: Concept, characteristics, types and functions.
Understanding of community organisation practice: Definition of community organisation, values and principles of Community Organisations, ethics of community organisation practice.

Community Organisation Practice: Community work within social work, Understanding Human Rights in community organisation practice.
Historical development of community organisation practice.

Power: Concept of power - The range of perspectives - Dimensions of power relevant to community organization.

Empowerment: Concept of Empowerment - Barriers to, process and cycle of empowerment.

Gender and Empowerment: Gender sensitive community organization practice

UNIT II

Models and Strategies of Community Organization - Locality Development Model - Social Planning Model - Social Action Model - Select methods of public interest mobilization, litigation, protests and demonstrations, Dealing with authorities, Public Relations, Planning, Monitoring and Evaluation - Roles in different models attributes and attitude.

UNIT III

Community Organization as a Method: Relevance of community organisation as a method across different spheres of social work intervention and relook at own attitudes.

Skills of Community Organization Practitioner: Problem analysis, resource mobilization, conflict resolution, organizing meetings, writing and documentation, networking, training.

UNIT IV

Strategy and Roles: Unionization as a strategy - Advocacy in community organization.

Current debates in Community Organisation Practice: Emerging issues - Impact of macro policies.

REFERENCES

1. Arora R. K. (Ed.) 1979 — People's Participation in Development Process: Essays in Honour of B. Mehta, Jaipur: the HCM State Institute of Public Administration.

2. Battern, T. R. 1962 — The Non-Directive Approach in Group and Community Work, London: Oxford University Press.

3. Brager, G. and Specht, H. 1969 — Community Organisation, New York: Columbia University Press.

4. Battern, T. R. 1965 — The Human Factor in Community Work, London: Oxford University Press.

5. Dandavate, M. 1977 — Marx and Gandhi, Bombay: Popular Prakashan Pvt. Ltd.

6. Dayal, R. 1960 — Community Development Programme in India, Allahabad: Kitab Mahal Publishers.

7. Dunham, Arthur E. 1970 — The Community Welfare Organisation, New York, Thomas Y. Crowell.

8. Gandhi, M. K. — Sarvodaya (I'he Welfare of All), Ahmedabad: Navjivan Publishing House.

9. Gangrade, K. D. 1971 — Community Organisation in India, Bombay, Popular Prakashan.

10. Henderson, Paul; Jones, David and Thomas, David N. 1980 — The Boundaries of Change in Community Work, Boston, George Allen and Unwin.

11. Lal, A. K. 1977 — Politics of Poverty: A Study of Bonded Labour. New Delhi: Chethana Publications.

12. Marulasiddaiah, H. M. 1987 — Community: Area and Regional Development in India, Bangalore, Bangalore University.

13. Mayo H., Jones D. 1974 — Community Work, London: Routledge and Kegan Paul.

14. McMiller, W. 1945 — Community Organisation for Social Welfare, Chicago: University of Chicago Press.

15. Murphy, C. G. 1954 — Community Organisation Practice, Boston: Houghton Mifflin Co.

16. Patnaik, U. and Dingwaney, M. 1985 — Chains of Servitude, Bondage and Slavery in India. Madras: Sangam Books Pvt. Ltd.

17. Polson and Sanderson. 1979 — Rural Community Organisation, New York: John Wiley and Sons.

18. Ramchandra Raj, G. 1974 — Functions and Dysfucntions of Social Conflict, Bombay: Popular Prakashan.

19. Ross Murray G. 1967 — Community Organisation: Theory, Principles and Practice, New York: Harper and Row.

20. Siddiqui, H. Y. 1997 — Working with Communities: An Introduction to Community Work, New Delhi: Hira Publications.

21. Shivappa R. 2009 — STREAMS IN THE RIVER- A Journey Into Inclusive Concerns, Dhatri Pustaka, Bangalore

22. Sussman, M. B. 1959 — Community Structure and Analysis, New York: Thomas Y. Crowell Co.

23. Volken, H. et. al. 1982 — Learning from the Rural Poor: Shared Experiences of the Mobile Orientation and Training Team, New Delhi: Indian Social Institute.

24. Warren, R. L. 1965 Studying Your Community, New York: Free Press.

25. Zaltman, G. and Duncan, R. 1977 Strategies for Planned Change, New York: Association Press.

Journals

Community Development Journal: An International Forum, UK, Oxford University Press.

Development and Change, Hague Blackwell Publisher.

Paper code: SWAHC-5
Paper Title: HUMAN GROWTH AND DEVELOPMENT

INTRODUCTION

The course aims to introduce the learners to the development of the individual across the life span, in a system and an ecological perspective. It also provides an understanding of human development and behaviour, in contextual influences, including individuals in disadvantaged or special contexts. The theoretical inputs are to enhance the understanding of people's growth, health, and development at various stages as bio-psycho-socio-spiritual being over the life span.

OBJECTIVES

a. Develop an overall understanding of the principles of growth; their relevance and application to behaviour at various phases in the life span.
b. Understand the twin roles of individual's heritage and environmental influences in growth and development.
c. Understand interactional nature of growth and behaviour at various stages in the life span: infancy, childhood, adolescence, youth, adulthood and old age, and impact of cultural aspects.
d. Develop sensitivity towards needs, developmental tasks and health status along with need for developmental programmes for the same.
e. Apply the information of growth, development and health in social work practice in general and individuals, groups and communities in particular.

Course Content

UNIT I

Life Span: Beginning of life - Human reproductive system; Fertilization and Foetal development - Delivery and pre-natal and post-natal care and their importance in development.
Principles of growth and development - Methods of studying human behaviour, - Role of heredity and environment - Social customs traditions, values in parenting and child rearing practices, deprivation and development during stages of life span. Understanding of the Indian concept of life span stages.

UNIT II

Developmental periods: Infancy, babyhood, childhood, puberty, adolescence -. Growth, hazards, lifestyle effects
Adulthood - Growth, personal and social adjustment, health, sexuality, vocational and marital adjustment.
Aging - Characteristics, hobbies, adjustment, physical and mental health, death, dying and bereavement.
Special focus is on psychosocial development, moral development, and personality development vis-a-vis the influence of the contexts of development., (The contexts here refers to gender, family, significant others, neighbourhood: peers, school, community, work place and other larger contexts like the society and culture. Emphasis is placed on the Indian context of development, variations from the

normal patterns of development and views on the stages)

UNIT III

Theories of Human Development: A critical look at the theories of human development - Freud's psychosexual theory, Erikson's psychosocial theory, learning theories.

UNIT IV

Basic human needs: Physical, psychological and intellectual needs, stress - Coping and social support.
Motivation, frustration and conflicts - Emotions and emotional behaviour.
Personality: Definition, nature, types and assessment of personality.
Intelligence: Concept, levels of intelligence, influence of heredity and environment, assessment of intelligence.
Relevance of Psychology to social work practice across the stages of development, period specific needs, tasks and challenges.

REFERENCES

1. Anastasi, Anne 1988	Psychological Testing, New York, Macmillan Publishing Company.
2. Baltes, P. B. (Ed.) (1978)	Life span Development and Behaviour. New York: Academic Press, Inc.
3. Bronfenbrenner, U. 1979	The Ecology of Human Development, Cambridge: Harvard University Press.
4. Chowdary, D. P. 1992	Aging and the Aged, New Delhi: Inter-India Publications.
5. Feldman Robert S 1997	Understanding Psychology, 4th Edition, Tata McGraw Hill Publishing Company Limited, New Delhi
6. Gore, M. S. 1978	Changes in the Family and the Process of Socialisation In India, In Anthony, E. J. & Colette, C. (Eds.). The Child in his Family, Wiley, 365-374.
7. Gore, M. S. 1992	Aging and the Future of the Human Being, The Indian Journal of Social Work, 53 (2), 210-219.
8. Hurlock, Elizabeth B. 1978	Child Growth and Development, New Delhi, Tata McGraw-Hill Publishing Company Ltd.

9. Hurlock, Elizabeth B. 1975 — Developmental Psychology, New Delhi, Tata McGraw-Hill Publishing Company Ltd.

10. Kail, R. V. and Cavanangh, J. C. 1996 — Human Development, Pacific Grove, CA: Brooks/ Core Publishing Company.

11. Kakar, S. 1979 — Indian Childhood, Cultural Ideals and Social Reality, Delhi: Oxford University Press.

12. Kakar, S. 1982 — Identity and Adulthood, Delhi: Oxford University Press.

13. Kakar, S. 1970 — Conflict and Choice - Indian Youth in a Changing Society, Bombay: Somaiya Publications.

14. Kakar, S. 1978 — Images of the Life Cycle and Adulthood in India, In Anthony, E. J. and Colette, C. (Eds.) The Child in his Family, Wiley. 319-332.

15. Kaplan, P. S. 1988 — The Human Odyssey: Life-Span Development, St.Paul, West Publishing Company.

16. Le francois, G. R. 1990 — The Life Span, Third Edition, University of Alberta.

17. Magmesson, D. and Allen, V. C 1983 — Human Development: An International Perspectives, New York: ,Academic Press. Chapters 1,5,6,11,14,16,19,21.

18. Maier, H. W. 1965 — Three Theories of Child Development, N.Y.: Harper and Row Publishers.

19. Misra, G. (Ed.) 1990 — Social Psychology in India, New Delhi: Sage Publications.

20. Rapoport, Rhona and Rapoport, Robert 1980 — Growing through Life, Lifecycle Book, New York: Harper & Row Publishers.

21. Sharma, N. 1999 — Adolescent Girl Child in India, News Bulletin of the Indian Council of Child Welfare.

22. Sheehy, G. 1976 — Passages: Predictable Crisis of Adult Life, New York: Bantam Books.

23. Sige1man, C. K. and Shaffer, D. R. 1995 — Life-Span Human Development, 2nd Edition, Pacific Grove, CA: Brooks Cole Pub1ishing Company.

24. Smolack, L. 1993 — Adult Development, New Jersey: Prentice-Hall.

25. Sternberg, R. J. and Wagner, R. K. 1986 — Practical Intelligence: Nature and Origin of Competence in Everyday World, London: Cambridge University Press.

26. Veedon, R. 1993 — Death in OId Age and Bereavement Counselling, Indian Journal of Social Work, 54 (1),85-92.

27. Weiner, E. A. and Stewart, B. J. 1984 — Assessing Individuals: Psychological and Educational Tests and Measurements, Boston, Little, Brown and Co.

Odd semester
Code: SWAHC-6

Title: SOCIAL WORK PRACTICUM - I

Orientation provides information regarding.

i. the importance and place of the practicum in the educational programme.
ii. the purpose, functions and ethics in professional practice.

In the first four weeks, the learners may make a local directory to include emergency numbers of Hospitals/ PHCs/ Police/ Panchayath Office and Network Agencies along with references to other developmental and welfare services in the location.

Visits - provide an exposure to and understanding of the services provided in responses to people's needs. (Agencies in health setting, education, community, institutional services, criminal justice system, civic administration, rehabi1itation etc.)

Structured experience laboratory - is a classroom activity, which provides opportunities through the games/activities, to form the involvement of self in various practice skills. These laboratory experiences are designed in small groups to encourage participation, sharing of the experience and aid in examining learning and applications of skil1s. These sessions have a specific objective of experiencing self, and applying /using self in practice. (Relationship skills, Communication skills etc., will be focused)

Concurrent practice learning of two-days a week - on going learning of practice is an opportunity to develop intervention skills in reality situations. This entails learning social work practice for two, or two and a half days or its equivalent, each week of the semester.

The learners may be placed in agencies or in communities to initiate and participate in direct service delivery. Practice learning is a vital component of the educational opportunity to be provided to the learner. The teaching-learning process must be designed to help the learner to move on the mastering strategies, skills and techniques to practice social work.

Even semester (II Semester)

Code: SWBHC -7

Paper Title: MANAGEMENT OF DEVELOPMENTAL AND WELFARE SERVICES

INTRODUCTION

The course aims to develop management competencies to function in organizations, participate as a team member and understand the role of a social work programmes manager.

OBJECTIVES

a. Understand the overall environment and its impact on the nature, structure and development of organizations in corporate, public and voluntary sectors in the context of social work profession.
b. Understand policies and procedures involved in establishing and maintaining human service organizations.
c. Acquire skills to network and participate in the management of resources - human, material and environmental.
d. Develop skills to participate in management of programmes, as a part of the inter-disciplinary team and initiate as well as develop new programmes.
e. Develop ability to analyse the practices applied in specific settings.

Course Content

UNIT I

Social Services: Need for welfare and developmental organisations, Factors determining social welfare programmes, Development and Welfare organizations' response to societal needs; role of state, voluntary and corporate sector.

Management services: Types of settings, organizational characteristics like origin, nature, size, structure, and design, organizational climate and impact of socio-political environment - Management process: Vision, Planning, Organizing, Directing, Staffing, Coordination, Reporting, Budgeting.

Establishment: Registration, different types of legislations, legal status, constitution, rules and procedure, goals - Financial resources: Organizational Budget, Sources of finance, Fund Raising, Records, Audit.

UNIT II

Physical: All activities related to acquiring, hiring and maintaining importable structure and infrastructure, maintenance of premises and daily upkeep.

Enhancing the involvement and the potential of people in organization's executive boards, committees; professionals and other staff-relationship, communication, team work, and facilitating team building, supervision, and participation in training.

UNIT III

Programme Development: Programme management: long term, short term, and Documentation.

Project proposals based on felt-needs, nature of resources, eligibility criteria, records, evaluation and research.

Impact analysis - Qualitative and quantitative.

UNIT IV

Public Relations: Public relations need and its promotion by all in the organisation. Representing the organization, networking, public, corporate and voluntary sector, resource building, accountability, transparency, use of media for publicity.

Change and its Management: Understand and manage change, innovation in a rapidly changing social environment: for policy programmes and structure.

Organizational understanding: Conflict, conflict resolution, creating positive climate.

REFERENCES

1. Choudhari, D. Paul. 1983 Social Welfare Administration, Delhi: Atma Ram and Sons.

2. Garain, S. 1998 Organizational Effectiveness of NGOs, Jaipur: University Book House.

3. Garain, S. Towards a Measure of Perceived Organizational Effectiveness in Non-government Organization, Mumbai: Indian Journal of Social Work, 54 (2), 251 -270.

4. Goel, S. L. and Jain, R. K. 1988 Social Welfare Administration: Theory and: Practice, Vol. I and II, New Delhi: Deep and Deep Publications.

5. Government of India Evaluation of Social Welfare Programmes, Encyclopedia of Social Work. Vol. 1, 297 - 310.

6. Haimann, A. 1982 Professional Management and Practice, Delhi: Eurasia Publications.

7. Hasenfeld, Y and English, R. (Eds.) 1978 — Human Service Organizations. Ann Arbor: University of Michigan Press.

8. Hauman, A. 1962 — Professional Management and Practice, Delhi: Eurasia Publications.

9. Jackson, J. 1989 — Evaluation for Voluntary Organizations. Delhi: Information and News Network.

10. Kapoor, K. K. 1986 — Directory of Funding Organizations, Delhi: Information and News Network.

11. Lauffer, A. 1977 — Getting the Resources You Need, New Delhi: Sage Publications.

12. Lauffer, A. 1977 — Understanding Your Social Agency, London: Sage Publications.

13. Luthans, Fred. 1990 — Organizational Behaviour, Boston, Irwin McGraw Hill.

14. PRIA. 1990 — A Manual on Financial Management - An Accounts Keeping for Voluntary Organizations, New Delhi: Society for Participatory Research in Asia.

15. PRIA b — Training of Trainers: A Manual for Participatory Training Methodology in Development, New Delhi: Society for Participatory Research in Asia.

16. Sachdeva, D. R. 1998 — Social Welfare Administration in India, Allahabad, Kitab Mahal.

17. Siddiqui, H. Y. 1984 — Social Work and Social Action, New Delhi: Hamam Publications.

18. Skidmore, R. A. 1983 — Social Work Administration, New Jersey, Prentice-Hall.

19. Slavin, S. (Ed.) 1978 — Managing Finance, Personnel and Information in Human Services, New York: Howorth Press.

20. Slavin, S. (Ed.) 1978 — Social Administration, New York: The Haworth Press.

21. Weiner, M. 1982 — Human Service Management, Illinois: The Dorsey Press.

22. Young, Pat 1985 — Mastering Social Welfare, London, Macmillan Master Series, Macmil1an Education Ltd.

Paper Code: SWBHC-8
Paper Title: SOCIAL WORK RESEARCH AND STATISTICS

INTRODUCTION

This course is to equip learners to utilize, and conduct research as service managers to improve services, evaluate, and develop new services and intervention methods: strategies and techniques and also, be an effective consumer of other researches.

OBJECTIVES

a. Develop an understanding of scientific approach to human inquiry in comparison to the native or common sense approach in various aspects, and its process.
b. Understand major research strategies, meaning, scope and importance of social work research.
c. Develop an ability to see the linkages between practice, research, theory and their role in enriching one another.
d. Develop ability to conceptualize, formulate and conduct simple research projects/exercises (This would include a broad range of basic research skills such as conceptualization of a research strategy and problem; writing a research proposal; developing tools for col1ecting data; use of sampling, strategies; data collection, processing, presentation, analysis and interpretation; and writing research report etc).
e. Make informed assessment and judicious use of research studies and findings.
f. Develop skills for use of library and documentation services for research.

Course Content

UNIT I

Science - Meaning and assumptions, scientific approach in comparison to the native or common sense approach.

Scientific attitude; Scientific method; application of scientific method for the study of social phenomena.

Research: Definition and objectives, Social Work Research: Meaning, objectives, functions and limitations; Scope of social work research in India; Agencies sponsoring and conducting social work research, ethics in research.

Problem identification: Criteria for the selection of research problem; Problem formulation.
Concepts, constructs, variables, conceptual and operational definitions. Hypothesis: Meaning, importance, uses and requirements.

UNIT II

Design of research: Definition and importance; types of research design; exploratory,

descriptive, experimental, evaluative design, participatory research and action research.

Source and Types of Data: Primary and secondary, objective and subjective, qualitative and quantitative.

Sampling: Sample and population: Rationale and Characteristics of sampling; methods of sampling, general considerations in the determination of sample size.

Methods of collection of primary data:
Observation: Structured and unstructured; participant and non-participant. Questionnaire, interview schedule and interview guide. Pilot study and Pre-testing.

Scales: Need for scales, some prominent scaling procedures.
Case study: Meaning, uses, steps.

Secondary data: Official data, personal documents, problem in the use of secondary data

UNIT III

Processing of data: Content, editing, coding data classification, manual and mechanical tabulation of data; frequency distribution, diagrammatic and graphic presentation - use of computers.

Issues related to Social Work Research: Interpretation of data, research reporting: contents of research report: foot-note, references, bibliography, preparation of abstract; the art of making book review.

UNIT IV

Statistics: Definition, functions and importance
Measures of Central Tendency; Measures of Dispersion.
Chi-square, Correlation Coefficient, 't' distribution; Analysis of Variance and 'F' distribution.

SPSS package.

REFERENCES

1. Ackoff, R. L. 1962 — Scientific Method: Optimizing Applied Research Designs, New York: John Wiley and Sons.

2. Anderson, J. et al. 1970 — Thesis and Assignment Writing, New Delhi: Wiley Eastern Limited.

3. Bailey, Kenneth, D. 1987 — Methods of Social Research, New York: The Free Press

4. Blaikie, Norman. 1993 — Approaches in Social Enquiry, Cambridge: Polity Press.

5. Blalock, H. M. 1972 — Social Statistics, New York: McGraw Hill.

6. Blalock, H. M. and Blalock, A. M. (Eds.) 1968 — Methodology in Social Research; New York: McGraw-Hill.

7. Coolidge, Frederick L. 2000 — Statistics: A Gentle Introduction, New Delhi: Sage Publications.

8. Crabtres, B. F. and Miller, W. L. (Eds.) 2000 — Doing Qualitative Research, New Delhi: Sage Publications.

9. Cranstein, A. and Phillips, W.R.1978 — Understanding Social Research: An Introduction, Boston: Allwyn and Bacon.

10. Denzin, Norman, K. & Lincoln, Y. S. (Eds.) 2000 — Handbook of Qualitative Research (II ed.), New Delhi: Sage Publications.

11. Field, Andy. 2000 — Discovering Statistics Using SPSS for Windows: Advanced Techniques for Beginning, New Delhi: Sage Publications.

12. Foster, J. J. 1998 — Data Analysis Using SPSS for Windows: A Beginner's Guide, New Delhi: Sage Publications.

13. Gahan, Celis and Hannibal, Mike. 1998 — Doing Qualitative Research Using QSR, NUD, IST, New Delhi: Sage Publications.

14. Geltung, J. 1961 — Theory and Methods of Social Research, London: George Allen & Unwin

15. Goode, W. J. and Hatt, P. K. 1962 — Methods in Social Research, New York, McGraw-Hill.

16. Gupta, S. P. 1984 — Statistical Methods, New Delhi, Sultanchand and Sons.

17. Jefferies, J. and Diamons, I. 2000 — Beginning Statistics: An Introduction for Social Scientists, New Delhi: Sage Publications.

18. Krishnaswamy, O. R. 1993 — Methodology of Research in Social Sciences, Bombay, Himalaya Publishing House.

19. La1das, D. K. 2000 — Practice of Social Research, Jaipur, Rawat Publications.

20. Manheim, Henry, L. 1977 — Sociological Research: Philosophy and Methods, Illinois:The Dorsey Press.

21. Marshal1, Gatherine and Rosaman, G. B. 1999 — Designing Qualitative Research, III Edition, New Delhi: Sage Publications.

22. May, Tim. 1997 — Social Research: Issues, Methods & Process, Buckingham: Open University Press.

23. Moser, C. A. and Kalton, G, 1977 — Survey Methods in Social Investigation, London: Heinemann Educational Books

24. Mukherji, Partha N. (Ed.) 2000 — Methodology in Social Research: Dilemma, and Perspectives, New Delhi: Sage Publications.

25. Nagel, Ernest. 1984 — The Structure of Science: Problems in the Logic of Scientific Explanation.

26. Padgett, Deborah, K. 1988 — Qualitative Methods in Social Work Research, New Delhi: Sage Publications.

27. Polansky, N. A. (Ed.) 1960 — Social Work Research, Chicago, University of Chicago.

28. Ramchandran, P. 1990 — Issues in Social Work Research in India, Bombay: Institute for Community Organisation Research.

29. Ramachandran, P. 1990 — Issues in Social Work Research in India, Bombay, Tata Institute of Social Sciences.

30. Reid, William J. and Smith, Andrey D. 1981 — Research in Social Work, New York: Columbia University Press.

31. Rosenberg, M. 1968 — The Logic of Survey Analysis, New York: Basic Books.

32. Rubin, A. and Babbie, K. 1993 — Research Methods for Social Work, California: Brooks Cole Publishing Co.

33. Sellits, Glaire et al. 1976 — Research Methods in Social Relations, New York:Holt, Rinebart and Winston.

34. Shah, F. V. 1977 — Reporting Research, Ahmedabad: Rachna Prakashan.

35. Shaw, Ian and Lishman, Joyce. (Ed.) 1999 — Evaluation and Social Work Practice, New Delhi: Sage Publications.

36. Silverman, David (Ed.) — Qualitative Research,. New Delhi: Sage Publications.1997

37. Society for Participatory Research in Asia, 1995 — Participatory Research: An Introduction, Participatory Research, Network Series, No.3, New Delhi: PRIA.

38. Stewart, Alex. 1998 — The Ethnographer's Method, New Delhi: Sage Publications.

39. Yanow, Dvora. 1999 — Conducting Interpretive Policy Analysis, New Delhi: Sage Publications.

40. Yin, Robert, K. 1.994 — Case Study Research: Design and Methods, New Delhi: Sage Publications

41. Young, Pauline V. 1982 — Scientific Social Survey and Research, New Delhi, Prentice-Hall of India Pvt. Ltd.

Code : SWBHC-9

Title: SOCIAL WORK PRACTICUM - II:

SOCIAL WORK CAMP:

Rural/ Tribal camps with a duration of 7 - 10 days - provide opportunities to experience rural life, analyze rural dynamics, and observe the functioning of local self government and voluntary organisations. This experience aids peer participation in planning for activities for own group and those for local people. It also helps develop skills to carry out, evaluate, and report the experience.

SUMMER PLACEMENT:

Summer Placement - provides an opportunity to experience day-to-day work in a setting. The learner gets involved with direct practice with the client system and with the ongoing management operations of the setting. The time frame recommended for this experience is about three weeks, after the first year of the post-graduate programme. The learner may use the same setting for data collection of research project, if such an arrangement is part of the plan.

Code: SWBHC -10
Title : SOCIAL WORK PRACTICUM - III

Concurrent practice learning of two-days a week - on going learning of practice is an opportunity to develop intervention skills in reality situations. This entails learning social work practice for two, or two and a half days or its equivalent, each week of the semester. The learners may be placed in agencies or in communities to initiate and participate in direct service delivery. Practice learning is a vital component of the educational opportunity to be provided to the learner. The teaching-learning process must be designed to help the learner to move on the mastering strategies, skills and techniques to practice social work.

Even semester
Paper Code: SWBSC-1
Paper title: COMMUNICATION AND COUNSELING

INTRODUCTION

This paper relates the relevance of components of communication and counseling in social work practice.

OBJECTIVES

a. Understand the meaning and importance of communication in day-to-day life.
b. Focus on interpersonal communication of interviewing and allied aspects.
c. Develop holistic understanding of counseling as a tool for help.
d. Acquire knowledge of various approaches: their theoretical under-pinnings for goals, values, processes and techniques,
e. Develop skills of application to real life situations.

Course Content

UNIT I

Communication: Meaning and importance of communication.
Process of communication: Key elements in the communication process - Communication, message, audience; channel of communication. Verbal and non-verbal communication.

Basics of Communication.
Education and communication for national development.

Interpersonal communication: Interviewing - Objectives, principles of interviewing; listening, qualities of effective communicator.
Seminars, conferences, lectures, group discussion, panel discussion, symposium, workshop, role playing, simulation exercises, written communication, report writing, letter writing, article/essay writing, games, brain storming, street play, field work exposure.

UNIT II

Visual aids in communication: Poster making, use of notice boards, flip charts, charts, flash cards, photographs, pamphlets, slide shows.

Mass Communication: Television, exhibition, newspapers and magazines, advertisements, radio, film, VCD/ DVD, e-mail, internet.

Impact of mass communication on society, family, marriage and child development.

Communication Analysis and Planning: Planning and executing a communication campaign on an issue using various methods of communication.

UNIT III

Counseling: Definition, nature and goals, areas of counseling; Historical background and origins of counseling, ethical nature of counseling, qualities of an effective counselor.

Counseling Situations: Developmental, preventive, facilitative, and crisis.

Counseling and Psychotherapy - Skills in counseling - Establishing the relationship.

Process of Counseling.

Approaches to Counseling: Approaches; Theoretical base, thrust, goals, key concepts, techniques - Approaches like person-centered, rational-emotive, behavioural approaches, gestalt, existential approaches, Egans three stage model, eclectic model.

Indigenous Approach: Indigenous approaches of help and self-help like yoga, reflection. Act of Prayashchit.

UNIT IV

Couple and Family Counseling: Issues in such counseling, its process and stages.

Crisis Counseling

Group Counseling: Counseling for groups - Process, advantages and disadvantages of group counseling.

Practice of counseling in family counseling centres, family courts, counseling bureau - Premarital and marital counseling, vocational counseling centres, mental health centres, child guidance clinics, correctional institutions, deaddiction and rehabilitation centres, educational institutions.

REFERENCES

1. Brown, Leland 1970 — Communicating Facts and Ideas in Business, New Jersey: Prentice-Hall Inc., Englewood Cliffs.

2. Chandrashekar, C. R. (Ed.) 1999 — A Manual on Counseling for Lay- Counselors, Bangalore, Prasanna Counseling Centre.

3. Dave, Indu 1983 — The Basic Essentials of Counseling, New Delhi: Sterling Publishers Pvt., Ltd.

4. Desai, M. M.(Ed.) 1979 — Creative Literature and Social Work Education, Bombay: Somaiya Publications Pvt. Ltd.

5. Desai, Murli (Ed.) 1994 — Family and Interventions - A Course Compendium, Bombay, Tata Institute of Social Sciences.

6. D'souza, Y. K. 1999 — Communication Today and Tomorrow, New Delhi: Discovery Publishing House.

7. Fisher, Dalmar 1999 — Communication in Organisations, Second Edition, Mumbai: Jaico Publishing House.

8. Fullmer, D. W. and Bernard, H. W. 1972 — Counseling: Content and Process, New Delhi: Thomson Press India.

9. Fuster, J. M. 2000 — Personal Counseling, Eighth Updated Edition, Mumbai, Better Yourself Books.

10. Kennedy, E. 1977 — On Becoming a Counselor - A Basic Guide for Non-professional Counsellors, Delhi: Gill and Macmillan.

11. Lakshmipathi Raju, M (Ed.) 1999 — Family Counseling: Perspectives and Practices, Tirupati, Sri Padmavati Mahila Visvavidyalayam.

12. Lewis,E. Patterson and Elizabeth, Reynolds Welfel 2000 — The Counseling Process, Stamford, Brooks / Cole Thomson Learning,

13. Melkote, Srinivas R. 1991 — Communication for Development in the Third World – Theory and Practice, New Delhi: Sage Publications.

14. Mohan, Krishna and Banerji, Meera. 1990 — Developing Communication Skills, Delhi: Macmillan India Ltd..

15. Murphy, Robert D. 1977 — Mass Communication. and Human Interaction, Boston:Houghton Miffiin Company.

16. Narang, Vaishna 1996 — Communicative Language Teaching, New Delhi: Creative Books.

17. Narayana, Rao S. 1981 — Counseling Psychology, New Delhi: Tata Mc Graw Hill Publishing Company Ltd.

18. Pollock, Thomas C1ark; Sheridan, Marion C; Ledbetter, Frances and Doll, Ronald C. 1955 — The Art of Communicating, New York: The Macmillan Company.

19. Robert, G. Madden 1998 — Legal Issues in Social Work Counseling and Mental Health, Sage Publications India Pvt., Ltd.

20. Small, Jacquelyn 1990 — Becoming Naturally Therapeutic: A Return to the True Essence of Helping, New York, Bantam Books.

21. Venkatramani, S. H. 1998 — Corporate Communications - The Age of Image, New Delhi: Sterling Publishers Private Ltd.

Paper code: SWBSC -1

Paper Title: GANDHIAN APPROACH TO WELFARE AND DEVELOPMENT

INTRODUCTION

The course aims at sensitizing the learner to the Gandhian approach and to utilize some of the skills in practice.

OBJECTIVES

a. Develop an understanding of Gandhi's concept of society and his approach to social transformation.
b. Develop knowledge of the specific programmes formulated by Gandhi for rural reconstruction and the development of the weaker sections of society, with the focus on strategies and skills.
c. Develop the ability to identify similarities and differences between the Gandhian and professional social work approaches to social change, welfare and development.

Course Content

Unit I

Gandhian thought: Salient features of Gandhian thought; Gandhian values; Concepts and methods; Concept of a healthy society; Sarvodaya.

Unit II

Gandhian Approach: Economic and its organization: Ownership of property; Concept of trusteeship, distribution and economic equality; System of production, problems of mechanization, decentralization of production, rural- urban relationship

Unit III

Social Organisation: Marriage and family, position of women, social stratification, caste and untouchability, education and its role; Basic education.

Unit IV

Constructive programmes: Contents training of constructive workers, skills involved, nature of programmes; Boodan, Gramdan.
Gandhian and Vinbobha's movements with special reference to Bhoodan and Gramdan

Gandhian and Professional Social Work Approach: Similarities and differences between Gandhian and professional approach to social development and welfare

REFERENCES

1. Dasgupta, S (Ed.) 1967 — Towards Philosophy of Social Work in India, New Delhi: Popular Book Service

2. Bandopadhyaya, J 1969 — Social and Political Thought to Gandhi, Bombay: Allied Publishers

3. Gandhi, M.K — Social Service, Work and Reform; 3 Volumes, Ahmedabad: Navijivan Press

4. Ganguli, B.N 1972 — Gandhi's Vission of Ideal Society, Hyderabad: Andhra Mahila Sabha

5. Iyer, R 1986 — Moral and Political Writings of Gandhi, Vol 3, Delhi: Oxford University Press

6. Kumarappa, J.C 1951 — Gandhian Economic Thought, Bombay: Vora and Co.

7. Mishra, R.M 1972 — Bhoodan Movement in India, Delhi : S Chand.

8. Nanda, B.R 1985 — Gandhi and His Critics, Delhi: Oxford University Press

9. Narayan, J 1965 — From Socialism to Sarvodaya, Varanasi: Sarva Seva Sangh

10. Palkhiwala, N 1986 Relevance to Gandhi, New Delhi: Gandhi Peace Foundation.

11. Unitahna, T.K.N 1979 Gandhi and Social Change, Jaipur: Rawat Publications

Even semester
Paper Code: SWSC-2
Paper title: PERSONAL AND PROFESSIONAL GROWTH.

INTRODUCTION

The course aims at enhancing personal and professional effectiveness by developing a continuous awareness and deeper insight into one's being. It encourages value clarification, upholding of professional ethics, and ability to make effective choices for integration. It provides opportunities to understand stress, stressors and methods to handle stress experienced.

OBJECTIVES

a. Understand self as a being, as one in the process of becoming and experience self-awareness.
b. Examine own values and attitudes and explore choices made to express self in own environment.
c. Develop positive life skills and practice self-help methods for integration and for stress reduction.
d. Understand and uphold professional values and ethics.

Course Content:

UNIT I

Self and Self Awareness: Understand self through a cognitive construct/paradigm (two/three models from among those available may be offered as workshops). Suggested approaches are: Rational Emotive Therapy, Gestalt Approach, Transactional Analysis, Reality Therapy, Yoga for Therapy, Meditation Techniques.

Explore self as being, and understand the process of becoming. (through observation)
Practice consciously measures to sustain and experience continuous awareness.
Observation and Reflection: Theory and techniques.
Communication Choices: Communication mode and patterns and effectiveness, Interpersonal communication, nature of choices made.

UNIT II

Emotions and their Expression: Emotions, nature of expression.
Understand own pattern of communication, choices made to express emotions, modes used, examine need for change.

Communication: Informal and knowledge and skills of rapid reading, writing, creative writing, report writing and public speaking.

UNIT III

Creativity and Self: Understand brain functions: Creativity, need and development
Life Style: Conscious life style - enhanced life skills: Communication, decision making, empathy, critical thinking, use of time and money, building and sustaining bonds-relational, colleagial and personal.
Self defeating behaviour - nature and impact. Choices for change.

UNIT IV

Values, Attitude and Professional Ethics: Values and attitudes - their role in life, Value conflict - its impact, value clarification.

Integration: Through Eastern and Western approaches experience the processes of integration. Approaches recommended are: Yoga as a science, meditation (tool for meditation - own choice).

Stress / Burn out - Self help Methods: Stress, Stressors, nature and impact of stress, its expression, and burnout.

Spirituality and Growth.

REFERENCES:

1. Becavar, D. (Ed.) 1997 — The Family, Spirituality and Social Work, Journal of Family Social Work, Vol.2, No.4,

2. Bhattacharya, K. 1971 — The Indian Concept of Self, Bulletin Ramakrishna Mission Institute of Culture, 22(8), August 1971. 304 - 13.

3. Burke, R, 1. 1982 — Personality, Self-Image and Situational Characteristics of Effective Helpers in Work Settings, The Journal of Psychology, Vol. 112,213.

4. Byrne, D. 1966 — Self-Concept, Ch. 12, 434. An Introduction to Personality: A Research Approach. New Jersey: Prentice Hall Inc.

5. Crum,J. K. 1976 — The Art of Inner-listening. Theosophist, 97 (8), May 1976, 64-65.

6. Feldman Robert S 1997	Understanding Psychology, 4th Edition, Tata McGraw Hill Publishing Company Limited, New Delhi.
7. Grossbard, H 1954	'Methodology for Developing Self-Awareness, Journal of Social Casework, Vol. 35, No.9, 380-386.
8. Hamilton, G. 1954	Self-Awareness in Professional Education', Journal of Social Casework, Vol. 35, No.9, 371-379.
9. Haskar, S. L. 1976	Know Thyself, Triveni 45(2), 88.
10. Paul, Brunton. 1975	The Hidden Teaching Beyond Yoga, Triveni, 44 (3), 91.
11. Ramakumar,. O. 1970	Intelligence and Self-concept, Education and Psychology Review, 10 (3), 154 -57.
12. Ritajanada. (Translated by John Phillip) 1996	The Practice of Meditation, Mylapore, Chennai: Ramakrishna Math Printing Press.
13. Singh, N. P. 1970	The Concept of Self in Modern Psychology, Indian Education Review, 5 (1), 84 -99.

Paper code: SWBSC-2

Paper Title: POPULATION AND ENVIRONMENT

INTRODUCTION

The content has two aspects to it. Population dynamics and its relatedness to the environment, natural resources, utilization and their preservation.

OBJECTIVES:

a. Understand characteristics, determinants of population growth.
b. Examine population policy, plan and initiatives.
c. Understand inter-relatedness of human life, living organisms and environment.
d. Examine utilization and management of resources.
e. Develop skills to participate in activities related to the two areas.

Course Content

UNIT I

Characteristics of population: Population, determinants of growth. global concerns - Characteristics of Indian Population – Distribution by age, sex, literacy and occupation – Fertility trends - Birth and death ratio.

Population Policy, World Action Plan, Population Policy of India- Implementation; Initiatives – Government and NGO.

UNIT II

Family Planning: Objectives, scope, methods, implementation, mechanisms and progress.

Concept and Scope of Population education, family life education, sex education, and family planning education.

Population and Environment: Interrelatedness of human life, living organisms; Environment and natural resource – Environment, lifestyle, degradation. Environment management, maintaining, improving, enhancing – Current issues of Environment.

UNIT III

Natural Resources and Diversity: Utilisation and management – Forest, land, water, air, energy sources - Pollution - Sources, treatment, prevention - Soil, water, air, noise - Waste matter - disposal, recycling, renewal, problems, issues - Programmes for forest, land and water management.

UNIT IV

Environment Protection Laws and Role of Social Worker: Acts related to environmental protection – Forest conservation- Water pollution – Standards and tolerance levels – Unplanned urbanization- Environmental movements in India - Role of NGOs in Environmental issues – Government agencies in environmental protection – Social work initiatives at different levels.

REFERENCES

1. Cassen, R.H 1978 India Population, Economy and Society, London: Macmillan.

2. Family planning Association of India — Family planning Counseling Guide, Population Reports Service Series J.N 35 and 36

3. Fisher, W.F 1997 — Towards Sustainable Development (Struggling over India's Narmada River), New Delhi: Rawat Publications.

4. Gadgil, and Guha. 1997 — This Fissured Land – An Ecological History of India: Delhi: Oxford University Press.

5. Klieinman.R (Ed.) 1998 — Family Planning Handbook for Doctors, Hertford: IPPF

6. Krishna. M. 1995 — Air Pollution and Control, Kakinada: Kaushal and Co.

7. Miller, Jr. Tyler, G and Armstrong. 1982 — Living in the Environment, California: Wordsworth International Group.

8. Mohan, R. 1985 — "Urbanization in India's Future", Population and Development Review, Vol. 11(4)

9. Oxford, 1987 — Our Common Future, Delhi: Oxford University Press.

10. Prasad, R.K — Population Planning, Policy and Programmes, New Delhi: Deep and Deep Publications.

11. Reddy, Laxmi, M.V.1994 — Population Education, New Delhi: Asish Publication.

12. Ryding, S.O. 1992 — Environmental Management Handbook, Ahmedabad: IOS Press.

13. Sapru, R.K (Ed.) 1987 — Environment Management in India, Vol. II, New Delhi: Ashish Publishing House

14. Satapathy, N. 1998 — Sustainable Development (An Alternative Paradigm), Ahmedabad: Karnavati Publications.

15. Seshadri and Pandey, J (Eds.) 1991 — Population Education, A Natural Source Book, New Delhi: NCERT.

16. Sharma, P.D. 1995 — Ecology and Environment, New Delhi: Rastogi Publishers.

odd semester (III Semester)

Odd Semester

Paper code: SWCHC-11

Paper Title: **HUMAN RESOURCE MANAGEMENT**

INTRODUCTION

The main objective of this course is to prepare young graduates for management and administrative positions in various industrial, business, governmental/non-governmental organisations and service sector organisations.

OBJECTIVES

a. Develop managerial skills in different functional areas of management with practical focus on HRM.
b. Develop the competence to evolve the problem-solving approaches by applying conceptual and behavioural skills.
c. Develop interpersonal skills/ competence and leadership qualities to work in a group with team building approach.
d. Develop sound theoretical base in various concepts and theories to enable the student to develop a broad perspective of the management field.
e. Distinguish the strategic approach to Human Resources from the traditional functional approach.
f. Understand the relationship of HR strategy with overall corporate strategy.

Course Content

UNIT I

Human Resource Management: Concept, scope, philosophy and objectives; Evolution; Approaches, Structure and Functions; Line and staff relations of HRM; HRM Model. Hierarchy, formal and informal structure, Organization chart/reporting structure.

Human Resource Planning: Concept and objectives; Human resource inventory; Human resource planning process; job analysis; job description; job specification; job design; career planning and career paths; job rotation.

UNIT II

Talent Acquisition: Goals; polices, sources and methods. Selection: Concept, process. Talent Acquisition Tests, Theories and issues in psychological testing, Intelligence testing – theoretical background, Aptitude Testing, Personality Assessment, MBTI. Placement, Induction and socializing the new employee. Talent retention: Concept, importance and methods.

UNIT III

Compensation Management: Factors influencing compensation plans and policies; Job evaluation - Fixation of salary, components of salary. Pay for performance – Incentive Schemes, principles and types, Employee Stock Option Plan, compensation survey / review

UNIT IV

Strategic Human Resource Management (SHRM): Business strategy and organizational capability, SHRM: aligning HR with Corporate strategy, Strategic HR planning and Development, Change Management and restructuring and SHRM, Corporate Ethics, Values and SHRM, Competencies of HR professional in a SHRM scenario.

REFERENCES

1. Agarwal, R. D. (Ed.) 1973	Dynamics of Personnel Management in India, New Delhi: Tata McGraw-Hill Publishing Company.
2. Bhargava, P. P. 1990	Issues in Personnel Management, Jaipur: Printwell Publishers.
3. Chalofsky, Neal E and Reinhart, Carlene. 1988	Effective Human ResourceManagement, London: Jossey Bass.
4. ChatteIjee, Bhaskar 1999	The Executive Guide to Human Resource Management,New Delhi, Excel Books.
5. Desai, K. G. 1969	Human Problems in Indian Industries, Bombay, Sindhu,
6. Famularo, Joseph 1987	Handbook of Human Resource Administration, McGraw-Hill.
7. Fisher, Cynthia; Schoenfeldt Lyle F. and Shaw, James, G. 1997	Human Resource Management, Third Edition., Boston, Houghton Mifflin Company.
8. Gary Desslar 1997	Human Resource Management, 7th Edition, New Delhi: Prentice Hall of India Pvt. Ltd.
9. Mamoria,C.B. 1989	Personnel Management, Bombay: Himalaya Publishing House.

10. McKenna, Eugene and Beech, Nic 1997 — The Essence of Human Resource Mangaement, New Delhi, Prentice – Hall of India Pvt. Ltd.

11. Moorthy,.M. V. 1992 — Human Resource Management: Psycho-Sociological Social Work Approach, Bangalore, R & M Associates.

12. Pareek, Udai and Rao, T. V. 1982 — Designing and Managing Human Resources, New Delhi, Oxford & IBH.

13. Rudrabasavaraj, M. N. 1984 — Human Factors in Administration, Bombay: Himalaya Publishing House.

14. Rudrabasavaraj, M. N. 1986 — Cases in Human Resource Management, Bombay: Himalaya Publishing House.

15. Subba Rao, P. 1996 — Essentials of Human Resource Management and Industrial Relations, Himalaya Publishing House.

Odd semester
Code: SWCHC-12
Title: SOCIAL WORK PRACTICUM - IV

Workshops: Skills Development - help learners acquire specific skills for situations encountered during practice and acquire skills for intervention. These may be for problems/ concerns, issues or situations like work with alcoholics, HIV/AIDS affected persons, adolescents for life ski11s development, youth for leadership development and couples for marital relationship and enrichment work with elderly. These workshops are to enhance skills/ develop new skills for practice in specific situation, specific problems and issues.

Concurrent practice learning of two-days a week -on going learning of practice is an opportunity to develop intervention skills in reality situations. This entails learning social work practice for two, or two and a half days or its equivalent, each week of the semester. The learners may be placed in agencies or in communities to initiate and participate in direct service delivery. Practice learning is a vital component of

the educational opportunity to be provided to the learner. The teaching-learning process must be designed to help the learner to move on the mastering strategies, skills and techniques to practice social work

Odd semester
Paper code : SWCSC-3
Paper Title : SOCIAL WORK WITH TRIBAL AND RURAL COMMUNITIES.

INTRODUCTION

This course aims at introducing the learner the programmes of tribal and rural development, and the importance of social work practice with tribal and rural communities.

OBJECTIVES

a. Develop an understanding of tribal and rural communities.
b. Understand the characteristics and problems of tribal and rural communities.
c. Acquire knowledge about the contribution of Governmental and Non-governmental Organisations to tribal and rural development.
d. Develop an understanding of the functions of Panchayath Raj Institutions with particular reference to Karnataka.
e. Gain knowledge about the application of social work in tribal and rural development programmes.

Course Content

UNIT I

Tribe in relation to caste and nation - Nature and Characteristics of Primitive Cultures- Tribes in India and their ecological distribution.
Emerging Trends in Tribal Social Institutions - Family and Kinship Systems, Jati Structure, Economic Structure, Political organisations.

Characteristics of Tribal Society - Economic, Social, Political and Cultural Problems of Tribal Life.

UNIT II

Government Programmes since Independence and their Impact on Tribal Societies - Programmes of Voluntary Agencies and their Impact on Tribal Societies.

Analysis and Assessment of Tribal Community Problems - Special Problems of the Tribals in a particular area.

Social Work Practice in Tribal Development: Community organisation as a method of intervention, Participatory Rural Appraisal (PRA), Logical Framework Approach/Analysis (LFA), techniques of intervention and its scope in tribal community development.

UNIT III

Rural Society and Poverty - Historical perspective - Dynamics in the village society – Caste/class relationships - Control and Power, Conflict and Integration. Poverty in the rural context - Its nature and manifestations. Analysis of Basic Problems - Issues faced by the rural poor such as indebtedness, Bonded labour, Low wages, Unemployment, Underemployment, and other forms of exploitations.

UNIT IV

Current Rural Development Programmes in India: Council for the Advancement of People's Action and Rural Technology (CAPART) and other Rural Development Statutory Bodies.

Panchayath Raj System in Karnataka and its role in rural and tribal development.

Role of social worker in tribal and rural development progrmmes. **REFERENCES:**

1. Barnabas, A. P. 1987 — Rural Community Development in India, In Encyclopedia of Social Work in India, Vol. II, New Delhi: Ministry of Welfare, Government of India,

2. Bhalla, Alok and Bumke, Peter J. (Eds) 1992 — Images of Rural India in the 2nd Century, New Delhi; Sterling Publishers Pvt. Ltd.

3. Bharadwaj, A. N. 1979 — Problems of Scheduled Castes and Scheduled Tribes in India, New Delhi: Light and Life Publishers.

4. Bose, Nirmal Kumar 1971 — Tribal Life in India, National Book Trust India, New Delhi.

5. Brahmananda, P. R., Narayan, B. K. and Kalappa, A. (Eds.) 1987 — Dimensions of Rural Development in India, Bombay: Himalaya Publishing House.

6. Desai, A. R. (Ed.) 1978 — Rural Sociology in India, Bombay: Popular Prakashan,

7. Desai, A. R (Ed.) 1981 — Peasant Struggles in India, New Delhi: Oxford University Press.

8. Debey, S. N. and Murdia, R. 1977 — Land Alienation. and Restoration in Tribal Communities, Bombay: Himalaya Publications,

9. Dube, S. C. 1987 — Welfare of the Scheduled Tribes, In. Encyclopaedia of Social Work in India, VoL, III, New Delhi: Ministry of Welfare, Government of India.

10. Epstein Scarlet J 1973 — South India: Yesterday, Today and Tomorrow; Mysore Villages Revisited, London and Basingstoke: Macmillan Press

11. Kuturnba Rao, M. and Perraju Sharma,P, (Eds.) 1989 — Human Resource Development for Rural Development, Bombay: Himalaya Publishing House.

12. Mahajan, V. S, (Ed.) 1993 — Employment through Rural Development - Towards Sustainability, New Delhi: Deep & Deep Publications.

13. Mahanti, Neeti 1994 — Tribal Issues - A Non-conventional Approach, New Delhi, Inter-India Publications.

14. Nair, T. K. and Anbarasan, R. S. (Eds.) 1981 — Training Social Workers for Rural Development, ASSWI.

15. Panwalkar, V. G. 1987 — Social Work in Rural Settings, In. Encyclopedia of Social Work in India, Vol. Ill, New Delhi: Ministry of Welfare, Government of India.

16. Patel, M. L. 1994 — Tribal Development without Tears, New Delhi, Inter-India Publications.

17. Ramaiah, P. 1988 — Issues in Tribal Development, Allahabad, Chugh Publications.

18. Singh, K. 1986 — Rural Development: Principles, Policies and Management, New Delhi: Sage Publications.

19. Sinha, B. B. 1982 — Society in Tribal India, Delhi, B,R Publishing Corporation.

20. Sodhi, J. S. 1990 — Poverty Alleviation of Rural Development, New Delhi: Criterion Publications.

21. Swaminathan, M. S. 1982 — Science and Integrated Rural. Development, New Delhi: Concept Publishing company.

Paper code SWCSC-3

Paper Title: ORGANIZATIONAL BEHAVIOUR AND ORGANIZATIONAL DEVELPOMENT

INTRODUCTION

The course aims to provide an understanding of human behavior at work so that the learner may acquire the skills required to analyze problems and develop a problem-solving approach.

OBJECTIVES:

a. To impart knowledge about individual, group and organizational dynamics and their consequences,
b. To make clear the concepts and approaches that help in developing models or systems that support human ingenuity.
c. To acquaint the students with the knowledge of theories and practices that govern human behavior at work,
d. To help the learner understand the value and worth of human resources in an organization.
e. To enable the students to become aware of their communication skills and sensitize them to their potential to become successful managers.
f. To gain self-confidence and healthy self-respect while retaining respect for other's rights.
g. To understand the application of Transactional Analysis in several areas of employee management.

Course content

UNIT I

Conceptual Framework: Organization Behavior: Definition, concept, approaches and scope, historical background of Organization Behavior.

Introduction to Enneagram, personality types according to Enneagram. Emotional Intelligence; Attitude, Values, Personality; Job satisfaction, Employee Morale : Meaning, influences and outcomes - Measuring job satisfaction.
Assertiveness Training: Benefits of assertiveness – components of assertive behavior, measuring assertiveness, handling fear, handling anger, handling depression, developing assertive behavior skills, assertiveness on the job, assertiveness in interpersonal relations.

UNIT II

Transactional Analysis (TA), TA and self awareness, Winners and Losers, Structural analysis, Life positions, transactions, games and strokes, Life scripts, TA applications in motivation, Leadership and Teamwork, TA in counseling.

Motivation: Concept and theories, techniques of motivation, role of reinforcement and punishment, motivation and organization reward system, awards, employee empowerment and engagement.

UNIT III

Leadership: Meaning, roles, skills, and styles, leadership theories, types of leadership, powerful persuasion strategies.

Group dynamics: Concept, types of groups, dynamics of group formation, decision making in groups.

Organization Development: Concept, emerging approaches and techniques, Foundations of OD, Organizational Diagnosis, OD interventions – An overview, individual and interpersonal interventions, team/group interventions, comprehensive interventions, organizational transformation, success and failure of OD, Planned Organizational change, feedback and OD.

UNIT IV

Organizational Conflict: Concepts, causes and types, conflict-resolution strategies.

Organizational change: Concept, forces of change and resistance to change, managing organizational change and diversity, facilitating creative and divergent thinking, planned organizational change.

Stress and Burn Out: Concepts, causes, consequences and coping strategies.
Managerial Ethics: Individual ethics, ethical dilemmas in management, Ethical practices of Indian Managers, Corporate ethics.

REFERENCES

1. Andrew, Dubrin J, 2006 — Leadersip – Research Findings, Practice, and Skills, New Delhi, Biztantra Publication.

2. Aswathappa K, 2008 — Organisational Behaviour- Text, Cases and Games, Mumbai, Himalaya Publication House.

3. Donald, Hislop, 2007 — Knowledge Management in Organisation- A Critical Introduction, Oxford University Press.

4. Khanka, S S,2008 — Organisational Behaviour, New Delhi, S Chand and Co., Ltd.

5. Hellriegul Don and Slocum John W., Jr,2004 — Organisational Behaviour, New Delhi, Thomson South-Western.

6. ICFAI, 2004 — Organisational Behaviour, Hyderabad, Centre for Management Research.

7. Kumar Arun and Meenakshi N, 2009 — Organisational Behaviour- A Modern Approach, NIILM Center for Management Studies, New Delhi.

8. Luthans Fred, 2005 — Organisational Behviour, New York, McGraw Hill International Edition.

9. Moorhead Gregory and Griffin Ricky W, 2005 — Organisational Behaviour- Managing People and Organisations, New Delhi, Biztantra Publications.

10. Nelson, Debra L and Quick, James Compbell, 2007 — Organisaional Behaviour- Foundations, Realities and Challenges, New Delhi, Thomson South-Western,.

11. Northouse Peter G, 2003 — Leadership- Theory and Practice, New Delhi, Response Books: A Division of Sage Publications.

12. Robibins, Stephen P, 2007 — Organisational Behaviour, New Delhi, Pearson Education.

13. Ryan, Rosemary K C, 2008 — Leadership Development- A Guide for HR and Training Professionals, New Delhi, Elsevier Publications.

14. Sadler, Philip, 2004 — Lerdership- Styles, Role Models, Qualities, Behaviours, Concepts, New Delhi, Kogan Page India Pvt., Ltd.

15. Subba Rao, P, 2004 — Organisational Behaviour, Mumbai, Himalaya Publications House.

Odd semester

Paper code: SWCSC-4

Paper Title: PREVENTIVE AND SOCIAL MEDICINE AND MEDICAL SOCIAL WORK

INTRODUCTION

This course introduces the basic health issues and the application of social work in health setting both in hospital and community.

OBJECTIVES

a. Understand the concept and dimensions of health.
b. Understand the issues related to the prevention, clinical features and treatment of major communicable and non-communicable diseases.
c. Trace the historical development of medical social work in India and abroad.
d. Understand the nature of medical social work services.
e. Understand the tenets of National Health Policy of India and modernization of community based health care services. .
f. Understand the health care services at different levels.

COURSE CONTENT

UNIT I

Concept of health : Physical, social, mental and spiritual dimensions of health - Positive health - Determinants of health - Health and development - Indicators of health. Concept of Prevention: Levels of prevention - Hygiene, public health, preventive medicine, community health, social medicine, community medicine.
Health Care of the Community; Concept of health care - Levels and principles of health care.

UNIT II

Communicable and Non-communicable Diseases: Leprosy, Tuberculosis, Sexually Transmitted Diseases (STDs), HIV/AIDS. Cancer, Hypertension, Accidents, Diabetes, Blindness, Neurological problems, Mental illnesses.
Maternal and Child Health Services - Immunization – Integrated Child Development Services (ICDS) Scheme - School health programmes.

UNIT III

Medical Social Work: Meaning, Definition and Scope - Historical background and nature: Medical Social Work in India and Abroad - Team work and Multidisciplinary approach in health care; Organization and administration of medical social work departments in hospitals.
Patient as a person and Role of Social Worker: Understanding the patient as a person; Illness behaviour and treatment behaviour of the patient - Impact of illness on the patient and family.
Role of social worker with patients and their families - Rehabilitation.

UNIT IV

National Health Policy of India, Directorate General of Health Services, Indian Council of Medical Research (ICMR), Health as a concurrent subject.

Health System in India - at the Centre, at the State level, at the district level, and village level. Health Education and Communication.
Voluntary Health Agencies in India - International health - World Health Organisation (WHO), UNICEF, UNDP, FAO, ILO, World Bank.

Non - governmental and other Agencies - Ford Foundation, CARE, International Red Cross, Indian Red Cross.

REFERENCES:

1. Bajpai, P. K. (Ed.) 1998 — Social Work Perspectives on Health, Jaipur, Rawat Publications.

2. Brody, Elaine M. and Contributors. 1974 — A Social Work Guide for Long-Term Care Facilities, U. S. Dept. of Health, Education and Welfare, Public Health Service, Maryland: National Institute of Mental Health.

3. Butrym, Zofia and Horder, John. 1983 — Health, Doctors and Social Workers, London: Routledge and Kegan Paul.

4. Clark, D. W. and — Preventive and Community Medicine,

MacMahon, B. (Ed.) 1981 — Boston. Little, Brown and Company,

5. Friedlander, W. A. 1967 — Introduction to Social Welfare (Chapter 12: Social Work in Medical and Psychiatric Settings), New Delhi: Prentice-Hall of India.

6. Hilleboe, H. E. and Larimore, G.W.1966 — Preventive Medicine, Philadelphia, W. B. Saunders Company.

7. Humble, Stephen and Unell Judith (Ed.) 1989 — Self Help in Health and Social Welfare, London: Routledge.

8. Jordan, William. 1972 — The Social Worker in Family Situations, London: Routledge and Kegan Paul.

9. Lathem, W. and Newbery, A. 1970 — Community Medicine - Teaching, Research and Health Care, London, Butterworths.

10. Mathur,J. S. 1971 — Introduction to Social and Preventive Medicine, New Delhi, Oxford and LB.H. Publishing Company,

11. Mechanic, David 1968 — Medical Sociology- A Selective View, New York, Free Press.

12. Mishne, Judith (Ed.) 1980 — Psychotherapy and Training in Clinical Social Work, New York: Gardner Press.

13. Nichols, P. J. R. (Ed.) 1980 — Rehabilitation Medicine, London: Butterworths.

14. Park, K. 2002 — Park's Textbook of Preventive and Social Medicine, Jabalpur, Banarsidas Bhanot.

15. Pathak, S. H. 1968 — Medical Social Work, Chapter.25, In Wadia, A R (Ed.) : History and Philosophy of Social Work in India, Bombay: Allied Publishers.

16. Ramachandrudu, G. 1997 — Health Planning in India,' New Delhi, A. P. H. Publishing Corporation.

17. Rusk, Howard A. 1977 — Rehabilitation Medicine, Saint Louis: Mosby Company.

18. UNICEF — Health and Basic Services, New Delhi, UNICEF South Central Asia Regional Office.

Paper code: SWCSC-4
Paper Title: **REHABILITATION AND AFTER CARE SERVICES**

INTRODUCTION

Rehabilitation of differently abled people is a noble and worthy endeavor, requiring the combined knowledge of the psycho-social theory and practical skills and techniques of social work. The current paper facilitates social work students to work with the specific group of clientele suffering from various types of disabilities and impart application of specific professional social work methods to cater to the needs of this population.

OBJECTIVES:

a. To understand the concept of handicap, rehabilitation and the scope for practice.
b. To identify the specific client categories requiring the rehabilitation services, problem specificity and rehabilitation service interventions.
c. To acquaint oneself with different rehabilitation settings, different therapeutic approaches to rehabilitation process.
d. To acquire the social work skills adapted to facilitate the process of rehabilitation,the rights and legal provisions provided for differently abled people and assimilate the knowledge of social work practice to disability specific client service.

Course Content

UNIT I

Rehabilitation: Definition and scope for social work interventions; definition of Impairment, Disability, Handicap; causes of Handicap - heredity, acquired, Major illnesses - physical, neurological and psychiatric Stress, vulnerability, coping and competence to deal with handicaps; Need for comprehensive rehabilitation – psycho-social rehabilitation

UNIT II

History, philosophy and principles of psycho-social rehabilitation; specific problem areas – physical handicap - vision, hearing, orthopedic, speech and language difficulties, mental retardation and others; neurological, psychiatric problems, disasters, alcohol and drug usage, terminal illnesses and any other.
Intervention in rehabilitation: Assessment, planning, intervention, evaluation, tools for assessment, follow-up services.

UNTI III

Rehabilitation Settings: Hospital based, day-care, night-care, quarter-way home, half- way-home, group home, hostels, long-stay homes, vocational guidance centre,

sheltered workshop, occupational therapy centre, community based rehabilitation centre, home care, inclusive education and others
Approaches: Therapeutic community, behavior modifications, transactional analysis and eclectic approach

UNIT IV

Practice of Social work methods in the process of rehabilitation: Case work, group work, community organisation, research, administration and social action.
Legal provisions for differently abled people – The Persons with Disabilities (Equal Opportunities, Protection of Rights and Full Participation) Act 1995, Rehabilitation Council of India: Formation, scope and functions, governmental policies and programmes, initiatives from the non- governmental sectors.

International trends and national initiatives in the rehabilitation scenario.

REFERENCES

1. Anthony, William. A. 1980.	The Principles of Psychiatric Rehabilitation. Baltimore University Part Press
2. Chowdhary, Paul. D. 1995.	Introduction to Social Work: history, concept, methods and fields. Delhi, Atma Ram & Sons.
3. Corey, Gerald. (6th ed.)2004.	Theory and Practice of Group Counseling. Thomas Brooks/ Cole Belmont
4. Dorothy Stock Whitaker. 1985.	Using Groups to help people. London & New York, Tavistock/ Routledge,.
5. Danda, Amita. 2000.	Legal order and Mental Disorder, Sage Publications.
6. Delhi Law House. 1998.	The Mental Health Act-1987, Law Publishers.
7. Thakur Hari Prasad Institute of Research and Rehabilitation of the Mentally Handicapped Publication, Hyderabad.	Enabling the Disabled.1999
8. Feldman, Robert. S (1997)	Understanding Psychology. New Delhi, Tata McGraw Hill.
9. Hume, Clephane and Pullen Ian. 1986	Rehabilitation in Psychiatry. Edinburgh Churchill Livingstone
10. International Labour persons,ffice. 1985.	Vocational Rehabilitation of Disabled ILO.

11. International Labour Office. 1982.	Vocational rehabilitation of the Mentally Retarded (second impression) ILO.
12. Kalyanasundaram S. and Verghese,Mathew,(Eds).2000	Innovations in Psychiatric Rehabilitation Richmond Fellowship Society, Bangalore, India.
13. Kapur, Malavika and Others. (Ed). 1979.	Psychotherapeutic process. NIMHANS Publication. Bangalore
14. Lakshman Prasad. 1994.	Rehabilitation of the Physically handicapped. Konark Publishers Pvt. Ltd.
15. Liberman, Robert. P. (ed). 1988.	Psychiatric Rehabilitation of Chronic Mental Patients. Washington D.C., American Psychiatric Association.
16. Madan, G.R. 2000	Indian Social Problems Vol.2 Social Work (3rd ed). New Delhi, Allied Publishers.
17.Manning, Nick. 1989	Therapeutic Community Movement. London, Routledge Publications.
18. Pandu Naik. G. 1992	A Review of Social Legislation in India. Lambani Publishers.
19. Schizophrenia Research Foundation. 1998	Community Mental Health and Community Based Rehabilitation. Chennai, SCARF Publication.
20. Sen, Anima. 1988	Psycho-social integration of the Handicapped, New Delhi, Mittal Publishers.
21. Sharma, S and Chadda, R.K 1997	Essential Psychiatry, New Delhi, Interprint Publishers.
22. Wolberg, L.R. 1977	The Technique of Psychotherapy Part I & II, 3rd edition. New York, Grune and Stratton,.

Paper code: SWCSC-5
Paper Title: SOCIAL POLICY, PLANNING AND DEVELOPMENT

INTRODUCTION

The course introduces the learner as to how policy is a link between Constitutional Principles, Development Plans, Legislative and Executive Actions. The analysis of these processes is to enable utilization of the knowledge to improve social work practice.

Further, it provides a critical and analytical framework to understand key concepts, development processes and current issues, pertaining to different parts of the world, with specific reference to India. This course is expected to provide the social work students with a context for micro-level interventions.

OBJECTIVES

a. Gain knowledge of policy analysis and the policy formulation process.
b. Acquire skills in critical analysis of social policies and development plans.
c. Develop an understanding of social policy in the perspective of national goals as stated in the Constitution, particularly with reference to Fundamental Rights and the Directive Principles of State Policy.
d. Critically understand the concept, content and process of social development.
e. Develop the capacity to identify linkages among social needs, problems, development issues and policies.
f. Locate strategies and skills necessary for social development and reinforce
values of social justice, gender justice and equality.

Course Content

UNIT I

Social Policy and Constitution: Concept of social policy, sectoral policies and social services - Relationship between social policy and social development--Values underlying social policy and planning based on the Constitutional provisions (i.e. the Directive Principles of State Policy and Fundamental Rights) and the Human Rights - Different models of social policy and their applicability to the Indian situation.

UNIT II

Sectoral Social Policies in India: Evolution of social policy in India in a historical perspective-Different sectoral policies and their implementation, e.g. Policies concerning education, health, social welfare, women, children, welfare of backward classes, social security, housing, youth, population and family welfare, environment and ecology, urban and rural development, tribal development and poverty alleviation.

UNIT III

Social Planning: Concept of social planning - Scope of social planning - the popular restricted view as planning for social services and the wider view as inclusive of all sectoral planning to achieve the goals of social development - Indian planning in a historical perspective - The Constitutional position of planning in India. Niti Ayog - Coordination between Centre and State, need for decentralization - Panchayath Raj - people participation.

UNIT IV

Social Development: Concept of social development - Current debates of development - Approaches to development - Development indicators.

Social Development in India: The historical and social context of development in India - Demographic transitions - Rural development: Agrarian and land reforms; Green Revolution - Industrialization and urban development - Labour relations-Gender issues - Environmental issues (land, water, forest) - Education - Health.

REFERENCES

1. Bagchi, A. K. 1982 — Political Economy of Underdevelopment, Cambridge: Cambridge University Press.

2. Bhanti, R. 1993 — Social Policy and Development in Rajasthan, Udaipur: Himanshu Publications.

3. Bulmer, M. et. aI., 1989 — The Goals of Social Policy. London: Unwin Hyman.

4. Chakraborty,S. 1987 — Development Planning - Indian Experience, Oxford: Claredon Press.

5. Dandekar, V. M. 1994 — "Role of Economic Planning in India in the 1990s & Beyond", Economic and Political Weekly, Vol. 29, No. 24, 1457-1464.

6. Desai, V. 1988 — Rural Development (Vol. 1) Mumbai: Himalaya Publishing House.

7. Dimitto, D. M. 1991 — Social Welfare: Politics and Public Policy, New Jersey: Prentice-Hall.

8. Fidelma, A. et. al. 1999 — Contemporary Social and Political Theory: An Introduction, Buckingham: Open University Press.

9. Ganapathy, R. S. and Others 1985 — Public Policy and Policy Analysis in India, Delhi: Sage Publications.

10. Ghosh, A. 1992 — Planning in India: The Challenge for the Nineties, New Delhi: Sage Publications.

11. Government of India — Five Year Plan Documents (latest), New Delhi.

12. Hebsur, R. K. (Ed.) — Social Intervention for Justice, Bombay: TISS.

13. Huttman, E. D. 1981 — Introduction to Social Policy, New York: McGraw- Hill.

14. International Labour Office. 1973 — Multinational Enterprises and Social Policy, Geneva, ILO.

15. Jones, K. et. al., 1983 — Issues in social Policy, London: Routledge & Kegan Paul.

16. Kahn, A. E. 1973 — Social Policy and Social Services, New York: Random House.

17. Kulkarni, P. D. 1979 — Social Policy and Social Development in India, Madras: Association of Schools of Social Work in India.

18. Kulkarni, P. D. 1952 — Social Policy in India, New York: McGraw-Hill Book Company.

19. Kulkarni, P. D. 1975 — Social Policy in India, Bombay, Tata Institute of Social Sciences.

20. Leonard, P. 1997 — Postmodern Welfare: Reconstructuring Emancipatory Project, London: Sage

21. Lindblom, C. E. 1980 — The Policy-making Process, New Jersey: Prentice-Hall.

22. Livingstane, A. 1969 — Social Policy in Developing Countries, London: Routledge & Kegan Paul.

23. Madison, B. Q .1980 — The Meaning of Social Policy, London: Croom Helm.

24. Macpherson, S. 1980 — Social Policy in the Third World, London: Wheatspeat Brooks.

25. Macpherson, S. 1982 — Social Policy in the Third World, New York: John Wiley and Sons.

26. Mathur, K. Bjorkman — Top Policy Makers in India, New Delhi: Concept Publishing Co.

27. Meadows, D. H. 1972 — The Limits to Growth, New York: University Books.

28. Mishra, R. 1977 — Society and Social Policy, London: Macmillan Ltd.

29. Mukherjee, N. 1993 — Participatory Rural Appraisal: Methodology and Applications, New Delhi: Concept Publishers.

30. Mundle, S. 1993 — 'Policies, Paradigms and Development Debate at the Close of Twentieth Century', Economic and Political Weekly, Vol. 28, No. 26, September 4, 1993.

31. Mullard, M. and Spieker. 1998 — Social Policy in a Changing Society, London: Routledge.

32. Phillips,D. R. and Verhasselt Yola (Eds.) 1994 — Health and Development, London: Routledge and Kegan Paul

33. Rao, V. 1994. — "Social Policy: The Means and Ends Question" Indian Journal of Public Administration, Vol. 50, No.1, Jan.-March, 1994.

34. Rastogi, P. N. 1992 — Policy Analysis and Problem-solving for Social Systems, New Delhi: Sage Publications

35. Roychaudhury, T. 1982 — The Cambridge Economic History of India, Vol. I & II, New Delhi: Cambridge University.

36. Singh, R. R. (Ed.) 1995 — Whither Social Development? New Delhi: ASSWI.

37. Singh, Y. 1972 — Modernization of Indian Tradition, Delhi: Thomas Press.

38. Spicker, Paul. 1998 — Principles of Social Welfare: An Introduction to Thinking About the Welfare State, London: Routledge.

39. The Probe Team. 1999 Association with Centre for Development Economics. — Public Report on Basic Education in India, New Delhi: Oxford University Press.

40. Upadhyay, S. B. 1992 — Urban Planning, Jaipur: Printwell

41. UNDP — Human Development Reports, Oxford University Press.

42. Weimer. D. L. and Vining, A. R. 1994 — Policy Analysis: Concepts and Practice, New Jersey: Prentice-Hall.

43. World Bank — World Development Reports (Annual), Oxford University Press.

44. Yadav, C. S. (Ed.) 1986 — Urban Planning and Policies - Part A, New Delhi: Concept Publishing Co.

Recommended Journals / Periodicals

Alternatives; Development and Change; Economic and Political Weekly.

Paper code : SWCSC-5
Paper Title : LEGAL SYSTEM IN INDIA

INTRODUCTION

The course is to help learners understand the legal system and procedures in India. It supports understanding the processes in public interest litigation and develops skills for the same.

OBJECTIVES

a. Acquire information on the legal rights of people.
b. Develop an understanding of the legal system and get acquainted with the process of the legal system with emphasis on functioning in India.
c. Understand the role of the police, prosecution, judiciary and correction. d. Gain insight into the problems faced by the people belonging to different strata of society, in interacting with this system.
e. Develop an understanding of the processes and problems of public interest litigation and legal aid to marginalized.

Course Content

UNIT I

Social Justice: Meaning and Concept; Social legislation: Meaning, definitions and concept. Social justice as an essential basis of social legislations; Social legislations in a welfare state with special reference to India.

Rights: Concept and definitions of Rights; types of Rights; Rights of women and children; Rights of Scheduled Castes and Scheduled Tribes; Rights of accused and offender under Constitution of India, Indian Penal Code and Criminal Procedure Code.

UNIT II

Division of Law: Substantive Law and Procedural Law.

Legislations pertaining to Social Institutions: Marriage, divorce, maintenance of spouse, adoption.

Legislations for prevention of Crime and Deviance: Indian Penal Code (relevant chapters like of Offences against Public Tranquility, of Offences affecting the Public Health, Safety, Convenience, of Decency and Morals, of Offences relating to Religion, of Offences affecting the Human Body, of Offences relating to Marriage, of Cruelty by Husband or Relatives of Husband)

Legislations pertaining to women.

UNIT III

Criminal Justice System in India:

Police: Structure, powers and functions and their role in maintaining peace and order in the society.

Prosecution: Meaning, structure, its role in criminal justice, trial participation.

Judiciary: Supreme Court, High Court - Constitution of Supreme Court and High Court: Powers and functions.
Sub-ordinate Courts - District Sessions Court, Magistrate Courts, and other subordinate courts.

UNIT IV

Correction and Correctional Laws: Corrective measures as per Criminal Procedure Code, Probation of Offenders Act, Juvenile Justice (Care and Protection of Children) Act.

Legal Aid: Concept of legal-aid, history of legal-aid, persons needing legal-aid, legal-aid schemes.

Public Interest Litigation: Meaning, Concept, Process and Problems.

Right to Information Act- Provisions and implementation.

Role of Social Worker: Social Work intervention, need, methods.

REFERENCES

1. Aranha, T.	Social Advocacy - Perspective of Social Work, Bombay: College of Social Work.
2. Buxi, U. 1982	Alternatives in Development: Law the Crisis of the Indian Legal System, New Delhi: ,Vikas Publishing House.
3. Curry, J. C. 1977	The Indian Police, New Delhi: Manu Publications.
4. Desai, A. E. (Ed.) 1986	Violation of Democratic Rights in India, Vol. 1.
5. Fleming, M. 1978	Of Crimes and Rights, New York: W.W. Norton and Company.

6. Gandhi B.M. 2006.	Indian Penal Code, Lucknow, Eastern Book Company.
7. Iyer, V. R. K 1980.	Some Half Hidden Aspects of Indian Social Justice, Lucknow: Eastern Book Company.
8. Iyer, V. R. K 1984.	Justice in Words and Justice in Deed for Depressed Classes, New Delhi: Indian Social Institute.
9. Iyer, V. R. K 1981.	Law Versus Justice: Problems and Solutions, New Delhi: Deep and Deep.
10. Iyer, V. R. K 1980.	Justice and Beyond, New Delhi: Deep and Deep.
11. Kelkar R. V. 2006.	Lectures on Criminal Procedure, Lucknow, Eastern Book Company.
12. Khanna, H. R. 1980	The Judicial System, New Delhi: II P A.
13. Mathew, P. D.	II P.A Legal Aid Series, Delhi: Indian Social Institute
14. McDonald. W. F. (Ed.) 1979	The Presentator, California: Berkeley: Hill
15. Newman, G. 1999	Global Report on Crime and Justice, New York: Oxford University Press.
16. Nirmal Anjali. 1992	Role and Functioning of Central Police Organisations, New Delhi: Uppal.
17. Peak, K. J. 1998	Justice Administration - Police, Courts and Correction, New Jersey: Prentice-Hall.
18. Ratanlal and Dhirajlal, 2006	Indian Penal Code, Lexis and Lexis, Nagpur.
19. Singh. L. M. (Ed.) 1973	Law and Poverty: Cases and Materials, Bombay: Tripathi.
20. Western, P. B. 1976	The Criminal Justice System: An Introduction and Guidelines, California: Good Year Publishers.
21. Government of India, 1973	Report of the Legal Aid Committee.

Open Elective
Paper Code: SWOE
Paper Title: GERONTOLOGICAL SOCIAL WORK

INTRODUCTION

Changing demographic profile in India has led to rise in the number of elderly as never before. Along with the enhanced longevity, a number of issues related to care and management of elderly have come into focus. Social work as a profession concerned with providing professional service to the needy, has recognized the need to address the concerns of the senior citizens. The paper envisages training the learners in professional social work practice with the elderly.

The paper focuses on senior citizens as target client group for social work intervention; the paper deals with the issues, concerns, problems and social work methods in facilitating healthy adaptation of the client group in the current Indian context.

OBJECTIVES:

a. To get an overview of the perspectives on aging and scope for practice.
b. To understand the various challenges related to aging, healthy aging and problems of the elderly in difficult situations.
c. To identify agencies working with elderly, the different care settings and issues in working with elderly in different settings. To gain an insight into process of working with elderly.
d. To train the learners in applying specific social work intervention measures in working with senior citizens, care givers and to have an understanding of
e. National Policy on Older Persons, and the role of International and NGOs in improving the quality of life of the elderly.

Course Content

UNIT I

Gerontology – Definition and scope. Understanding the elderly – demographic, developmental, psychological, socio cultural, economic, and health perspectives. The issues pertaining to elderly- health, occupation, income, retirement planning, family support, gender issues, property Rights and any other

UNIT II

Developmental tasks in elderly: Issues in health care, changes in family structure, coping with aging process, challenges due to changing physiological, economic, safety, status in the family and other issues, Healthy aging, quality of life, coping with demise of the life partner, bereavement, resolving one's own death, and any other.

UNIT III

Care settings for elderly: General hospitals, geriatric wards/ hospitals, home-based care, homes for the aged, nursing homes, day-care-centers, hobby centers, and facilities for homeless elderly, elder helpline, and senior citizen forum.
Tools for assessment of the problems of elderly, intervention and follow up services and evaluation.

UNIT IV

Social work intervention measures for senior citizens through methods of social work: Case work, group work, community organisation, welfare administration, social work research, social action
Care giver issues - Needs, burden, coping and training; training for caregivers of institutions for the elderly

National Policy on Older Persons, Legal and governmental welfare benefits for senior citizens, Role of HelpAge India and other prominent Organisations working for elderly.
International scenario

REFERENCES

1. Bali . P. Arun, 2001 — Care of the Elderly in India. Shimla, Indian Institute of Advanced Studies.

2. Chatterjee, S.C., Patna, and K.P., Charian, V. 2008., . — Discourses on aging and Dying. New Delhi, Sage Publications

3. Dandekar, Kumudini. 1996 — The Elderly In India, New Delhi, Sage Publications.

4. Desai, Murli and Raju, Siva (Ed.) 2000. — Gerontological Social Work in India - Some issues and Perspectives. Delhi, BR Publishing House,.

5. Dey, A. B (Ed.) 2003 — Ageing in India: Situation Analysis and Planning for the Future. New Delhi / WHO and AIIMS.

6. Emmatty, Leena. M. 2008 — An insight into Dementia Care in India. New Delhi, Sage Publications,.

7. Hurlock, Elizabeth. 1981 — Developmental Psychology. 5th Edition. New Delhi, Tata McGraw Hill Publications.

8. Khan M.Z. 1989 — Voluntary Welfare Services for the Aged, Dept. of Social Work, New Delhi, Jamia Milia Islamia.

9. Kumar, Vinod (Ed.) 1996 — Aging - Indian Perspective and Global Scenario, New Delhi, AIIMS.

10. Rajan, Irudaya.S., Mishra,U. S., and Sharma, S.P. 1999. — India's Elderly, New Delhi, Sage Publications.

11. Ramamurti P,V and Jamuna D (Ed) 2004. — Handbook of Indian Gerontology. New Delhi, Serial Publishers.

12. Vineeta B Pai 2000 — Coping with Retirement, UNESCO CLUB, Naganur, Belgaum

JOURNALS.

1. Indian Journal of Gerontology, C-207, Manu Marg, Tilak Nagar, Jaipur 302 004

2. R & D Journal of Helpage India . C-14, Qutab Institutional Area, New Delhi, 110016.

Open Elective
Paper code SWOE
Paper Title: SOCIAL WORK PRACTICE WITH CHILDREN

INTRODUCTION

Children are the future of human society. Profession of social work has to work with children in difficult circumstances while rendering services in varied settings. There is a need for social workers specially trained in working with the children and adolescents. Such trained social workers can render valuable services to children in need of professional help.

The current paper focuses on children as a special group for focused social work intervention through facilitating acquisition of knowledge about children from different perspectives, types of settings where the children can be helped and application of social work methods to render social work intervention to children.

OBJECTIVES

a. To understand children facing difficult circumstances and the impact of difficult circumstances on children's development.
b. To gain an overview of agencies where children form the major client group, and appropriate evaluation of children's problems.
c. To impart to the trainee, specific social work intervention methods in dealing with children as a client group; to understand the Rights of children in the legal, national and international context.

Course Content

UNIT I

Human reproductive system - beginning of life till beginning of adulthood. Understanding the children and adolescents from different perspectives - developmental, demographic, economic, psychological, sociological, environmental, familial, educational dimensions of child development. Issues in adolescence - self image, peer group, career choice, sexuality, education, vocation and other issues
Healthy child development, importance of supportive environment in upbringing of the children.

UNIT II

Children in difficult circumstances - developmental delay, physical and intellectual handicaps; chronic illnesses, nutritional deficiencies, accidents, poverty, child labour, abandoned and orphaned children, adoption issues, children in institutions, psychological problems in children, self harm and suicides in children, addiction related problems in children, children brought up by single parent due to death, divorce and other related issues, problems in formal schooling, children living in difficult situations - children in streets, slums, war zones, migration, children in conflict with law, truancy, drug abuse, running away from homes, neglected children, child abuse, child trafficking, child marriage and any other. Special focus on adolescent issues as applicable.

UNIT III

Children in difficulties – Helping agencies, Settings and issues - paediatric hospitals, nursing homes, child care centres, child guidance clinics, residential care services for children - residential schools, orphanages, homes for children in conflict with law, agencies dealing with differently abled children, any other.
Assessment, intervention, follow up and evaluation of children and adolescents facing difficulties.

UNIT IV

Social Work Intervention Programmes - Case work, group work, community organisation methods in helping children, school mental health programmes, home visits, school visits, life skills training, family life education for adolescents, creative use of play therapy, art, dance, drama and other mediums for helping children, child

help lines, child care centres, adoption services, special rehabilitation services for rescued children and any other.

Legislations pertaining to children, legal protection, International, National and non-governmental organisations working with children, Rights of the children.

REFERENCES

1. Bhargava. Vinita. 2005 — Adoption in India, New Delh, Sage Publications,

2. Beck, Laura — Developmental Psychology. New Delhi, Pearson Education Inc..

3. Government of India, Dept. of Women and Child Development 1992. — Plan of Action – A Commitment to the Child.

4. Hegarty S and Arul, M. 2002 — Children with Special Needs - From segregation to Inclusion, New Delhi, Sage Publications.

5. Hurlock, Elizabeth. 1981 — Developmental Psychology. 5th Edition. New Delhi, Tata McGraw Hill Publications,.

6. Hurlock, Elizabeth. 1996 — Personality Development. New Delhi, Tata McGraw Hill Publications.

7. Kantha Amod and Varma, R.M, 1993 — Neglected Child – Changing Perspective, New Delhi, Prayas Juvenile Aid Centre,.

8. NIPCCD,1989. — Perspective Plan on Child Development (1980-2060), New Delhi

9. NIPCCD.1992. — National Evaluation of Integrated Child Development Services, New Delhi.

10. Rani, Asha 1986. — Children in Different situation in India – A Review, Bombay, Tata Institute of Social Sciences.

11. Reddy, Suma Narayan,1989. — Institutionalized Children, Allahabad, Chug Publication,

12. UNICEF Publication — The State of The World's Children. Annual Report. http://WWW. unicef.org

13. Ved Kumar and Brooks, Susan. L. 2004 — Creative Child Advocacy, New Delhi, Sage Publications,

14. Venkatesan. S. 2004 — Children with Developmental Disabilities, New Delhi, Sage Publications,.

Even semester (IV Semester)

Paper code SWDHC-13

Paper Title: EMPLOYEE RELATIONS AND LEGISLATION

INTRODUCTION

The purpose is to provide an in-depth knowledge about the relationship between employer, employee and the state, to bring out the importance of cordial employee relations for organizational productivity and gain an understanding of the mechanism of inter-personal relations, collective bargaining and productivity improvement functions in the organisation through involvement of all groups.

OBJECTIVES

a. Develop the skills of interpersonal relationship as per organisational requirement.
b. Understand the trends and dynamics between the partners in the organisation.
c. Enhance the knowledge on organisational performance, role and responsibility.
d. Develop the knowledge on various statutory / legal aspects influencing the organizations.
e. To stimulate thinking on rationale behind the Laws and their enforcement.

Course Content

UNIT I

Employee relations, History of industria1ization in India - Issues related to employees in organized and unorganized sector.

Concept, Definition, Philosophy and Principles of employee relations. Employee relations with special reference to Occupation - Safety - Health and Environment (OSHE) Education.

Analysis of the terms 'industry' and 'industrial dispute', industrial discipline – misconduct, disciplinary proceedings.

Domestic Enquiry: Contents and Process, Principles of Natural Justice, Tribunal; Discharge/Dismissal.

UNIT II

Trade Unions: Trade Unionism in India, emergence, history and growth, Trade Union as an organization – Various Trade Unions in India, Trade Union policies, Role of Trade Unions in India, Employers'' Associations – Objectives, structure and activities. Contemporary issues in employee relations.

UNIT III

Employee Legislations: - The Payment of Bonus Act, 1965, Employees Provident Fund (and Misc. Previsions) Act 1952, Workmen's Compensation Act 1923, Employees State Insurance Act 1948, Payment of Gratuity Act, 1972,Child Labour (Prohibition and Regulation) Act, 1986.
Fundamentals of Labour laws, The Constitution of India: Preamble, Fundamental Rights including writs, Directive Principles of State Policy, The Factories Act 1948, The Contract Labour (Regulation and Abolition) Act 1970,The Minimum Wages Act 1948 and The Payment of Wages Act 1936; The Apprentices Act, 1961,The Maternity Benefit Act 1961.

UNIT IV

The Trade Union Act 1926, The Industrial Employment (Standing Orders) Act 1946, The Industrial Dispute Act 1947, The Employment Exchanges (Compulsory Notification of Vacancies) Act 1958. Introduction to Right to Information Act, Intellectual Property Rights, Patent Law, Copyrights, Trademark Law.

Collective Bargaining: Definitions, characteristics, critical issues in collective bargaining, theories of collective bargaining, Hick's Analysis of Wages setting under collective bargaining, conflict-choice model of negotiation, Behavioral Theory of Labor Negotiation, Collective Bargaining in India, Collective bargaining in practice, levels of bargaining, coverage and duration of agreements, administration of agreements, negotiating a contract, the negotiation process, effective negotiation, negotiation and collective bargaining, post negotiation – Administration of the agreement.

Employee relations in knowledge based industry - Concepts of self-managed teams (SMT) - Changing employee/ employer and trade union relationship. Current rules of Taxation of Salaries.

Labor Welfare Officer - Duties and functions; Social Work in Industry.

REFERENCES

1. Achar, M. R. 1976 — Labour Rules in Karnataka, Bangalore, Shree Vidya Printers.
2. Arora, M, 2005 — Industrial Relations, New Delhi, Excell Books.
3. Dasgupta, S. K. — Industrial Law, Sterling Publishers Pvt. Ltd.
4. Devar, R. S. 1967 — Personnel Management and Industrial Relations, New Delhi, Vikas Publishing House.
5. Joseph, T.M. 2009 — Industrial Law, Mumbai, Himalaya Publications Pvt., Ltd.
6. Lal Das, D. K. 1991 — Personnel Management, Industrial Relations and Labour Welfare, Agra, Y. K. Publishers.
7. Madhusudhana Rao, M. 1986 — Labour Management Relations and Trade Union Leadership, New Delhi, Deep and Deep Publications.
8. Malik P. L. 1986 — Handbook of Labour and Industrial Law, Lucknow, Eastern Book Company.
9. Mamoria, C. B. and Mamoria S. 2006 — Dynamics of Industrial Relations, Mumbai, Himalaya Publishing House.
10. Mamoria, C. B; Mamoria Satish, Gankar, S. V. 2000 — Dynamics of Industrial Relations in India, Mumbai, Himalaya Publishing House.
11. Mishra M, 2006 — Case Laws on Industrial Relations, New Delhi, Excell Books.

12. Moorthy, M. V. 1968 — Principles of, Labour Welfare, Vishakapatnam, Gupta Brothers.

13. Nagaraju, S. 1981 — Industrial Relations System in India, Allahabad, Chugh Publications.

14. Pyle M and George, Simon A, 2009 — Industrial Relations and Personnel Management, New Delhi,Vikas Publishing House Pvt Ltd.

15. Rudrabasavaraj, M. N. 1984 — Human Factors in Administration, Bombay, Himalaya Publishing House.

16. Sanajaoba, Naorem 1985 — Industrial Tribunal - Working, Procedure and Judicial Trends, New Delhi, Deep and Deep Publications.

17. Sharma, A. M. 1989 — Industrial Relations - Conceptual and Legal Frame Work, Bombay, Himalaya Publishing House.

18. Saiyed I A, 2009 — Labour Law, Mumbai, Himalaya Publishing House Pvt., Ltd.

19. Singh BD, 2005 — Industrial Relations: Emerging Paradigms, New Delhi, Excell Books.

20. Sinha, G. P. and Sinha, P. R. 1977 — Industrial Relations and Labour Legislation in India, New Delhi, Oxford IBH Publishing Co.

21. Somani, Anjan and Mishra, Shivani, 2009-10 — Employment Laws, Jaipur, Ramesh Book Depot

22. Srivastava S C, 2009 — Industrial Relations and Labour Law. New Delhi, Vikas Publishing House Pvt Ltd.

23. Subramanian, H. N. 1967 — Labour Management Relations in India, Bombay, Asia Publishing House.

24. Tripati, P. C. 1989 — Personnel Management and Industrial Relations, New Delhi, S. Chand and Sons,.

25. Tyagi, B. P. 1976 — Labour Economics and Social Welfare, Meerut, Jai Prakash Nath & Co.

26. Vaid, K. N. 1970 — Labour Welfare in India, New Delhi, Sri Ram Centre for Industrial Relations.

27. Yoder, D. 1972 — Personnel Management an Industrial Relations, New York, Prentice-Hall India.

Paper code: SWDHC-14
Paper Title: **MENTAL HEALTH AND PSYCHIATRIC SOCIAL WORK**

INTRODUCTION

This course is to provide awareness about mental health and mental health problems and also application of social work in mental health settings.

OBJECTIVES

a. Understand the concepts 'mental health' and 'mental illness'.
b. Understand the signs and symptoms, etiology, diagnosis and treatment of
mental health problems.
c. Understand different services for the care of mentally ill.
d. Understand historical background of psychiatric social work in India and
abroad.Understand the nature of psychiatric social work services and relevance of team work.
e. Understand the nature of collaboration with voluntary organisations for the
welfare of mentally ill.
f. Identify the issues related to psychiatric social work department in hospitals
and community mental health settings.

Course Content

UNIT I

Concept of mental health and mental illness - Mental health as a part of general health - Misconceptions about mental illnesses. General approaches to the mentally ill - International Classification of Mental Disorders.
Signs, symptoms, etiology, diagnosis, prognosis and management of the following:

- Neuroses
- Psychoses
- Psycho physiologic disorders
- Personality disorders
- Psychiatric disturbances in children and adolescents
- Organic psychotic conditions
- Mental retardation.

UNIT II

Introduction to Psychiatric Social Work: Meaning and Scope - Historical background of psychiatric social work in India and abroad - Reasons for its development as a specialty. Application of social work methods and other related techniques used in the field - Multi-disciplinary approach and team work in mental health care - Problems of hospitalization - Impact of mental illness on the patient, family and community.

Practice of Social Work: Importance of home visit and visit to the place of work - Role of family in the treatment of mentally ill - Preparing the family and community for the return of the affected individual, follow-up.

UNIT III

Care of mentally ill: Day-care centre, night-care centre, half-way-home, sheltered workshop, Occupational therapy units - Role of social worker and role of voluntary organisations.
Role of voluntary organisations, governmental-agencies and paraprofessionals in the welfare of mentally ill.

Role of social worker in mental health centers, departments of psychiatry in general hospitals, child guidance clinics, community mental health units, correctional institutions, industries, and family welfare centres.

Role of social worker with head injured, paraplegics and epileptics.

Role of social worker in the management of substance abuse – Educational avenues in psychiatric social work - Research avenue in the field of mental health for social workers.

UNIT IV

Organisation of psychiatric social work department - Functions; and collaboration with other departments.

Community mental health and social work, NMHP, Innovations like Satellite clinics, district mental health programme etc.

Rehabilitation and Acts: Occupational therapy - Principles and practice - Psychosocial rehabilitation.

Mental Health Act, 1987.

The Persons with Disabilities (Equal Opportunities, Protection of Rights and Full Participation) Act, 1995.

REFERENCES

1. Ahuja, Niraj 1995 — A Short Textbook of Psychiatry, Third Edition, New Delhi, Jaypee Brothers.

2. Anderson, David. 1982 — Social Work with. Mental Handicap, London, Macmillan Press Ltd.

3. Banerjee, G. R. 1968 In. — Psychiatric Social Work, Chapter 26, Wadia, A. R. (Ed.): History and Philosophy of Social Work in India, Bombay: Allied Publishers.

4. Brody, Elaine M. and care Contributors 1974 — A Social Work Guide for Long-term Facilities, U. S. Department of Health, Education and Welfare, Public Health Service, Maryland: National Institute of Mental Health.

5. Coleman, J. C. 1976 Life, — Abnormal Psychology and Modern Bombay, D. B. Taraporevala and Sons.

6. Dickerson, Martha Ufford. 1981 — Social Work Practice with the Mentally Retarded, New York: Free Press.

7. Freedman, A. M. and Kaplan, H. I. (Eds.) 1967 — Comprehensive Textbook of Psychiatry, Baltimore, Williams and Wilkins Company.

8. French, Lois Meredity. 1940 — Psychiatric Social Work, New York; The Commonwealth Fund.

9. Friedlander, W. A. 1967 — Introduction to Social Welfare, (Chapter 12: Social Work in Medical and Psychiatric Settings), New Delhi: Prentice-Hall of India.

10. Feldman Robert S 1997 — Understanding Psychology, 4th Edition, Tata McGraw-Hill Publishing Company Limited, New Delhi

11. Golan, Naomi. 1978 — Treatment in Crisis Situations, New York: Free Press.

12. Henderson, Sir David and Batchelor, I. R. C. 1962 — Textbook of Psychiatry, New York Oxford University Press.

13. Hudson, Barbara L. 1982 — Social Work with Psychiatric Patients, London: Macmillan.

14. Humble, Stephen and Unell, Judith (Ed.) 1989 — Self Help in Health and Social Welfare, London: Routledge.

15. Jones, Kathleen. 1972 — A History of the Mental Health Services, London: Routledge and Kegan Paul.

16. Jordan, William. 1972 — The Social Worker in Family Situations, London: Routledge and Kegan Paul.

17. Maller, Joshua-o. 1971 — The Therapeutic Community with Chronic Mental Patients, S. Karger.

18. Mishne, Judith (Ed.) 1980 — Psychotherapy and Training in Clinical Social Work, New York: Gardner Press.

19. Page, J. D. 1983 — Abnormal Psychology, New York, McGraw-Hill.

20. Robbins, Arthur J. 1957 — Mental Hospitals in India and Social Work Service, Delhi School of Social Work.

21. Strean, Herbert S. 1979 — Psychoanalytic Theory and Social Work Practice, New York: Free Press.

22. Stroup, H. H. 1960 — Social Work - An Introduction to the Field, (Chapter 9: Psychiatric Social Work), New Delhi: Eurasia Publishing House.

23. Todd,F.Joan.1967 — Social Work with the Mentally Subnormal, New York: Routledge and Kegan Paul.

24. Towle, Charlotte. 1941 — Social Case Records from Psychiatric Clinics with Discuss Notes, Chicago;

Illinois: University of Chicago Press.

25. Yelloly, Margaret. 1980 Social Work Theory and Psychoanalysis, New York: Van Nostrand Reinhold Company.

26. National Mental Health Programme for India

Code SWDHC -15
Title: **MAJOR PROJECT**

Students are given broad guidelines for undertaking empirical evidence-based project in the fourth semester. In case of group project work, the group will be formed by the college or the university department by adopting random method of selection. The project shall comprise of selection of the topic, methodological details, analysis, interpretation and deductions made. The department will prepare a set of guidelines for presenting the report.

Evaluation of the Project will be done along with the viva-voce examination by the viva-voce committee constituted for the assessment of social work practicum.

Even semester
Code: **SW DHC-6**
Title : **SOCIAL WORK PRACTICUM - V**

Concurrent practice learning of two-days a week - on going learning of practice is an opportunity to develop intervention skills in reality situations. This entails learning social work practice for two, or two and a half days or its equivalent, each week of the semester. The learners may be placed in agencies or in communities to initiate and participate in direct service delivery. Practice learning is a vital component of the educational opportunity to be provided to the learner. The teaching-learning process must be designed to help the learner to move on the mastering strategies, skills and techniques to practice social work.

Even semester

Code: **SWDHC-17**

Title: **SOCIAL WORK PRACTICUM – VI**: (BLOCK PLACEMENT)

Block Placement - enables learners to integrate learning and generate newer learning by participating in the intervention process over a period of 6 weeks continuously, in a specific agency. Usually, block field work is provided at the end of the two-year programme. There shall be a professionally qualified worker in the setting willing to plan orientation and provide consultation, when needed.

Paper code: SWDSC-6

Paper Title: **HUMAN RESOURCE DEVELOPMENT AND EMPLOYEE WELLNESS**

INTRODUCTION

The purpose of this course is to provide practical exposure and knowledge in behavioural science to develop skills not only to understand and analyse problems but also to develop a problem-solving approach to issues.

OBJECTIVES

a. To develop multi facets of the personality and to build self confidence.
b. To develop a spirit of continuous learning and innovation.
c. To strengthen the competency base of individuals, teams and organization and also femilar with the organizational culture.
d. Understand and further the organization culture.
e. To appreciate the importance of bottom-line focus to the Human Resource
function and trend toward HR Accountability.
f. To understand the various approaches to and techniques of measuring HR issues.
g. To create awareness of different types of information systems in an organization so as to enable the use of computer resources efficiently, for effective decision- making.

Course Content

UNIT I

Human Resource Development (HRD): Concept, origin and needs for HRD; Overview of HRD as a Total system; Approaches to HRD; human capital approach; social psychology approach and poverty alleviation approach; HRD and its dimensions, Competency Mapping.

UNIT II

HRD Interventions: Performance Measurement Systems – Fundamental issues. Feedback sessions. Organizational goal setting process, Key Result Area (KRA) and Key Performance Indicator (KPI),Coaching, Mentoring, career planning, career development, reward system, quality of work life. HRIS: - Computers and computer based Information Systems. Measuring HR : Changing role of HR, HR as a strategic partner, the need for measuring HR. Approaches to measuring HR: - Competitive Benchmarking, HR Accounting, HR Auditing, HR Effectiveness Index, HR Key Indicators, HR MBO (Management by Objectives).

Instructional Technology: Learning and HRD; Building Learning Organization: measuring learning – the intellectual capital, architecting a learning organization, Organizational Learning, models and curriculum; factors and principles of learning; group and individual learning; HRD trends; behavioural sciences; transactional analysis; Concepts of continuous learning, behavior modeling and self-directed learning; evaluating the HRD effort; data gathering; analysis and feedback; HRD experience in Indian organizations; future of HRD - Organization culture and development.

UNIT III

Talent Development: Concept and importance; Training Need Analysis, process of training, designing and evaluating training and development programs. Use of information technology, Types and Methods of Training: Training within industry (TWI), External; on the job and off the job; Training methods; lecture, incident process, role play, structured and unstructured discussion, in-basket exercise, simulation, vestibule, training, management games, case study, programmed instruction, team development, and sensitivity training; review of training programs.

UNIT IV

Employee Wellness: Concept, philosophy, principles and scope; Importance and relevance of wellness programs, Role of Welfare Officer as per the Factories Act 1948. Relevance - with reference to Accidents, Absenteeism, Alcoholism, Domestic Violence: Preventive and remedial measures.

Employee Counseling. Role of Counselor in Organizations. Corporate Social Responsibility (CSR): CSR as a business strategy.

Environmental management systems ISO 14001, ISO 26000: Social responsibility guidance standard, environmental impact assessment.

REFERENCES

1. Bhattacharyya, Dipak Kumar.1999 Managing People, New Delhi, Excel Books.

2. Business Today Managing People: The Business Today, ExperientialGuide to Managing Workforce 2000, January 7-21, 1996.

3. Cowling, Alan and James Philip The Essence of Personnel Management and Industrial Relations, New Delhi, Pentice-Hall of India Pvt., Ltd.

4. Davis, Keith. 1983 Human Behaviour at Work, New Delhi: Tata McGraw-Hill

5. Fisher, Cynthia; Schoenfeldt, Lyle F. and Shaw, James, B. 1997 Human Resource Management, Third Edition, Boston, Houghton Mifflin Company.

6. Jayagopal, R. 1990 Human Resource Development: Conceptual Analysis and Strategies, New Delhi: Sterling Publishers Pvt. Ltd.

7. Moorthy, M. V. 1982 Priciples of Labour Welfare, New Delhi, Oxford & IBH.

8. Moorthy, M. V. 1992 Human Resource Management Psycho-Sociological Social Work Approach, Bangalore, R & M Associates.

9. Norman, M. 1960 Psychology in Industry, London, Harrap & Company.

10. Prasad, L. M. 1996 Organisational Behaviour, New Delhi, S.Chand & Co.

11. Rao, T. V. 1990 HRD Missionary, New Delhi. Oxford & IBH.

12. Rao, T. V. 1991 Reading in Human Resource

Development, New Delhi: Oxford and IBH Publishing Co. Pvt. Ltd

13. Rudrabasavaraj, M. N. 1984 — Human Factors in Administration, Bombay: Himalaya Publishing House.

14. Sahni, P. and Sharma, K. K. 1988 — Organisational Behaviour, New Delhi: Deep and Deep Publications.

15. Singh M. K. and Bhattacharya (Eds.) 1990 — Personnel Management, New Delhi : Discovery Publishing House.

16. Vroom, V. H. and Grant, L. 1969 — Organisational Behaviour and Human Performance, New York. Wiley.

Code: SWDSC-6
Title: CASE STUDIES

Every Candidate is expected to take up five cases, study them in depth and present the intervention, if any. Case refers to a unit of study – an individual, an institution, a community or an incident. The candidate has to work under the guidance of faculty member and submit the report on or before the date prescribed.

The university or the college concerned can develop guidelines for undertaking case studies. However, the students are encouraged to start his/her work on case studies from the beginning of the course.

Evaluation of the case study will be done along with the viva-voce examination by the viva-voce committee constituted for the assessment of social work practicum or similar committee may be constituted, if required.

Credit Matrix, Course of Study and Scheme of Examination for M.Sc. Degree Programme in Biochemistry

(With effect from 2021-22)

Programme Code: BIC

Course Type	Credits to be earned				Total Credits
	I Semester	II Semester	III Semester	IV Semester	
Hard Core Course	12	12	12	16	**52**
Soft Core Course	08	08	04	–	**20**
Open Elective Course*	–	–	04	–	**04**
Semester Total	**20**	**20**	**20**	**16**	**76**

*An Open Elective course offered by PG Dept. of Biochemistry to the students of other Depts.

Course Code	Course Type	Course Title	Credit Pattern (L:T:P)	Credits
Semester – I				
BCA040	HC	Analytical Biochemistry–I	3:1:0	4
BCA050	HC	Chemistry and Metabolism of Proteins and Nucleic Acids	3:1:0	4
BCA060	HC	Experiments in Biochemical Techniques and Enzymology** and Seminar	0:0:4	4
BCA230	SC	Enzymology	3:1:0	4
BCA250	**Choose any ONE from the following**		3:1:0	4
	SC	(i) Chemical Principles and Biochemical Reactions (ii) Plant Biochemistry (iii) Microbial Biochemistry		
Semester Total Credits				**20**

Course Code	Course Type	Course Title	Credit Pattern (L:T:P)	Credits
Semester – II				
BCB040	HC	Analytical Biochemistry–II	3:1:0	4
BCB050	HC	Chemistry and Metabolism of Carbohydrates and Lipids	3:1:0	4
BCB060	HC	Experiments in Immunology and Biochemical Estimations** and Seminar	0:0:4	4
BCB250	SC	Immunology and Microbiology	3:1:0	4
BCB260	**Choose any ONE from the following**		3:1:0	4
	SC	(i) Human Physiology and Nutrition (ii) Research Methodology and Biostatistics (iii) Clinical Research Methods and Industrial Biochemistry		
Semester Total Credits				**20**

Course Code	Course Type	Course Title	Credit Pattern (L:T:P)	Credits
Semester – III				
BCC070	HC	Cell Biology, Endocrinology and Cell Signaling	3:1:0	4
BCC050	HC	Clinical Biochemistry	3:1:0	4
BCC060	HC	Experiments in Clinical Biochemistry and Molecular Biology** and Research Paper Presentation	0:0:4	4
BCC220	**Choose any ONE from the following**		4:0:0	4
	SC	(i) Genomics, Proteomics and Bioinformatics (ii) Biotechnology and Research Methodology (iii) Pharmaceutical Biochemistry		
BCC630	OE	Nutrition and Health	4:0:0	4
		Semester Total Credits		**20**

Course Code	Course Type	Course Title	Credit Pattern (L:T:P)	Credits
Semester – IV				
BCD010	HC	Molecular Biology and Gene Regulation	3:1:0	4
BCD070	HC	Genetics and Genetic Engineering	3:1:0	4
BCD060	HC	Project Work OR Dissertation***	0:4:4	8*
		Semester Total Credits		**16**
		Total CREDITS to be earned for M.Sc. BIOCHEMISTRY		**76**

* Grade Point will be calculated with respect to the allotted credits

HC	Hard Core Course
SC	Soft Core Course
OE	Open Elective Course
C1	Component 1 of Internal Assessment (IA)
C2	Component 2 of Internal Assessment (IA)
C3	Component 3 (Semester-end Exam)
L	Lecture (1 Credit=1 hr)
T	Tutorial (1 Credit=2 hrs)
P	Practical (1 Credit=2 hrs)

** Weekly Four hrs of practical for Two days

*** Project work OR Dissertation should be in-house only and may be allotted to the students in the 2nd/3rd semester

Note: Two Practical examinations of four hrs duration each for C3 (component 3) of Hardcore Course with Practical Component Only.

SCHEME OF ASSESSMENT

Course Code	Course Type	Course Title	Exam Hrs	Max. Marks			
				IA		Exam C3	Total
				C1*	C2*		
Semester - I							
BCA040	HC	Analytical Biochemistry–I	3	15	15	70	100
BCA050	HC	Chemistry and Metabolism of Proteins and Nucleic Acids	3	15	15	70	100
BCA060	HC	Experiments in Biochemical Techniques and Enzymology ** and Seminar	4	15	15	70	100
BCA230	SC	Enzymology	3	15	15	70	100
BCA250	**Choose any ONE from the following**		3	15	15	70	100
	SC	(i) Chemical Principles and Biochemical Reactions (ii) Plant Biochemistry (iii) Microbial Biochemistry					
Semester Total Marks							**500**

Course Code	Course Type	Course Title	Exam Hrs	Max. Marks			
				IA		Exam C3	Total
				C1*	C2*		
Semester - II							
BCB040	HC	Analytical Biochemistry–II	3	15	15	70	100
BCB050	HC	Chemistry and Metabolism of Carbohydrates and Lipids	3	15	15	70	100
BCB060	HC	Experiments in Immunology and Biochemical Estimations** and Seminar	4	15	15	70	100
BCB250	SC	Immunology and Microbiology	3	15	15	70	100
BCB260	**Choose any ONE from the following**		3	15	15	70	100
	SC	(i) Human Physiology and Nutrition (ii) Research Methodology and Biostatistics (iii) Clinical Research Methods and Industrial Biochemistry					
Semester Total Marks							**500**

Course Code	Course Type	Course Title	Exam Hrs	Max. Marks			
				IA		Exam C3	Total
				C1*	C2*		
Semester - III							
BCC070	HC	Cell Biology, Endocrinology and Cell Signaling	3	15	15	70	100
BCC050	HC	Clinical Biochemistry	3	15	15	70	100
BCC060	HC	Experiments in Clinical Biochemistry and Molecular Biology** and Research Paper Presentation	4	15	15	70	100
BCC220	**Choose any ONE from the following**		3	15	15	70	100
	SC	(i) Genomics, Proteomics and Bioinformatics (ii) Biotechnology and Research Methodology (iii) Pharmaceutical Biochemistry					
BCC630	OE	Nutrition and Health	3	15	15	70	100
Semester Total Marks							**500**

Course Code	Course Type	Course Title	Exam Hrs	Max. Marks			
				IA		Exam C3	Total
				C1*	C2*		
Semester - IV							
BCD010	HC	Molecular Biology and Gene Regulation	3	15	15	70	100
BCD070	HC	Genetics and Genetic Engineering	3	15	15	70	100
BCD060	HC	Project Work OR Dissertation***	–	15	15	70	100
Semester Total Marks							**300**

- C1* & C2* Internal test will be conducted for 20 marks (if MCQs are used as assessment pattern, then there will be 30 MCQs carrying one mark each conducted through LMS of one hour duration and in both the cases the scored marks is reduced to 10 marks and 5 marks for continuous assessment is added, making a total of 15 marks each for C1 and C2.
- Continuous assessment comprise of assignments, group discussions, seminars and tutorials
- ** The Project evaluation is as below

  Component 1 (C1): Periodic Progress Report (15%)
  Component 2 (C2): Periodic Progress Report (15%)
  Component 3 (C3): Final Viva-Voce and Evaluation (70%)
  (The report evaluation is for 40% and the Viva-Voce examination is for 30%)

Program Outcome(s):

PO1: Provides with the necessary knowledge and skills to undertake a career in research, either in industry or in an academic setting
PO2: Provides the breadth and depth of scientific knowledge in Biochemistry and allied areas
PO3: Equips to apply for a PhD or to gain employment in biochemistry and allied areas
PO4: Provides a substantial element of hands-on research experience, with enhanced experimental skills
PO5: Demonstrates detailed knowledge and understanding of the principles and theories of biochemistry
PO6: Helps to understand the principle techniques of biomolecular structural characterization, including spectroscopy

Program Specific Outcome(s): The Specific Outcome of this programme is to train and provide the candidate with knowledge related to

PSO1: Global level research opportunities to pursue PhD programme targeted approach of CSIR-NET examination
PSO2: Enormous job opportunities at all level of chemical, pharmaceutical, food products, life oriented material industries
PSO3: Specific placements in R&D and quality control or analysis division of nutraceutical, pharmaceutical industries and allied division

Course Code	Title of the Course	Credits
BCA040	ANALYTICAL BIOCHEMISTRY–I	4

COURSE OUTCOME(S):

CO1 Specify in depth cell fractionation techniques

CO2 Write down in details with application, if applicable, chromatography and spectroscopy

CO3 Write down in details with application, if applicable, principle and applications of electrophoresis

CO4 Understand the classification and characteristics of centrifugation and microscopy

		No. of Lectures
Unit I:		**08**
1.1	**Cell Fractionation**	
1.1.1	Cell fractionation techniques: Preparation of extracts for biochemical investigations. Physico-chemical properties of solvents, solubility and miscibility, salting–in and salting–out.	
1.1.2	Choice of solvent for solvent extraction, mixed solvents, solid phase extraction. Cell lysis, dialysis, precipitation and ultra filtration.	

Unit II:		**14**
2.1	**Chromatography and Spectroscopy**	
2.1.1	Adsorption *vs.* Partition chromatography. Paper, TLC, Ion exchange, Reverse phase, Gel filtration, Affinity, HPLC, and Gas chromatographic techniques.	
2.1.2	Beer-Lamberts Law, Its verifications and Deviations, Concept of Absorptions, Transmission, Scattering, Phosphorescence, Fluorescence, Luminescence, Diffraction Spectra.	
2.1.3	Principle, instrumentation, working and applications of– UV and Visible Spectroscopy,	
2.1.4	Turbidometry and Nephlometry.	

Unit III:		**12**
3.1	**Electrophoresis**	
3.1.1	Theory of electrophoresis, continuous and discontinuous PAGE, SDS-PAGE.	
3.1.2	Other electrophoretic methods–Isoelectric focusing, 2–dimensional gel electrophoresis, Capillary electrophoresis and PFGE.	
3.1.3	Agarose gel electrophoresis of nucleic acids. Isotachophoresis.	
3.1.4	Separation of proteins, lipoproteins, visualizing separated	

	components–staining, fluorescence, PAS staining, zymogram and reverse zymogram,	

Unit IV:		
4.1	**Centrifugation and Microscopy**	**14**
4.1.1	Analytical and Preparative Ultracentrifuge–Principle, instrumentation and applications.	
4.1.2	Analysis of subcellular fractions, marker enzymes and determination of relative molecular mass–Svedberg's constant, sedimentation velocity and sedimentation equilibrium.	
4.1.3	Theories of Tissue Fixation and Staining Techniques. Principles of Transmission and Scanning Electron Microscopy.	
4.1.4	Principles of Phase Contrast and Fluorescence Microscopy, Confocal Microscopy	

References

[1] Analytical techniques in Biochemistry and Molecular Biology; Katoch, Rajan. Springer (2011)

[2] Basic Methods for the Biochemical Lab; Martin Holtzhauer, Springer, (2007).

[3] Principles and Techniques of Biochemistry and Molecular Biology 7th Edn. Keith Wilson and John Walker, Cambridge University Press, (2010).

[4] Biochemistry LabFax, Ed. J.A.A. Chambers and D. Rickwood,, Blackwell Science, (1993),

[5] Protein Purification Applications, S.L.V. Harris and Angal IRL Press, (1990)

[6] Laboratory Techniques in Biochemistry and Molecular Biology, Work and Work Vol. I & II, North Holland, (1969).

[7] Basic Mathematics for Biochemists; Cornish Bowden, Oxford University Press (1998),.

[8] Biophysical Tools for Biologists *In Vivo* Techniques; John Correia H. Detrich, III Elsevier (2008).

[9] Practical Biochemistry by Keith Wilson and Walker 5th ed. Cambridge.

[10] Biophysical chemistry, Upadhyaya, A., Upadhyaya, K. and Nath, N. Himalayan Publishing House.

[11] Practical biochemistry- Principles and Techniques. Wilson and Walker. J.Cambridge Uni. Press.

[12] Physical Biochemistry-David Freifelder, 2nd Edition.

[13] Principles of Instrumental Analysis. 5th Ed. Douglas A Skoog, James Holler and Timothy A Nieman.

[14] Introduction to Electron Microscopy for Biologists; Terry Allen, Academic Press (2008).

Course Code	Title of the Course	Credits
BCA050	**CHEMISTRY AND METABOLISM OF PROTEINS AND NUCLEIC ACIDS**	**4**

COURSE OUTCOME(S):

CO1 Identify the details of amino acids and proteins

CO2 Understand in details with application, if applicable, nitrogen metabolism and degradation

CO3 Write down the classification and characteristics of synthesis of amino acids and proteins

CO4 Write down in details with application, if applicable, metabolism of nucleic acids

		No. of Lectures
Unit I:		**10**
1.1	**Chemistry of Amino acids and Proteins**	
1.1.1	Classification and structure of 20 amino acids, newly discovered amino acids, essential, non–essential, unusual and non-protein	
1.1.2	General properties of aa, acid–base titrations, pKa Peptide bond–stability and formation, chemical synthesis of peptide. Primary structure and determination, GN Ramachandran plots	
1.1.3	Secondary structure and motifs, α helix, β sheet, Leucine zipper, Zinc finger	
1.1.4	Tertiary & Quaternary structure (myoglobin, hemoglobin) Protein-protein interactions (actin, tubulin) Small peptides (glutathione, peptide hormones), Cyclic peptides (Gramicidin)	
1.1.5	Classification of proteins-globular, fibrous, membrane, metallo–proteins, Denaturation (pH, temperature, chaotropic agents), refolding, Role of chaperones in folding	
Unit II:		**14**
2.1	**Nitrogen Metabolism and Degradation of Amino Acids**	
2.1.1	Nitrogen cycle, Nitrogen fixation – symbiotic and non-symbiotic, Nitrogenase complex. Assimilation of ammonia	
2.1.2	Metabolic fate of dietary proteins and amino acids Degradations to glucose and ketone bodies	
2.1.3	Amino acids degraded to Pyruvate, Oxaloacetate	
2.1.4	Amino acids degraded to Acetyl-CoA, Succinyl-CoA Metabolism of branched chain amino acids, urea cycle, regulation of urea cycle	
2.1.5	Genetic defects in metabolism of amino acids (albinism, Phenylketonuria, maple syrup urine disease, homocystinuria alkaptonuria, methyl malonic Acidemia)	

Unit III:		
3.1	**Biosynthesis of Amino Acids and Protein Degradation**	
3.1.1	Biosynthesis of amino acids and regulation of amino acid metabolism	**08**
3.1.2	Biosynthesis and degradation of heme	
3.1.3	Biosynthesis of polyamines, creatine, gramicidine and glutathione	
3.1.4	Biosynthesis and degradation of glycoproteins and proteoglycans	
3.1.5	Protein degradation pathway–Ubiquitin–Proteosome pathway, lysosomal pathway	

Unit IV:		
4.1	**Chemistry and Metabolism of Nucleic Acids**	
4.1.1	Purines, pyrimidines, nucleosides, nucleotides, unusual bases. Structure of DNA – Watson Crick Model, A- and Z- forms.	**16**
4.1.2	Supercoiling of DNA – negative and positive, linking number	
4.1.3	Structure of RNA, tRNA, rRNA, siRNA / miRNA Denaturation and renaturation, Tm (factors affecting Tm) and Cot curves, Isolation and purification of nucleic acids from biological sources.	
4.1.4	Biosynthesis of purines and pyrimidines, Degradation of purines and pyrimidines, Regulation: de novo, salvation, nucleotide analogs, conversion of nucleotides to deoxynucleotides, mechanism of action of methotrexate, 5–flurouridine, azathymidine.	
4.1.5	Gout and Lesch–Nyhan syndrome	
4.1.6	Biosynthesis of NAD, FAD and Co–enzyme A	

References

[1] Lehninger Principles of Biochemistry 4th Ed By David L. Nelson and Michael M. Cox, WH Freeman and Company.

[2] Biochemistry by Lubert Stryer. WH Freeman and Co.

[3] Biochemistry: The Molecular Basis of Life by Trudy McKee and James R McKee. Publisher: McGraw-Hill Higher education.

[4] Biochemistry and Molecular biology By William H. Elliott and Daphne C. Elliott. Oxford University Press.

[5] Biochemistry 3rd Ed. By Donald J. Voet and Judith G. Voet. John Wiley and Sons.

[6] Biochemistry: Biomolecules, Mechanisms of Enzyme Action and Metabolism Vol 1 by D Voet. John Wiley and Sons.

Course Code	Title of the Course	Credits
BCA060	**EXPERIMENTS IN BIOCHEMICALTECHNIQUES AND ENZYMOLOGY AND SEMINAR**	**4**

COURSE OUTCOME(S):

CO1 Identify the details of spectrophotometer

CO2 Identify the details of specific activity of enzymes

CO3 Deliberate the characteristics of gel electrophoresis

CO4 Deliberate the characteristics of use of pipettes

Group I:	1. Determination of Normality, Molarity and Molality of solutions 2. Preparation of buffers: Acetate, Phosphate and Tris buffer 3. Colorimetry–Beer's law and its applications 4. Determination of Molar Extinction Coefficient 5. Chromatography–Separation of amino acids by ascending, descending, circular paper chromatography 6. TLC of amino acids 7. Gel filtration, Ion exchange chromatography	
Group II:	8. Estimation of protein by Lowry's method. 9. Estimation of protein by Biuret reagent method. 10. Estimation of amino acids by Ninhydrin method 11. Isolation of casein from milk and its quantification 12. Electrophoresis–Separation of proteins by Native and SDS-PAGE 13. Determination of *pKa* and *pI* of amino acid, formal titration. 14. Separation of nucleic acids by agarose gel electrophoresis	
Group III:	15. Isolation of microbes from air, soil and water 16. Gram's staining 17. Determination of growth curve of bacteria 18. Antibiotic sensitivity tests 19. Determination of specific activity of (i) Acid Phosphatase (ii) Alkaline Phosphatase (iii) Salivary Amylase (iv) Protease (v) Invertase (vi) Aminotransferase	

Group Study	Extraction, Isolation, Purification and enzyme characterization. Determination of specific activity, optimum pH, temperature, time and energy of activation. Determination of *Km* and *Vmax* Enzyme inhibition studies	

References

[1] Analytical techniques in Biochemistry and Molecular Biology; Katoch, Rajan. Springer (2011).

[2] Basic Methods for the Biochemical Lab; Martin Holtzhauer, Springer, (2007).

[3] Principles and Techniques of Biochemistry and Molecular Biology 7th Edn. Keith Wilson and John Walker, Cambridge University Press, (2010).

[4] Biochemistry LabFax, Ed. J.A.A. Chambers and D. Rickwood,, Blackwell Science, (1993),

[5] Protein Purification Applications, S.L.V. Harris and Angal IRL Press, (1990)

[6] Laboratory Techniques in Biochemistry and Molecular Biology, Work and Work Vol. I & II, North Holland, (1969).

[7] Physical Biochemistry, Kansal Edward Van Halde. Prentice Hall.

[8] Modern Experimental Biochemistry R.F.Boyer [Ed.] (1986) Addition Wesley.

[9] Analytical Biochemistry; D.J. Holme and H. Pick Longman (1983).

[10] Principles and techniques of Biochemistry and Molecular Biology; Keith Wilson and John Walker; 6th Edn. (2005) Cambridge University Press.

[11] Biochemical Calculations, Irwin H. Segel (1976) 2nd Ed. John Wiley and Sons.

Course Code	Title of the Course	Credits
BCA230	ENZYMOLOGY	4

COURSE OUTCOME(S):

CO1 Write down in details with examples enzyme kinetics

CO2 Identify in details with examples enzyme catalysed reactions

CO3 Identify the characteristics of cooperativity reactions

CO4 Learn the classification and characteristics of multienzyme complex reactions

		No. of Lectures
Unit I:		**16**
1.1	**Enzyme Kinetics and Inhibition**	
1.1.1	Nature of enzymes, Nomenclature and IUB classification of enzymes, Units of enzyme activity, IU and activity and specific activity. Localization, isolation, purification and characterization of enzymes. Criteria of purity of enzymes. Assay methods–coupled enzyme assays, continuous, end point and kinetic assay.	
1.1.2	Enzyme Kinetics: Rate of a reaction, order and molecularity. Michaelis Menten equation, initial velocity approach, steady state approach. Vmax, Km and their significance. Linear transformation of Michaelis Menten equation–Lineweaver Burk plot, Eadie Hofstee, Haynes–Wolf and Cornish–Bowden.	
1.1.3	Inhibition: Reversible inhibition–Competitive, Non competitive and Uncompetitive, product inhibition, irreversible inhibition–suicide inhibition. Determination of *Ki.* Fast reactions–Stopped flow, temperature jump method with examples of enzymes.	
Unit II:		**08**
2.1	**Enzyme Catalyzed Reactions**	
2.1.1	Bisubstrate enzyme catalysed reactions–Cleland's notation with examples for ordered, ping pong, and random.	
2.1.2	General rate equation. Primary and secondary plots. Mechanisms of enzyme catalysis–Active site structure and its investigation.	
2.1.3	Methods of determining active site structure–isolation of ES/EI complex, affinity labeling, chemical modification studies.	

Unit III:		
3.1	**Enzyme Catalysis and Cooperativity**	
3.1.1	Nature of enzyme catalysis: Transition state theory, proximity and orientation, orbital steering, acid base catalysis, covalent catalysis, metal ion catalysis, nucleophilic and electrophilic catalysis, intramolecular catalyses, entropy effects.	**12**
3.1.2	Effect of temperature and pH on enzyme catalyzed reactions.	
3.1.3	Oligomeric proteins and Cooperativity: Binding of ligands to macromolecules–Scatchard plot, Positive and Negative cooperativity. Oxygen binding to hemoglobin.	
3.1.4	Hill equation, homotropic and heterotropic effectors. Allosteric enzyme–Aspartyl transcarbamylase.	

Unit IV:		
4.1	**Multienzyme Complex and Coenzymes**	
4.1.1	Mechanisms of action of specific enzyme: Chymotrypsin zymogen activation, acid–base catalysis, charge relay net work. Lysozyme, alcohol dehydrogenase, ribonuclease, Carboxypeptidase–A, RNA as enzyme, coenzymic action of NAD+ FAD, TPP, PLP, biotin, CoA, folic acid and lipoic acid.	**12**
4.1.2	Multienzyme complexes: Isoenzymes, eg. LDH. Multifunctional enzyme (DNA polymerase) multi enzyme complex (PDC)	
4.1.3	Metabolic regulation of enzyme activity–Feedback regulation.	

References

[1] Fundamentals of Enzymology; 3rd Edn. Nicholas C. Price and Lewis Stevens, Oxford University Press (2012).
[2] Enzymes; Trevor Palmer, East − West Press Pvt. Ltd., Delhi (2004).
[3] Enzymes: A Practical Introduction to Structure, Mechanism, and Data Analysis; Robert A. Copeland, Wiley-VCH Publishers (2000).
[4] Enzyme Kinetics and Mechanism; Paul F. Cook, W. W. Cleland, Garland Science (2007).
[5] Enzyme Kinetics; Roberts, D.V. (1977), Cambridge University Press.
[6] The Enzymes; Boyer, Academic Press, (1982).
[7] Principles of Enzymology for Food Sciences; Whitaker, Marcel Dekker (1972) Academic Press.
[8] Introduction to Enzyme and Co-enzyme Chemistry. Ed. T. Bugg, (2000), Blackwell Science.

Course Code	Title of the Course	Credits
BCA250	CHEMICAL PRINCIPLES AND BIOCHEMICAL REACTIONS	4

COURSE OUTCOME(S):

CO1 Specify in details with examples chemical principles and bonding

CO2 Write down in depth thermodynamics

CO3 Learn in details with application, if applicable, stereochemistry

CO4 Deliberate in depth secondary metabolites

		No. of Lectures
Unit I:		**16**
1.1	**Chemical Principles and Bonding**	
1.1.1	Chemical principles: Acids and bases, Buffers. Buffering capacity. Ionic strength- Molarity, Normality, Mole concept, Avogadro number, structure and special properties of water.	
1.1.2	Bonding: Covalent bond, ionic bond, Coordinate bond. Coordinate bond formation by transition metals in biological complex structures.	
1.1.3	Crystal field theory, ligand field theory, valence bond theory.	
1.1.4	Bonding of iron in hemoglobin and cytochromes, cobalt in Vit B12, and Mg2+ in chlorophyll. Chelates and complexes.	

Unit II:		**08**
2.1	**Thermodynamics**	
2.1.1	Physiological importance of electrolytes: Osmotic pressure, vapour pressure, vapour pressure osmometer, Donnan membrane equilibrium.	
2.1.2	Introduction to thermodynamics: I, II and III law. Enthalpy, entropy and free energy. Free energy and chemical equilibrium	
2.1.3	Electrodes: Hydrogen electrode, oxygen electrode, oxidation and reduction reactions, redox potential.	

Unit III:		**12**
3.1	**Stereochemistry and Heterocyclic Compounds**	
3.1.1	Importance of Stereochemistry, position and order of groups around carbon. Geometric and optical isomerism, absolute and relative configuration. Symmetry view of	
3.1.2	chirality, relation between chirality and optical activity, representation of chiral structures by Fischer.	
3.1.3	Structure and stereochemistry of glucose–anomers, epimers and sterioisomers, D and L, + and – R and S notations.	
3.1.4	Heterocyclic Compounds: Chemistry, biological	

	occurrence of furan, indole, thiazole, pterine, pteridine, isoalloxazine, pyrrole.	

Unit IV:		
4.1	**Organic Reactions and Secondary Metabolites**	
4.1.1 4.1.2 4.1.3	Mechanism of Organic Reactions: Classification of organic reactions. Reaction intermediates, reaction energetics, rate, order and molecularity of reactions. Mechanisms and stereochemistry of substitution, addition, and elimination. Rearrangements reactions. Mechanisms of ester hydrolysis. Aromaticity and resonance structure. Hydrogenation- homogenous and heterogenous hydrogenation Secondary metabolites: Phytochemicals, terpenes, polyphenols, procyanidins, flavonoids, xanthones, alkaloids and pigments.	**12**

References

[1] Basic principles of organic chemistry- Robers and Caserio
[2] Organic chemistry, Hendrickson, Cram and Hammonal.
[3] Organic chemistry, I. L. Finar, Longman group Ltd.
[4] Organic chemistry, Morrison and Boyd, 4th edition Allyn and Bacon Inc.

Course Code	Title of the Course	Credits
BCA250	PLANT BIOCHEMISTRY	4

COURSE OUTCOME(S):

CO1 Specify in details with examples Photosynthetic pathways and its regulations

CO2 Write down in depth plant growth hormones in the agriculture

CO3 Learn in details with application, if applicable, Medicinal plants

CO4 Deliberate in depth secondary metabolites of plants and its significance

		No. of Lectures
Unit I:		**12**
1.1	**Plant Cell and Photosynthesis**	
1.1.1	Plant cell–Structure and functions of subcellular organelles, plant cell wall, Mechanism of water absorption, Ascent of sap. Transpiration - types, stomatal opening, Mechanism and factors affecting transpiration.	
1.1.2	Photosynthesis–Photosynthetic pigments, Photo synthetic apparatus, Light reactions, cyclic and non cyclic Phosphorylation. Calvin cycle, Hatch–Slack cycle, CAM plants.	
1.1.3	Regulation of photosynthesis, Photorespiration. □	

Unit II:		**12**
2.1	**Cycles of elements**	
2.1.1	Nitrogen cycle, Biochemistry of symbiotic and non symbiotic nitrogen fixation, Sulphur cycle, Phosphorus cycle.	
2.1.2	Plant nutrition–Biological functions of micro and macro nutrients in plants and their deficiency symptoms.	

Unit III:		**16**
3.1	**Growth Regulators**	
3.1.1	Plant growth regulators–chemistry, biosynthesis, mode of action, distribution and physiological effects of Auxins, Gibberellins, Cytokinins, ABA and Ethylene.	
3.1.2	Biochemistry of seed dormancy, Seed germination,	
3.1.3	Fruit ripening and Senescence.	

Unit IV:		
4.1	**Medicinal Importance**	**08**
4.1.1	Medicinal value of different parts of plants.	
4.1.2	Basic methods to identify the secondary metabolites. Role of secondary metabolites in Ayurvedha and Siddha treatment.	
4.1.3	Medicinal value of Amla, Stevia, Aswagandha, Turmeric and other Indian medicinal plants. □	

References

[1] Plant physiology, Verma, 7th Revised edition, Emkay Publications 2001.

[2] Plant Physiology, S. N. Pandey and B.K. Sinha, Vikas Publishing House Pvt. Ltd, 3rd edition, 1999.

[3] Plant Biochemistry and Molecular Biology, Peter Jhea, Richard C. Leegood,

[4] Introduction to plant physiology, William. G.Hopkins, Norman. P.A. Hunger, 3rd edition

[5] A Handbook of Medicinal Plants –Prajapathi, Purohit,Sharma, Kumar

[6] Medicinal Plants –a compendium of 500 species.

Course Code	Title of the Course	Credits
BCA250	MICROBIAL BIOCHEMISTRY	4

COURSE OUTCOME(S):

CO1 Specify in details with examples staining techniques used for the identification of microbes

CO2 Write down in depth Molecular biology of prokaryotes

CO3 Learn in details with application, if applicable, Operon systems in gene regulation of bacteria

CO4 Deliberate in depth antimicrobial drugs are used for the microbial infections

		No. of Lectures
Unit I:		**10**
1.1	**Pure Culture, Staining Technique and Growth**	
1.1.1	Principles of microbial nutrition: Nutritional requirements, different kinds of media, factors affecting growth.	
1.1.2	Enrichment culture techniques for isolation of chemoautotroph's, chemoheterotroph's and photosynthetic microorganisms. Modes of reproduction,	
1.1.3	Biosynthesis of cell wall components, enumeration, growth curve, generation time, synchronous growth, Chemostat. Adaptation to stationary phase, heat and cold shock, osmolarity and salinity, oxidative stress.	
1.1.4	Gram, Acid fast & flagellar staining. Mechanism of bacterial motility.	

Unit II:		**14**
2.1	**Regulation of Genes in Bacteria**	
2.1.1	Nucleic Acids as Carriers of Genetics Information, Arrangement and Organization of Gene in Prokaryotes:	
2.1.2	Operon Concept, Catabolite Repression, Instability of Bacterial RNA, Inducers and Co repressors E. coli Lac Operon: Negative Regulation and Positive Regulation, E. Coli Arabinose Operon: Regulation by Attenuation, His and Trp Operons: Anti-termination,	
2.1.3	Genetic Transfer: Conjugation, Transformation and Transduction.	

Unit III:		
3.1	**Virology and Biological Nitrogen Fixation**	
3.1.1	Introduction to Virus, Classification, Assay Methods, Properties and Characteristic of Bacterial, Plant and Animal Viruses	**16**
3.1.2	Virus Host Interaction, Acute Virus Infections, Persistent of Virus Infection, Influenza, Herpes, Hepatitis A and B.	
3.1.3	Nitrogen Metabolism: Mechanism and Regulation of Utilization of Ammonia, Nitrate and other Nitrogen Source	
3.1.4	Nitrogen Fixation: Mechanism and Regulation of Nitrogen Fixation, Symbiotic and Asymbiotic Nitrogen Fixation and Biochemistry of Nitrogenase.	

Unit IV:		
4.1	**Antimicrobial Agents**	
4.1.1	The Development of Antimicrobial Agents, Past, Present and Future, Selection of Antimicrobial Agents	**08**
4.1.2	Synthetic Organic Antimicrobials, β-Lactam Antibiotics, Amino glycoside Antibiotics, Antifungal Drugs, Antiviral Drugs	
4.1.3	Resistance to Antimicrobial Drugs	

References

[1] Microbial physiology, 2nd Edn. I.W. Dawes and I.W. Sutherland (1991) Blackwell Scientific.
[2] Microbial physiology, 4th Edn. Albert G. Moat, John W. Foster and Michael P. Spector, Wiley-Liss (2002).
[3] Biology of Microorganisms, Brock Prentice Hall (1996).
[4] Microbiology: Lansing M. Prescot, Hartley and Klein, 5th Edn. McGraw Hill (2002).
[5] General Microbiology, Stainer *et al.,* 4th Edn. McMillan (1975).
[6] Microbiology, Pelczer, Reid and Kreig Tata McGraw Hill (1996).

Course Code	Title of the Course	Credits
BCB040	ANALYTICAL BIOCHEMISTRY–II	4

COURSE OUTCOME(S):

CO1 Identify in details with application, if applicable, flow cytometry

CO2 Specify the characteristics of biosensor technology

CO3 Understand in details with examples spectroscopy

CO4 Write down the details of x-ray crystallography

		No. of Lectures
Unit I:		**08**
1.1	**Flow Cytometry and Model Systems**	
1.1.1	Flow Cytometry: Principle and design of flow cytometer, cell sorting.	
1.1.2	Animal models: Choice of animals, types of studies, mutant organisms, cultured cells, plant as models and tissue culture models.	

Unit II:		**16**
2.1	**Biosensor Technology and Radioactivity**	
2.1.1	Concept and design of biosensors, types and uses of biosensors.	
2.1.2	Principle and applications of biosensors for glucose, triglyceride, uric acid, cholesterol and oxalate.	
2.1.3	Units of radioactivity. Detection and measurement of radioactivity–solid and liquid scintillation counting, scintillation cocktails and sample preparation. Cerenkov counting. Applications of radioisotopes in biology. Radiation hazards.	
2.1.4	Principle and Applications of Autoradiography	

Unit III:		**10**
3.1	**Spectroscopy**	
3.1.1	Principle, instrumentation, working and application of– Spectrofluorimetry, Flame Spectrophotometry, Atomic Absorption Spectrometry.	
3.1.2	IR spectroscopy: Physical basis of IR spectroscopy. Instrumentation, use of IR in structure determination, Fourier Transfer–IR spectroscopy.	
3.1.3	NMR: Principle, effect of atomic, identity on NMR, chemical shift, spin coupling NMR, measurement of NMR spectra, biochemical application of NMR.	
3.1.4	ESR: Principle, measurement of ESR spectra, biochemical application of ESR.	
3.1.5	Principle, instrumentation and applications of ORD and CD	

Unit IV:		
4.1	**Mass spectroscopy, X-ray Crystallography and Nanoparticles**	
4.1.1	Theory and construction of mass spectrometer. Ionization, fragmentation, *m/z*, time of flight, MALDI and ESI.	**14**
4.1.2	Other methods: MS/MS, LC/MS, GC/MS, Peptide mapping, post translation modification analysis, determination of disulfide bridges	
4.1.3	X-ray crystallography–Bragg's law, Unit cell, Isomorphous replacement, Fibre pattern of DNA.	
4.1.4	Introduction to Nanoscience: Importance and fundamental science behind nanotechnology.	
4.1.5	Applications of Nanoparticles: Tools to make nanostructures, Nanoscale lithography, E–beam lithography, molecular synthesis, self assembly. Drug and Gene delivery for human health, Biosensors and sensors, cleaning environment (for heavy metal & Bioremediation).	

References

[1] Analytical techniques in Biochemistry and Molecular Biology; Katoch, Rajan. Springer (2011)

[2] Basic Methods for the Biochemical Lab; Martin Holtzhauer, Springer, (2007).

[3] Principles and Techniques of Biochemistry and Molecular Biology 7th Edn. Keith Wilson and John Walker, Cambridge University Press, (2010).

[4] Biochemistry LabFax, Ed. J.A.A. Chambers and D. Rickwood,, Blackwell Science, (1993),

[5] Protein Purification Applications, S.L.V. Harris and Angal IRL Press, (1990)

[6] Laboratory Techniques in Biochemistry and Molecular Biology, Work and Work Vol. I & II, North Holland, (1969).

[7] Basic Mathematics for Biochemists; Cornish Bowden, Oxford University Press (1998),.

[8] Biophysical Tools for Biologists *In Vivo* Techniques; John Correia H. Detrich, III Elsevier (2008).

[9] Practical Biochemistry by Keith Wilson and Walker 5th ed. Cambridge.

[10] Biophysical chemistry, Upadhyaya, A., Upadhyaya, K. and Nath, N. Himalayan Publishing House.

[11] Practical biochemistry- Principles and Techniques. Wilson and Walker. J.Cambride Uni. Press.

[12] Physical Biochemistry-David Freifelder, 2nd Edition.

[13] Principles of Instrumental Analysis. 5th Ed. Douglas A Skoog, James Holler and Timothy A Nieman.

Course Code	Title of the Course	Credits
BCB050	CHEMISTRY AND METABOLISM OF CARBOHYDRATES AND LIPIDS	4

COURSE OUTCOME(S):

CO1 Understand the classification and characteristics of chemistry of carbohydrates

CO2 Deliberate the classification and characteristics of bioenergetics

CO3 Write down the characteristics of chemistry of lipids

CO4 Learn in depth metabolism of lipids

		No. of Lectures
Unit I:		**10**
1.1	**Chemistry of Carbohydrates**	
1.1.1	Classification, monosaccharides (aldoses & ketoses) Configuration and conformation of monosaccharides (pyranose & furanose, chair & boat).	
1.1.2	Reducing and optical properties of sugars. Stability of glycosidic bond disaccharides, oligosaccharides.	
1.1.3	Structural polysaccharides–cellulose, hemicellulose, pectin, lignin, chitin, chitosan	
1.1.4	Storage polysaccharides: starch, glycogen, inulin Steric factors in polysaccharides folding, blood group polysaccharides and lectins. Glycosaminoglycans, mucopolysaccharides, hyaluronic acid Chondroitin sulfate, keratan sulfate, dermatan sulfate. Bacterial cell wall polysaccharides, proteoglycans (syndecan and agrecan)	

Unit II:		**14**
2.1	**Metabolism of Carbohydrates and Bioenergetics**	
2.1.1	Reactions and energy balance in Glycolysis, Gluconeogenesis, TCA cycle, HMP Shunt pathway, Pasteur and Crabtree effect, Anapleurotic reactions	
2.1.2	Glyoxylate cycle, Glucuronic acid cycle, Glycogen metabolism.	
2.1.3	Photosynthesis reactions for biosynthesis of glucose C3 and C4 cycle in plants	
2.1.4	Mitochondrial ETC–Organization of respiratory chain complexes, P/O ratio, ATP synthesis, Mitchell's hypothesis, uncouplers and inhibitors.	

Unit III:		**12**
3.1	**Chemistry of Lipids**	
3.1.1	Classification & biological significance of lipids, fatty acids and Steroids	
3.1.2	Bile acids and salts, Phospholipids, Oils, waxes, isoprene units, Lipoproteins, Glycolipids, Sphingolipids	

3.1.3	Cerebrosides, Gangliosides, Prostaglandins, Prostacyclins, Thromboxanes, Leukotrienes, cysteinyl leukotrienes	

Unit IV:		**12**
4.1	**Metabolism of Lipids**	
4.1.1	Fate of dietary lipids and Apo-lipoproteins Fatty acid biosynthesis, Desaturation of fatty acids Beta oxidation, breakdown of odd chain fatty acids, energy yields	
4.1.2	Regulation of β–oxidation, ώ–oxidation & α–oxidation Metabolism of phospholipids &Sphingolipids Regulation and Biosynthesis of cholesterol, action of statins	
4.1.3	Fate of acetyl CoA, formation of ketone bodies and ketosis	
4.1.4	Biosynthesis of prostaglandins, Prostacyclins, Thromboxanes, Leukotrienes, Action of aspirin	
4.1.5	Genetic defects in lipid metabolism, Medium chain acyl coenzyme A dehydrogenase deficiency MCAD, Long–chain 3–hydroxyacyl–CoA dehydrogenase (LCHAD) deficiency, Familial hypercholesterolemia	

References

[1] Lehninger Principles of Biochemistry 4th Ed By David L. Nelson and Michael M. Cox, WH Freeman and Company.

[2] Biochemistry by Lubert Stryer. WH Freeman and Co.

[3] Biochemistry: The Molecular Basis of Life by Trudy McKee and James R McKee. Publisher: McGraw-Hill Higher education.

[4] Biochemistry and Molecular biology By William H. Elliott and Daphne C. Elliott. Oxford University Press.

[5] Biochemistry 3rd Ed. By Donald J. Voet and Judith G. Voet. John Wiley and Sons.

[6] Biochemistry: Biomolecules, Mechanisms of Enzyme Action and Metabolism Vol 1 by D Voet. John Wiley and Sons.

Course Code	Title of the Course	Credits
BCB060	**EXPERIMENTS IN IMMUNOLOGY AND BIOCHEMICAL ESTIMATIONS**	4

COURSE OUTCOME(S):

CO1 Understand in details with examples antigen antibody reactions

CO2 Specify in details with application, if applicable, oils and fats estimation

CO3 Understand in depth acid value principle and determination

CO4 Identify in details with examples mitosis and meiosis

Group I:	1. Demonstration of Ag-Ab interaction: Radial immuno-diffusion and ODD. 2. Demonstration of direct agglutination reaction using human blood group antigens. 3. Demonstration of indirect agglutination reaction– latex agglutination. 4. Fluorescence emission of proteins and vitamins 5. UV–Vis spectra of proteins, nucleic acids and other aromatic compounds 6. Extraction of neutral lipids, phospholipids 7. TLC of lipids and estimation of phospholipids	
Group II:	8. Iodine No. of Oils/Fats 9. Saponification Value of Oils/Fats 10. Acid Value/Peroxide Value of Oils/Fats 11. Estimation of α-Keto-acid 12. Estimation of ascorbic acid 13. Estimation of Iron 14. Estimation of Calcium	
Group III:	15. Isolation of Starch from potato and purity determination 16. Colorimetric estimation of reducing sugars (DNS reagent method) 17. Estimation of reducing sugar: Hegedorn and Jensen Method 18. Estimation of Phosphate 19. Mitosis in onion root tips 20. Meiosis in *tradescantia/*grasshopper testis 21. Total and Differential Cell Counting of blood	

Group Study	Preparation of antigen adjuvant mixture, injection and raising antibodies in rat. Purification of antibodies Antibody titer and ELISA	

References

[1] Analytical techniques in Biochemistry and Molecular Biology; Katoch, Rajan. Springer (2011).
[2] Basic Methods for the Biochemical Lab; Martin Holtzhauer, Springer, (2007).
[3] Principles and Techniques of Biochemistry and Molecular Biology 7th Edn. Keith Wilson and John Walker, Cambridge University Press, (2010).
[4] Biochemistry LabFax, Ed. J.A.A. Chambers and D. Rickwood,, Blackwell Science, (1993),
[5] Protein Purification Applications, S.L.V. Harris and Angal IRL Press, (1990)
[6] Laboratory Techniques in Biochemistry and Molecular Biology, Work and Work Vol. I & II, North Holland, (1969).
[7] Physical Biochemistry. Kansal Edward Van Halde. Prentice Hall.
[8] Modern Experimental Biochemistry R.F. Boyer [Ed.] (1986) Addition Wesley.
[9] Analytical Biochemistry; D.J. Holme and H. Pick Longman (1983).
[10] Principles and techniques of Biochemistry and Molecular Biology; Keith Wilson and John Walker; 6th Edn. (2005) Cambridge University Press.
[11] Biochemical Calculations, Irwin H. Segel (1976) 2nd Ed. John Wiley and Sons.
[12] Methods in Immunology and Immunochemistry; Curtis Williams, Academic Press (1971).
[13] Immuno Assay Hand Book; David Wild, Elsevier (2013).

Course Code	Title of the Course	Credits
BCB250	IMMUNOLOGY AND MICROBIOLOGY	4

COURSE OUTCOME(S):

CO1 Identify in details with examples antigens and antibodies

CO2 Understand the details of cellular basis of immunity

CO4 Identify the classification and characteristics of MHC Complex

CO4 Learn in depth basic concepts of microbiology

		No. of Lectures
Unit I:		**12**
1.1	**Antigens and Antibodies**	
1.1.1	Introduction: Historical development and milestones in immunology. Barriers to infection–skin, mucous membrane, Definitions–Antigenicity, Immunogenicity, primary and secondary lymphoid organs, self and non self discrimination. Innate and acquired immunity.	
1.1.2	Antigens and Antibodies: Haptens and determinants–Epitopes and paratopes. Antigenicity, carbohydrates, proteins, nucleic acids, and cells as antigens. Valency of antigen.	
1.1.3	Classes and subclasses of immunoglobulins, structure of immunoglobulins, hyper variable region, isotypic, allotypic and idiotypic variations.	
Unit II:		**12**
2.1	**Complement and Cellular Basis of Immunity**	
2.1.1	Complement: Structure, components, properties and functions of complement pathways, biological consequences of complement activation.	
2.1.2	Hyper sensitivity reactions (Type I, II, III and IV).	
2.1.3	Cellular basis of immunity: Primary and secondary immune response. Reticuloendothelial system. T, B and accessory cells. Subsets of T (T–helper cells, T–killer cells, T–suppressor cells) and B cells. Development of T and B cells. T and B cell receptors, antigen processing and presentation.	
2.1.4	Cytokines and co–stimulatory molecules–Lymphokines, interleukins structure and function of IL-2, TNFα. T and B interaction. Suppression of immune response, immunoglobulin, diversity of gene rearrangement, factors affecting diversity, class switching and clonal selection theory of Burnet.	

Unit III:		
3.1	**MHC, Transplantation, Tumor Immunology and Vaccines**	
3.1.1	MHC: MHC gene and its polymorphism, role of MHC in immune response.	**16**
3.1.2	Transplantation: Autograft, isograft, allograft and xenograft, Graft rejection, graft *Vs* host reaction, MHC in transplantation.	
3.1.3	Immunochemical techniques: Precipitation, agglutination, complement fixation, immunodiffusion, immunoelectrophoresis, immunofluorescence, RIA, ELISA.	
3.1.4	Tumor immunology: Tumor associated antigens, factors favoring tumor growth, immune surveillance. Tumor necrosis factors α and β Disorders of immunity: Immunological tolerance, auto immune disorders, AIDS, SCID, lupus erythematosus Vaccines: Adjuvants; vaccines and their preparations. Polyclonal and monoclonal antibodies–hybridoma technique.	
Unit IV:		
4.1	**Microbiology**	
4.1.1	Historical aspects - Discovery of microorganisms. Theory of spontaneous generation. Era of Louis Pasteur. Microbes and fermentation. Microbes and diseases-Koch's Postulates.	**08**
4.1.2	General characteristics: Morphology, nomenclature and classification of bacteria, virus, yeasts and fungi.	
4.1.3	Microbial nutrition-Factors influencing growth, growth curve of bacteria. Measurement of growth, continuous culture, synchronous culture and chemostat. Auxotrophs, autotrophs, heterotrophs. Methods of cultivations and preservation of microorganisms.	
4.1.4	Methods of control of microorganisms-Sterilization Techniques: Definitions of physical methods, heat (dry & moist) filtration, radiation; chemical agents-phenols, alcohols, halogens, heavy metals, aldehydes, quaternary ammonium compounds & gases.	

References

[1] Antibodies–A Laboratory Manual; E. D. Harlow, David Lane, 2nd Edn. CSHL Press (2014).
[2] Basic and Clinical Immunology; Stites *et al.,* [Ed] (1982) Lange.
[3] Roitt's Essential Immunology; Ivan, M. Roitt & Peter J Delves (2001) Blackwell Science.
[4] Immunology: Roitt *et al.,* Mosby (2001),
[5] Kuby Immunology; Oven, Punt, Stranford, 7th Edn. W. H. Freeman (2013).
[6] Immune System; M. C. Connel et al., Eds. (1981) Blackwell Science.
[7] Immunology at a Glance: J.H.L. Playfare [ed.] Blackwell Science, (1987).
[8] Immunology; Jan Klein [Ed.], Blackwell Science (1990).
[9] Introduction to Immunology; Kim Bell [Ed.,] 3rd Edn. McMillan (1990).

Course Code	Title of the Course	Credits
BCB260	HUMAN PHYSIOLOGY AND NUTRITION	4

COURSE OUTCOME(S):

CO1 Specify the classification and characteristics of blood and respiratory systems

CO2 Identify in depth digestive and excretory systems

CO3 Learn in details with application, if applicable, concepts of nutrition

CO4 Specify the details of vitamins and minerals

		No. of Lectures
Unit I:		**12**
1.1	**Blood and Respiratory System**	
1.1.1	Blood–Composition, cells. Erythrocytes–structure and function, WBC–types and functions.	
1.1.2	Platelets and their function. Buffer systems; hemostasis–blood volume, blood pressure and its regulation. Blood clotting, Dissolution of clot; anticoagulants. CSF–composition and function.	
1.1.3	Respiratory System–Mechanism of gas exchange, oxygen binding by hemoglobin and factors affecting oxygenation. Acid–base balance and its regulation.	

Unit II:		**12**
2.1	**Hepatobiliary, Digestive and Excretory System**	
2.1.1	Hepatobiliary system–Anatomy of the liver, blood supply; cells–hepatocytes, endothelial cells, Kupffer cells and paranchymal cells.	
2.1.2	Secretory and excretory function; detoxification and formation of bile	
2.1.3	Digestive system–GI tract, digestion and absorption of carbohydrates, proteins and lipids. Mechanism of HCl production in the stomach. Gastrointestinal hormones.	
2.1.4	Excretory System–Ultra structure of the nephron, glomerular filtration, tubular reabsorption and tubular secretion, formation of urine.	

Unit III:		**16**
3.1	**Nutrition, Carbohydrates, Proteins and Fats**	
3.1.1	Nutrition–Concepts of macro and micro nutrients, essential nutrients and their classification. Food groups, proximate analysis of foods, chemical and biological analysis for nutrients.	
3.1.2	Food as source of energy, methods of determining energy value of foods, calorimetry, physiological fuel values and daily requirement of energy, high and low	

	calorie diets. Basal metabolic rate (BMR), factors affecting BMR, specific dynamic action of foods.	
3.1.3	Carbohydrates–dietary sources, dietary fiber essentiality of carbohydrates.	
3.1.4	Proteins–Evaluation of nutritive value of dietary protein PER, BV, essential amino acids, nutritional classification of proteins, supplementary value of proteins, protein calorie malnutrition–Kwashiorkor and Marasmus.	
3.1.4	Fats–Sources, invisible fat, essential fatty acids, PUFA.	

Unit IV:		
4.1	**Vitamins and Minerals**	
4.1.1	Vitamins–Fat soluble and water soluble vitamins, provitamins, antivitamins, dietary sources, structure, daily requirements and functions.	**08**
4.1.2	Deficiency symptoms of B complex members and fat soluble vitamins, hypervitaminosis, vitamin like compounds.	
4.1.3	Minerals–Macro and micronutrients, sources, requirements, functions and deficiency symptoms.	
4.1.4	Water metabolism–distribution in body, function and factors affecting water balance.	
4.1.5	Recommended daily allowances, special nutrition for infants, children, during pregnancy, lactation and old age.	

References

[1] The Cell, Copper, Geoffery, M., Oxford University Press, (2001)
[2] Text Book f Biochemistry with Clinical correlations; Thomas Devlin [Ed.] (1997), Wiley –Liss.
[3] Lehninger- Principles of Biochemistry; DL Nelson and MM Cox [Eds), 6th Edn. Macmillan Publications (2012).
[4] Principles of Human Physiology; 4th Edn. Cindy L. Stanfield Pearson, (2010).
[5] Human Biochemistry, Orten and Neuhans , 10th Edn. Mosbey International, (1983).
[6] Human Physiology: The mechanisms of Body functions. A.J. Vander, et. Al.,(1985) McGraw-Hill.
[7] Molecular Cell Biology, Baltimore et. al. (1995) Scientific American Publication.
[8] Harper's Review of Biochemistry, Murray et. al., (1997) 24th Edn., Lange
[9] Molecular Biology of Cell; Albertis *et. al.* (2002) Garland Science.
[10] Biochemistry Ed. Donald Voet & Judith G. Voet, John Wiley & Sons, Inc. (2010).
[11] Mammalian Biochemistry; White, Handler and Smith, McGraw-Hill, (1986).
[12] Textbook of human Physiology by Guyton, 11th ed.Elesvier.
[13] Introduction to Human Nutrition, 2nd Edn. Michael J. Gibney, Susan A. Lanham-New, Aedin Cassidy, Hester H. Vorster, Wiley-Blackwell (2009).
[14] Nutrition: Everyday Choices, 1st Edition; Mary B. Grosvenor, Lori A. Smolin Wiley (2006).
[15] Bioactive Food as Dietary Interventions for Liver and Gastrointestinal Disease; Watson Elsevier (2012).
[16] Nutrition and Metabolism, 2nd Edn., Lanham S, Mac Donald I and Roche H. The Nutrition Society, London, UK, (2012).
[17] Introduction to Human Nutrition, 2nd Edn., Gibney M, Lanham S, Cassidy A and Vorster H. The Nutrition Society, London, UK, (2012).

Course Code	Title of the Course	Credits
BCB260	RESEARCH METHODOLOGY AND BIOSTATISTICS	4

COURSE OUTCOME(S):

CO1 Specify the classification and characteristics of research methodologies and the experimental designs

CO2 Identify in depth statistical analysis

CO3 Learn in details with application, if applicable, scientific write-up

CO4 Specify the details of Interpretation of data

		No. of Lectures
Unit I:		
1.1	**Research Methodology and Design**	
1.1.1	Research Methodology: Meaning of research, Objectives of research, Motivation in Research, Types of Research, and Research approaches.	
1.1.2	Research methods vs. Research Methodology, Research process–scientific method, Criteria for good research, Defining the research problem.	**12**
1.1.3	Research Design: Meaning and need for research design, features of good design. Preparation of Scientific report, presentation of a review.	

Unit II:		
2.1	**Scientific Writing**	
2.1.1	Mechanical and stylistic aspects of scientific writing- Precision and clarity of language, writing style, writing process, presentation of numerical data and scientific figures.	
2.1.2	Constraints on scientific writing–audience, format and mechanics (grammar, word choice, punctuation, tenses).	**12**
2.1.3	Objectives and design of experiment–experimental unit, identifying variables, replications & controls, power analysis in planning experiments, treatment structure and design structure.	
2.1.4	Graphical analysis of data and presentation of results.	

Unit III:		
3.1	**Statistical Significance Analysis**	
3.1.1	Significance and limitations of statistical calculations, Sampling techniques.	
3.1.2	Probability theory, random variables and distribution functions, Point and interval estimation, linear regression. Statistical evaluation of results–Hypothesis testing, interpretation of statistic for analysis of error.	**16**
3.1.3	Measures of central tendency and dispersion	

Unit IV:		**08**
4.1	**Testing Methods**	
4.1.1	ANOVA, F-test, t-test, z-test, chi-square, correlation coefficient.	

References

[1] Research Methodology: Methods & Techniques By CR Kothari. Publisher: New Age International

[2] From Research to Manuscript: A Guide to Scientific Writing (Paperback) By Michael Jay Katz. Publisher: Springer

[3] The Craft of Scientific Writing (3rd Edition) By Michael Alley. Publisher: Springer-Verlag.

[4] Writing Scientific Research Articles: Strategy and Steps (Hardcover) By Margaret Cargill and Patrick O.Connor. Publisher: WileyBlackewell.

[5] The Mayfield Handbook of Technical and Scientific Writing By Leslie Perelman and Edward Barrett. McGraw-Hill NY

[6] Scientific Style and Format: The CBE Manual for Authors, Editors, and Publishers(Hardcover) 6th Ed By Edward J. Huth. Publisher: Cambridge University Press.

[7] The Handbook of Technical Writing, Eighth Edition (Handbook of Technical Writing Practices) (Hardcover) By Gerald J. Alred, Charles T. Brusaw and Walter E. Oliu, St. Martin's Press.

[8] Science and Technical Writing: A Manual of Style (2nd Ed.) By Philip Rubens. Publisher: Routledge, London.

[9] The Elements of Technical Writing (Elements of Series) (Paperback) By Gary Blake and Robert W. Bly. Publisher: Longman.

[10] Technical Writing: Principles, strategies and readings (7th Edition) By Diana C. Reep. Publisher: Longman.

[11] Biostatistics By PN Arora and PK Malhan, Himalaya Publishing House.

[12] Experimental Design and Data Analysis for Biologists By Gerry P. Quinn and Michael J. Keough. Publisher: Cambridge University Press.

[13] Principles of Biostatistics (with CD-ROM) (Hardcover) By Marcello Pagano and Kimberlee Gauvreau. Publishers: Duxbury Press

[14] Biostatistics: Experimental Design and Statistical Inference (Hardcover) By James F. Zolman. Oxford University Press.

[15] Intuitive Biostatistics By Harvey Motulsky. Publisher: Oxford University Press

Course Code	Title of the Course	Credits
BCB260	CLINICAL RESEARCH METHODS AND INDUSTRIAL BIOCHEMISTRY	4

COURSE OUTCOME(S):

CO1 Specify the classification and characteristics of clinical practice and clinical research

CO2 Identify in depth fermentation technology and downstream processing

CO3 Learn in details with application, if applicable, clinical research methods

CO4 Specify the details of steps involved in drug discovery

		No. of Lectures
Unit I:		
1.1	**Introduction to Clinical Research**	
1.1.1	Introduction to Clinical Research, Terminologies and definition in Clinical Research, Origin and History of Clinical Research	
1.1.2	Difference between Clinical Research and Clinical Practice, Types of Clinical Research, Phases of clinical research	**10**
1.1.3	Clinical Trials in India–The National Perspective, Post marketing surveillance	
1.1.4	Pharmaceutical Industry–Global and Indian Perspective Clinical Trial market, Career in Clinical Research	

Unit II:		
2.1	**Clinical Research Methods**	
2.1.1	Design of experiments, factorial experiments, randomization, interaction among factors.	
2.1.2	Types of studies: Cohort studies, double blind, placebo control, cross over and double dummy.	
2.1.3	Introduction to Good Clinical Practices, Clinical Trial Development: Protocol Design and Development, Case Report Form Design and Development, Principals of Data Management, Clinical Trial Management: Maintaining and Managing Essential Documents, Recording and Reporting Non–Serious and Serious Adverse Events.	**14**

Unit III:		
3.1	**Drug Discovery Concepts and Biostatistics**	
3.1.1	Proof of concept, target identification and validation. Identifying the lead compound, optimization of lead compound, mechanism of action, drug target and validation of target.	**12**
3.1.2	Safety pharmacology, pharmaco–kinetics and	

	pharmaco–dynamics, acute and chronic toxicity Development of new drug/molecules and elucidation of their mechanisms of actions, formulations, factors affecting drug efficacy, drug resistance, traditional medicines; biotransformation.	
3.1.3	Statistical concept: Data structure, sampling methods, collection, classification and tabulation of data, graphical and diagrammatic representation, histogram, frequency polygon, frequency curve, bar graph, pie chart.	
3.1.4	Measure of central tendency: Mean, median, mode,mean deviation, standard deviation, standard error Types of distribution of data: Normal, binomial, Poisson,	
3.1.4	Z-test, t-test and ANOVA. Correlation and regression.	
Unit IV:		
4.1	**Bioprocess Methods**	
4.1.1	Basics of chemical engineering, mass transfer, heat generation and removal, fluid dynamics:	
4.1.2	Bernoulli's principle, viscosity, hydraulic conductivity, capillary flow, control and applications of industrial processes, process evaluation and development, over production of metabolites and methods;	**12**
4.1.3	Fermentation–Submerged and solid state fermentation Fermentor design, Industrial use of microbes. Strain improvement, Inocula preparation, Downstream processing–Recovery and purification of intracellular and extra cellular products. Methods to maximize the yield.	

References

[1] Basic Test for Drugs, WHO-GENEVA 1998 edition
[2] Who Expert Committee on Specification for Pharmaceutical Preparation WHO-GENEVA, 2005 edition
[3] Who Expert Committee on Biological Standardization WHO-GENEVA 2003 edition
[4] Clinical Research Fundamental and Practice –Vishal Bansal Parar Medical Publisher, 2010 edition
[5] Introduction to Pharmacopoeia CBS Publishers and Distributors 1991 edition
[6] Essential of Clinical Research –Dr. Ravindra B. Ghooi and Sachin C. Itkar Nirali Prakashan 2010 edition
[7] Basic Principle of Clinical Research and Methodology, Jaypee Brothers Medical Publishers (P) Ltd. 2009 ed.
[8] A Comprehensive Clinical Research Manual-Samir Malhotra, Nusrat Shafiq, Promila Pandhi Jaypee Brothers Medical Publishers (P) Ltd, 2008 edition
[9] Industrial microbiology, A.H. Patel
[10] Principles of Fermentation technology, Stanburry. P. Whitaker and S.J. Hall, 1995
[11] Biotechnology–U. Sathyanarayana. □YLL

Course Code	Title of the Course	Credits
BCC070	CELL BIOLOGY, ENDOCRINOLOGY AND CELL SIGNALING	4

COURSE OUTCOME(S):

CO1 Specify in details with examples cellular organization

CO2 Learn the characteristics of endocrinology

CO3 Learn in depth cell signaling

CO4 Write down the characteristics of membrane biology

		No. of Lectures
Unit I:		**12**
1.1	**Cellular Organization, Division and Cytoskeletons**	
1.1.1	Cell types–organization of prokaryotic and eukaryotic cells.	
1.1.2	Cell division–mitosis and meiosis, cell cycle–phases of cell cycle, cyclins and cdks. Regulation of cell growth and cell cycle.	
1.1.3	Cell motility–molecular motors, microtubules, structure and composition. Microtubular associated proteins–role in intracellular motility.	
1.1.4	Cellular organelles–Nucleus–internal organization, traffic between the nucleus the nucleolus, and cytoplasm. Endoplasmic reticulum–protein sorting and transport, golgi apparatus and lysosomes, morphology and function of mitochondria, chloroplasts and peroxisomes, glyoxysomes.	

Unit II:		**12**
2.1	**Membrane Biology**	
2.1.1	Organization of lipid monolayer, bilayer, Physicochemical properties of biological membranes - compositions, supra molecular organization - Singer and Nicolson's model.	
2.1.2	Membrane asymmetry-lipids proteins and carbohydrates, lateral diffusion, biogenesis of lipids and proteins. Polarized cells, membrane domains- caveolae, rafts, Membrane lipid and protein turnover, intracellular targeting of proteins. Factors influencing fluidity of membrane	
2.1.3	Membrane transport - Laws of diffusion across membranes, simple diffusion, facilitated diffusion and active transport - glucose transporter Na+ K+ ATPase (Structure and mechanism of action), bacterial phosphotransferase system. Endocytosis, receptor mediated endocytosis, exocytosis, ion channels, aquaporin channel, ionophores. Patch clamp technique.	

Unit III:		
3.1	**ENDOCRINOLOGY**	
3.1.1	Endocrine System–Endocrine organs in man. Hierarchy and regulation of hormone release.	
3.1.2	Structure and control of hypothalamus, GRH, somatostatin, TRH, CRH, GnRH. Pituitary-anatomy and structure.	
3.1.3	Hormones of anterior, posterior and median lobes. Pro-opiomelanocortin. Thyroid, parathyroid, adrenals, gonads–Testes and ovaries. Menstrual cycle. Hypothalamus–pituitary target organ axis and regulation by feedback mechanism, Pineal gland, melatonin and circadian rhythm	**12**
3.1.4	Classification of hormones based on solubility and structure, mechanism of action of water soluble and lipid soluble hormones.	
Unit IV:		
4.1	**Cell Signaling**	
4.1.1	Nerve transmission–Central and peripheral nervous systems. Structure of neuron, axon, dendrites, synapse neuromuscular junction. Neurotransmitters- mechanisms of nerve conduction. α and β adrenergic neurons, nicotinic and muscarinic neurons.	
4.1.2	Muscle contraction–Skeletal muscle and smooth muscle contraction, muscle proteins–actin, myosin, tropomyosine, troponins, mechanisms of muscle contraction, role of calcium and calmodulin Biochemistry of vision	**12**
4.1.3	Cellular signaling: Extra cellular signaling–G Protein linked receptors ,Role of cyclic AMP, IP3, DAG, Ca2+ as a second messenger, receptos tyrosine kinases , MAP kinase pathway, NFkB pathway, apoptosis, Cell survival pathway, Jak/Stat pathway, TGF β Signaling. Multiple signaling path ways–Insulin receptor (regulation of blood glucose)	
4.1.4	Steroid hormone receptors, structural organization of receptor protein, hormone binding domain, antigenic domain and DNA binding domain.	

References

[1] The World of the cell by Becker, Kleinsmith and Harden Academic Internet Publishers; 5th edition (2006)

[2] The Cell: A Molecular Approach, Fourth Edition by Geoffrey M. Cooper and Robert E. Hausman.

[3] Cell and Molecular Biology by concepts and experiments by Gerald Karp (2005) John Wiley sons & Inc.

[4] Molecular cell Biology by Harvey Lodish. W. H. Freeman; 6th edition (2007)

[5] The Cell–Biochemistry, physiology and morphology by J. Brachet and A. E. Mirsky, Academic Press (1963)

Course Code	Title of the Course	Credits
BCC050	CLINICAL BIOCHEMISTRY	4

COURSE OUTCOME(S):

CO1 Identify in details with application, if applicable, specimen collection and analysis

CO2 Specify in details with application, if applicable, metabolic disorders

CO3 Write down the characteristics of hormonal disorders

CO4 Write down in details with application, if applicable, hematology

		No. of Lectures
Unit I:		
1.1	**Specimen Collection and Analysis**	
1.1.1	Concepts of accuracy, precision, reproducibility, reliability, and other factors in quality control.	
1.1.2	Normal values. Specimen collection and Processing: Collection of blood–venipuncture, skin puncture, arterial puncture. Anticoagulants. Collection and analysis of normal and abnormal urine–timed urine specimens, preservatives.	**10**
1.1.3	Clinical significance of sugars, proteins, ketone bodies, bilirubin and porphyrins. CSF–collection, composition and analysis. Amniotic fluid–Origin, collection, composition.	

Unit II:		
2.1	**Disorders**	
2.1.1	Disorders of carbohydrate metabolism: Diabetes mellitus, glycohemoglobins, hypoglycemias, galactosemia and ketone bodies.	
2.1.2	Various types of glucose tolerance tests. Glycogen storage diseases.	
2.1.3	Lipid profile, lipidosis and multiple sclerosis. Causes and diagnosis of the disorders of HDL–cholesterol, LDL–cholesterol and triglycerides.	**14**
2.1.4	Cancer: Etiology, diagnosis, treatment and prognosis. Carcinogens, oncogens, mechanism.	
2.1.5	Biochemistry of ageing: Cellular senescence, Role of Telomerase in aging, Alzheimer's disease, Parkinson's disease.	

Unit III:		
3.1	**Enzymes and Hormonal Disorders**	
3.1.1	Evaluation of organ function tests: Clinical assessment of renal, hepatic, pancreatic, gastric, intestinal and thyroid functions. Clinical importance of bilirubin.	**12**
3.1.2	Diagnostic enzymes: Principles of diagnostic enzymology. Clinical significance of aspartate aminotransferase, alanine aminotransferase, creatine	

	kinase, aldolase and lactate dehydrogenase.	
3.1.3	Enzyme tests in determination of myocardial infarction. Enzymes of pancreatic origin and biliary tract.	
3.1.4	Hormonal disorders: Protein hormones (anterior pituitary hormones, posterior pituitary hormones), steroid hormones, adrenocorticosteroids, and reproductive endocrinology. Disorders of thyroid hormones.	

Unit IV:		
4.1	**Hematology**	
4.1.1	Biochemical aspects of hematology: Total cell count, differential count, hematocrit.	**12**
4.1.2	Disorders of erythrocyte metabolism, hemoglobinopathies, thalassemias, thrombosis, porphyrias and anemias. Laboratory tests to measure coagulation and thrombolysis.	
4.1.3	Doping	
4.1.4	Detoxification in the body: Enzymes of detoxification, polymorphism in drug metabolizing enzymes. Mechanism of drug action and channels of its excretion.	
4.1.5	Test for lung function: Chest X-ray, Spirometry. Test for Brain function: EEG, MRI, CT.	

References

[1] Textbook of Medical Biochemistry by MN Chatterjea and Rana Shinde, Jaypee Brothers.

[2] Lehninger Principles of Biochemistry 5th Ed by David L. Nelson and Michael M. Cox, WH Freeman and Company.

[3] Davidson's Principles and Practice of Medicine: A Textbook for Students and Doctors (Hardcover) 15th Ed by LSP Davidson, J MacLeod and CRW Edwards. Publisher: Churchill Livingstone.

[4] Medical Biochemistry (Paperback) by John W. Baynes and Marek Dominiczak. Publisher: Mosby.

[5] Clinical Biochemistry: An Illustrated Colour Text (Paperback) 3rd Ed By Allan Gaw, Michael Murphy, Robert Cowan, Denis O'Reilly, Michael Stewart and James Shepherd. Publisher: Churchill Livingstone.

[6] Review of Medical Physiology (Lange Basic Science) (Paperback) By William F. Ganong. Publisher: McGraw-Hill Medical

[7] Harper's Biochemistry (Lange Medical Books) (Paperback) By Robert K. Murray, Daryl K. Granner, Peter A. Mayes and Victor W. Rodwell. Publisher: Appelton and Lange.

[8] Clinical Biochemistry by Richard Luxton. Scion Publishing Ltd.

[9] Principles of Medical Biochemistry: With STUDENT CONSULT Online Access (Paperback) by Gerhard Meisenberg and William H. Simmons. Publisher: Mosby.

Course Code	Title of the Course	Credits
BCC060	**EXPERIMENTS IN CLINICAL BIOCHEMISTRY AND MOLECULAR BIOLOGY**	**4**

COURSE OUTCOME(S):

CO1 Specify the details of urine and blood analysis

CO2 Specify the characteristics of determination of enzyme activity

CO3 Identify the classification and characteristics of DNA quantification and analysis

CO4 Deliberate the details of isolation of nucleic acids from plant, animal and microbial sources

Group I:	**Urine analysis** 1. Qualitative analysis of urine for normal organic and inorganic constituents 2. Qualitative analysis of urine for abnormal constituents- Glucose, albumin, Ketone bodies. 3. Quantitative estimation of Creatine and Creatinine, Urea Uric acid Sulphate Chloride 4. Titrable acidity **Blood analysis** 5. Quantitative estimation of Urea Uric acid Creatine Cholesterol HDL–C and LDL–C 6. Blood glucose and GTT	
Group II:	**Determination of Enzyme activity of** 7. Alkaline phosphatase 8. SGOT 9. SGPT 10. LDH 11. Electrophoresis of lipoproteins: Serum proteins. 12. Albumin/Globulin Ratio. 13. Fractionation of serum proteins-Ammonium sulphate precipitation. 14. Isolation of DNA and RNA from biological sources. 15. Quantitative determination of DNA and RNA.	
Group III:	16. Determination of melting temperature of DNA (Tm) 17. Sub-cellular fractionation of rat liver by differential centrifugation and marker analysis 18. Determination of activities of marker enzymes 19. Preparation of erythrocyte ghosts 20. Kinetics of uptake of glucose by erythrocytes 21. Viability of cells by trypan blue dye exclusion 22. Study of morphology of *Drosophila melanogaster*	

	23. Study of mutants of *Drosophila melanogaster* 24. Study of polytene chromosomes of *Drosophila melanogaster*	

Group Study	Isolation of plasmid DNA, Restriction digestion of plasmid DNA, ligation of DNA fragment into a plasmid vector, preparation of competent cells, *E.Coli* transformation and amplification of DNA by PCR.	

References

[1] Practical Clinical Biochemistry, ed. Harold Varley, 4th edn. CBS Publishers (1988).
[2] Practical Clinical Biochemistry: Methods and Interpretation, ed. Ranjna Chawla, Jaypee Brothers Medical Publishers (1996).
[3] Practical and Clinical Biochemistry for Medical Students, ed. T.N. Pattabhiraman, Gajana Publishers (1994).
[4] Hawk's Physiological Chemistry, ed. Oser, 14th Edn.(1976), Tata-McGrawHill.
[5] Biochemistry, ed. Plummer Tata-McGraw Hill, (1971).
[6] Molecular Biology Techniques; Sue Carson, Heather Miller and D. Scott Witherow, Academic Press (2011).
[7] Principles and Techniques of Biochemistry and Molecular Biology; 7th Edn. Keith Wilson and John Walker (2012).
[8] Principles of Gene Manipulations; 6th Edn. S.B. Primrose, R.M. Twyman, and R.W. Old, Blackwell Science (2012).
[9] Gene Cloning and DNA analysis- An Introduction; T. A. Brown, 5th Edition, Wiley-Blackwell (2006).
[10] Laboratory methods in Enzymology; Part-A; Jon Lorsch, Academic Press (2014).
[11] Gene Cloning Laboratory Manual 4th Edn. Michael R. Green and Joseph Sambrook, CSHL Press (2014).
[12] Current Protocols in Molecular Biology; S Gallaghar, Wiley Interscience (2008).

Course Code	Title of the Course	Credits
BCC220	GENOMICS, PROTEOMICS AND BIOINFORMATICS	4

COURSE OUTCOME(S):

CO1 Specify the details of DNA sequencing methods

CO2 Specify the characteristics of determination of Proteins

CO3 Identify the classification and characteristics of microarray data

CO4 Deliberate the details of bioinformatics in biological databases and sequencing analysis

		No. of Lectures
Unit I:		**12**
1.1	**Structural Organization of Genome and Sequencing**	
1.1.1	Structural organization of genome in Prokaryotes and Eukaryotes, Organelle DNA–mitochondrial, chloroplast,	
1.1.2	DNA sequencing–principles and translation to large scale projects, Recognition of coding and non–coding sequences and gene annotation. Tools for genome analysis–RFLP, DNA fingerprinting, RAPD, PCR, Linkage and Pedigree analysis–physical and genetic mapping.	
1.1.3	Microbes, plants and animals, Accessing and retrieving genome project information from web, Comparative genomics, ESTs and SNPs.	

Unit II:		**12**
2.1	**Proteomics**	
2.1.1	Protein analysis (includes measurement of concentration, amino-acid composition, N-terminal sequencing),	
2.1.2	2–D electrophoresis of proteins, Microscale solution isoelectricfocusing, Peptide fingerprinting,	
2.1.3	LC/MS-MS for identification of proteins and modified proteins, MALDI-TOF	
2.1.4	SAGE and Differential display proteomics, Protein-protein interactions, Yeast two hybrid systems.	

Unit III:		**08**
3.1	**Functional Genomics, Proteomics and Metabolomics**	
3.1.1	Analysis of microarray data, Protein and peptide microarray–based technology; PCR–directed protein *in situ* arrays	
3.1.2	Structural proteomics	
3.1.3	Metabolomics	

Unit IV:		
4.1	**Biological Databases and Sequence Analysis**	
4.1.1	Introduction biological databases: Types (relational & object–oriented). Primary, secondary & specialized databases.	**16**
4.1.2	Types of databases–Nucleotide sequence database, EMBL, Genebank, Unigene, Genome biology, Protein dBase (Swiss–prot & Trembl and Motif) and 3D structure databases (PDB, SCOP, Cath, Genecards, SRS & Entrez).	
4.1.3	Computational approaches for gene identification, ORF and Human Genome Project.	
4.1.4	Basics of sequence analysis: Alignments using BLAST and FASTA, Multiple Sequence Alignment (CLUSTAL–X and CLUSTAL–W), Application of multiple sequence alignment	
4.1.5	Protein Structure Prediction in Bioinformatics–*Ab initio* based methods, Homology based methods, secondary structure prediction.	
4.1.6	Protein structure comparison–intermolecular and intramolecular methods. Phylogenetic construction by distance based methods	

References

[1] Voet D, Voet JG & Pratt CW, Fundamentals of Biochemistry, 2nd Edition. Wiley 2006
[2] Brown TA, Genomes, 3rd Edition. Garland Science 2006
[3] Campbell AM & Heyer LJ, Discovering Genomics, Proteomics and Bioinformatics, 2nd Edition. Benjamin Cummings 2007
[4] Primrose S & Twyman R, Principles of Gene Manipulation and Genomics, 7th Edition, Blackwell, 2006.
[5] Glick BR & Pasternak JJ, Molecular Biotechnology, 3rd Edition, ASM Press, 1998.
[6] Essential Bioinformatics (Paperback) byJin Xiong. Cambridge University Press.
[7] Bioinformatics: Methods & Protocols by Stephen Misener and Stephen A. Krawetz,
[8] Humana Press.
[9] Essentials of Bioinformatics by Irfan Ali khan and Atiya Khanum. Publisher: Ukaaz Publications.
[10] Bioinformatics: Sequence and Genome Analysis (Hardcover) by David W. Mount. Cold Spring Harbor Laboratory Press
[11] Introduction to Bioinformatics (Paperback) by Arthur M. Lesk. Oxford Univ Press.
[12] Introduction to Bioinformatics: A Theoretical and Practical Approach (Paperback) by David Womble, Stephen A. Krawetz and David D. Womble. Humana Press Inc., U.S.
[13] Applied Bioinformatics: An Introduction (Paperback) y Paul M. Selzer, Richard
[14] Marhofer and Andreas Rohwer. Publisher: Springer-Verlag Berlin and Heidelberg GmbH & Co. K.

Course Code	Title of the Course	Credits
	BIOTECHNOLOGY AND RESEARCH METHODOLOGY	**4**

COURSE OUTCOME(S):

Upon completion of the course, the student is able to

CO1	Understand the concepts of biotechnology
CO2	Provide examples of current applications of biotechnology
CO3	Explain the concept and application of enzyme technology
CO4	Explain the general principles of generating transgenic plants, animals and microbes
CO5	Understand the concepts of research methods, tools and ethics

		No. of Lectures
Unit I:		**12**
1.1	**Tissue culture and transgenesis**	
1.1.1	Techniques of tissue culture–culturing explants and haploids, protoplasts fusion and embryoids.	
1.1.2	Methods of gene transfer to plants, animals and bacteria-Ca transfection, electroporation, shotgun and others.	
1.1.3	Transgenic plants, gene knockouts and transgenic animals.	

Unit II:		**16**
2.1	**Industrial Biotechnology**	
2.1.1	Fermentors: principle, types product recovery and purification of ethanol, citric acid, vitamin B12, streptomycin.	
2.1.2	Enzyme biotechnology–production and uses of industrially important enzymes such as protease, immobilization of enzymes and their applications	
2.1.3	Waste treatment, bioenergy, biogas production, biopesticides and bioleaching.	

Unit III:		
3.1	**Biosafety and Bioethics**	
3.1.1	Biotechnology–potential hazards, biological weapons, biosafety of GM foods and GMOs–substantial equivalence and safety testing.	**08**
3.1.2	Human genome research–the objectives and approaches, genomics and genome prospecting–the controversies, issues of biotechnology-social and scientific, technology protecting systems and the terminator.	
3.1.3	IPR, its concepts and conditions–patenting of genes, cells and life forms, evaluation of life patenting.	

Unit IV:		
4.1	**Research Methodology**	
4.1.1	Types of Research: Academic, Industrial, Clinical, Basic and Applied research. Research objectives, review of literature and hypothesis formulation.	**12**
4.1.2	Information, types and sources. PubMed as a resource. Research Design: Types of studies-cohort, double blind, placebo and cross-over.	
4.1.3	Statistical Methods: Error and significance, sample size and data collection, presentation of data, parametric and non-parametric tests	
4.1.4	Ethical issues: ICMR guidelines of ethical issues, IPR and Plagiarism	

References

[1] Fermentation Biotechnology O.P. Ward. 1989 Prentice Hall.
[2] Biotechnology J.E. Smith Cambridge University Press 1996.
[3] Introduction to Biotechnology Brown, Campbell and Priest Blackwell Science 1987.
[4] A Textbook on Biotechnology H.D. Kumar 2nd edition East West Press 1998.
[5] Molecular Biotechnology Glick and Pasternak, Panima Publ.
[6] From Genes to clones Winnaecker VCH Publication.
[7] Elements of Biotechnology P.K. Gupta, Rastogi Publication, 1998.
[8] Molecular Biology and Biotechnology. Walker and Gingold. 3rd ed. Panima Publ. 1999.
[9] Plant Biotechnology. Ignacimuthu, Oxford, IBH.
[10] Recombinant DNA Technology, Watson, Scientific American Publ.
[11] Principles of Genome analysis, Primrose, Oxford University Press, 1998.
[12] Handbook of Research Methodology: A compendium for scholars and researchers, Dr. Shanti Bhushan Mishra Dr. Shashi Alok, EDUCREATION PUBLISHING, 2019
[13] Research Methodology: A step-by-step Guide for Beginners, 3rd Edition, Ranjit Kumar, SAGE Publications, 2011

Course Code	Title of the Course	Credits
BCC220	PHARMACEUTICAL BIOCHEMISTRY	4

COURSE OUTCOME(S):

CO1 Identify the details of ADME mechanism of drugs

CO2 Learn in details with application, if applicable, Drug receptor interactions

CO3 Deliberate in details with application, if applicable, Mode of action of anti cancer drugs

CO4 Write down in depth Drug tolerance and abuse

		No. of Lectures
Unit I:		**10**
1.1	**Drugs**	
1.1.1	Drugs: History of Drugs Classification of drugs, routes of drug administration, absorption and distribution of drugs.	
1.1.2	Factors influencing drug absorption and elimination of drugs. □	

Unit II:		**14**
2.1	**Drug Receptor and Metabolism**	
2.1.1	Drug-Receptor interactions involvements of binding forces in drug receptor interaction, drug action not mediated by receptors.	
2.1.2	Drug metabolism: Mechanism of phase I and II enzyme reactions, biochemical importance of xenobiotic metabolism. □	

Unit III:		**12**
3.1	**Anticancer Drugs**	
3.1.1	Cancer: Cancer and principles of cancer chemotherapy, mode of action of anti cancer drugs.	
3.1.2	Antimetabolites, antibiotics, alkylating agents and other agents, □	

Unit IV:		**12**
4.1	**Adverse Drug Reactions**	
4.1.1	Adverse drug reactions and drug induced side effects.	
4.1.2	Biological effects of drug abuse and drug dependence.	
4.1.3	Drug tolerance and intolerance. □	

References

[1] The Pharmacology volume I and II –Goodman and Gillman
[2] Basic Pharmacology –Foxter Cox
[3] Oxford text book of Clinical Pharmacology and Drug Theraphy ,D.G Grahme Smith and J.K.Aronson
[4] Pharmacology and Pharmatherapeutics – R.S.Satoskar,S.D.Bhandhakarand
[5] Essentials of Pharmacotherapeutics ,Barav.F.S.K
[6] Lippincotts illustrated review Pharmacology, Mary.J.Mycek,Richards ,Pamela

Course Code	Title of the Course (Open Elective)	Credits
BCC630	NUTRITION AND HEALTH	4

COURSE OUTCOME(S):

CO1 Identify the details of basic concepts of nutrition

CO2 Learn in details with application, if applicable, nutrients

CO3 Deliberate in details with application, if applicable, nutrition associated problems

CO4 Write down in depth social health problems

		No. of Lectures
Unit I:		**10**
1.1	**Basic Concepts in Nutrition**	
1.1.1	Understanding relationship between food, nutrition, health and food pyramid.	
1.1.2	Functions of food: Physiological, psychological and social Basic food groups and concept of balanced diet	
1.1.3	Energy: Functions, sources and concept of energy balance.	
1.1.4	Nutritional requirements: Physiological considerations and nutritional concerns for the following life stages: Adult man / woman Preschool children Adolescent children Pregnant woman, Nursing woman and infant Geriatrics	

Unit II:		**14**
2.1	**Nutrients**	
2.1.1	Functions, Recommended Dietary Allowances, dietary sources, effects of deficiency and/ or excess consumption on health of the following nutrients: Carbohydrates and dietary fibre Lipids Proteins Fat soluble vitamins: A, D, E and K Water soluble vitamins: Thiamin, Riboflavin, Niacin, Pyridoxine, Folate, Vitamin B12 and Vitamin C Minerals: Calcium, Iron, Zinc and Iodine	
2.1.2	Gut Microbiome	

Unit III:		
3.1	**Nutritional problems, their implications and related nutrition programmes**	
3.1.1	Etiology, prevalence, clinical features and preventive strategies of Undernutrition: Protein energy malnutrition, nutritional anemia's, vitamin A deficiency and iodine deficiency disorders Overnutrition: Obesity, Coronary Heart Disease and Diabetes	**14**
3.1.2	National Nutrition Policy and Programmes: Integrated Child Development Services (ICDS) Scheme Mid day Meal Programme (MDMP) National programmes for prevention of Anemia Vitamin A deficiency and Iodine Deficiency Disorders	

Unit IV:		
4.1	**Social health problems**	
4.1.1	Smoking Alcoholism AIDS including AIDS Control Programme	
4.1.2	Nutrition for special conditions: Nutrition for physical fitness and sport, BMI Feeding problems in children with special needs Considerations during natural and man-made disasters e.g. floods, war. Basic guidelines in disaster management	**10**

References

[1] Text Book f Biochemistry with Clinical correlations; Thomas Devlin [Ed.] (1997), Wiley –Liss.

[2] Harper's Review of Biochemistry, Murray et. al., (1997) 24th Edn., Lange

[3] Bryan Derrickson, Gerard J Tortora Principles of Anatomy and Physiology , twelfth Ed, 2011, Wiley & Sons Limited.

[4] Bamji MS, Krishnaswamy K and Brahmam GNV (Eds) (2009). Textbook of Human Nutrition, 3rd edition. Oxford and IBH Publishing Co. Pvt. Ltd. New Delhi.

[5] Mudambi, SR and Rajagopal, MV. Fundamentals of Foods, Nutrition and Diet Therapy; 2012; New Age International Publishers

[6] Wardlaw GM, Hampl JS. Perspectives in Nutrition; Seventh Ed; 2007; McGraw Hill.

[7] Swaminathan M. Handbook of Foods and Nutrition; Fifth Ed; 1986; BAPPCO.

[8] Suri S. and Malhotra A. Food Science, Nutrition & Food Safety Pearson India Ltd. 2014.

[9] Edelstein S, Sharlin J (ed). Life Cycle Nutrition- An Evidence Based Approach; 2009; Jones and Barlett Publishers.

[10] ICMR (1989) Nutritive Value of Indian Foods. National Institute of Nutrition, Indian Council of Medical Research, Hyderabad.

[11] ICMR (2011) Dietary Guidelines for Indians – A Manual. National Institute of Nutrition, Indian Council of Medical Research, Hyderabad

[12] World Health Organization (2006). WHO Child Growth Standards: Methods and development: Length/height-for-age, weight-for-age, weight-for-length, weight-for-height and body mass index-for-age (d).

[13] Lakra P, Singh MD. Textbook of Nutrition and Health; First Ed; 2008; Academic 14 Excellence

Course Code	Title of the Course	Credits
BCD010	MOLECULAR BIOLOGY AND GENE REGULATION	4

COURSE OUTCOME(S):

CO1 Write down the characteristics of DNA characteristics and replication

CO2 Write down in depth Transcription and regulation

CO3 Learn in depth translation

CO4 Identify in depth translational regulation

		No. of Lectures
Unit I:		14
1.1	**DNA Replication and Gene Expression**	
1.1.1	Introduction: Historical perspective, types of RNA, Central dogma of molecular biology.	
1.1.2	DNA Replication: Nearest neighbor base frequency analysis. Replication of DNA semiconservative model-Meselson and Stahl experiment. Direction of replication of *E.coli*, discontinuous replication–Okazaki fragments.	
1.1.3	Composition and properties of DNA polymerase I, II and III. of *E.coli* DNA ligase, fidelity of replication. DNA topoisomerases and gyrases.	
1.1.4	Replication in viruses single stranded DNA virus, ϕX174, rolling circle model. Replication of mitochondrial DNA.	
1.1.5	Organization of prokaryotic and eukaryotic gene–promoters, introns, exons, other regulatory sequences, enhancers, silencers, function of introns.	
1.1.6	Regulation of Gene expression in prokaryotes: Operon model–Lac operon–structure and regulation; Galactose operon–role of two promoters; Arabinose operon–positive control; tryptophan operon–attenuation control.	
1.1.7	Regulation of gene expression at the level of DNA structure: Super coiling, DNA methylation, role of nucleosome structure of eukaryotic DNA in gene expression–eg. glucocorticoid gene, chromatin remodeling	

Unit II:		
2.1	**Transcription and Regulation**	
2.1.1	Transcription: RNA biosynthesis in prokaryotes and eukaryotes- initiation, elongation and termination. RNA polymerase I, II and III. RNA dependent RNA synthesis - RNA replicase of QB virus.	**10**
2.1.2	Processing of eukaryotic mRNA–cap addition, poly A tail addition, intron splicing, RNA editing. Processing of t–RNA.	
2.1.3	Regulation at the level of transcription: Transcription factors, TF II. Formation of initiation complex. Role of enhancers	
2.1.4	Regulation at the level of RNA processing: RNA export and RNA stability. Factors affecting RNA stability. RNA degradation.	
Unit III:		
3.1	**Translation**	
3.1.1	Translation: Genetic code, triplet codon, Universality features of the genetic code, assignment of codons studies of Khorana, Nirenberg, triplet binding techniques, degeneracy of codons, wobble hypothesis, evolution of genetic code and codon usage, variation in the codon usage.	**12**
3.1.2	3D structure of prokaryotic and eukaryotic ribosomes, Translation: initiation, elongation and termination. Role of m–RNA and t–RNA; aminoacyl t–RNA synthetase and its role in translation accuracy, signal sequence, translational proof-reading, translational inhibitors.	
3.1.3	Post translational modification of proteins–signal peptide cleavage, disulphide bond formation, O–and N–Glycosylation, folding of nascent protein, role of chaperones, attachment of glycosyl anchor, and other modifications.	

Unit IV:		
4.1	**Translational Regulation**	
4.1.1	Regulation at the level of translation: Secondary structure in the 5' and 3' untranslated region–eg. Regulation of Ferritin and Transformation of m-RNA. Role of upstream AUG codons. (eg. GCN 4 gene regulation), transplicing and translational introns, protein splicing introns.	**12**
4.1.2	Role of ribosomes in the regulation of translation: Proof–reading mechanism. Ribosomal optimization of translation. Regulation at the level of ribosome assembly. Regulation at the level of post-translational modification, protein stability, N–end rule, PEST and other sequences	

References

[1] Molecular Biology of the Cell, Alberts et al., Garland Publications, (2012).
[2] Molecular Biology, David Freifelder, Narosa Publishers, (1997).
[3] Molecular Biology Robert F. Weaver, McGraw Hill (2012).
[4] Molecular Biology of Gene; Watson, J.D. et al., 5th Edn. Pearson Education; (2004).
[5] Principles of Virology; S.J. Flint et al., ASM Press (2000).
[6] Biochemistry and Molecular Biology; 5th Edn. D.Papachristodoulou, A. Snape, W.H. Elliott, and D. C. Elliott Oxford University Press (2014)
[7] Chromatin structure and Gene Expression; 2nd Edn. Sarah Elgin, Jerry Workman, Oxford University Press (2000)
[8] Molecular Cell Biology; Harvey Lodish 5th Edn. (2010)
[9] Biochemistry 5th Edn. Jeremy M. Berg, John L. Tymoczko, Lubert Stryer (2011).
[10] Genome Stability: DNA Repair and Recombination; James Haber, Garland Science (2013)

Course Code	Title of the Course	Credits
BCD070	GENETICS AND GENETIC ENGINEERING	4

COURSE OUTCOME(S):

Upon completion of the course, the student is able to

CO1	Understand the importance of plasmids and viruses to genetic engineering.
CO2	Understand the principle of Mendelism and gene development
CO3	Describe how mutations occur and scope of population genetics
CO4	Explain the principle of genetic engineering
CO5	Understand the value of and the processes involved in the amplification of DNA

		No. of Lectures
Unit I:		**12**
1.1	**Mendelism and Gene Organization**	
1.1.1	Basic principles of Mendelism–Laws of inheritance, dominance, codominance, epistasis, (eg. Comb shape in chickens). Pleiotropism. Cytoplasmic inheritances (eg. Shell Coiling)	
1.1.2	Organisation of genes in chromosomes–Single copy gene, gene families, tandemly repeating genes, pseudo genes	
1.1.3	Chromosome number–Ploidy, karyotyping, sex chromosome and dosage compensation. Mobile genetic elements,	
1.1.4	Chromosomal basis of human diseases–Extra or missing chromosome, abnormality in chromosome structure–deletion duplication, inversion and translocation.	
1.1.5	Gene and development–Model systems for studying development in Drosophila, genetic control of development in Drosophila, anteroposterior axis, specification role of maternal genes, segmentation of larval body, gap genes, pair rule genes, homeotic genes, complex gene interaction in development, sequential gene action.	

Unit II:		
2.1	**Population Genetics and Mutations**	
2.1.1 2.1.2 2.1.3	Population Genetics–Genetic variation, Hardy–Weinberg Law, genetic frequency, migration, genetic equilibrium Mutations- nature of mutations–spontaneous and induced mutation, conditional lethal (eg. Temperature sensitive) mutation. Biochemical basis of mutation. Point mutation, base substitution mutation, missense, nonsense and silent mutations. Mutation rates. Chemical mutagens, radiation induced mutation, reverse mutations and suppressor mutations–intergenic and intragenic suppression, reversion as a means of detecting mutagens - Ames test Repair Mechanism–DNA repair mechanisms. Reciprocal recombination, site specific recombination, *E. coli* rec system. Holliday model of recombination, SOS repair.	**16**

Unit III:		
3.1	**Tools of Genetic Engineering**	
3.1.1 3.1.2 3.1.3 3.1.4 3.1.5	Basic principles–mechanism of natural gene transfer by Agrobacterium, generation of foreign DNA molecules. Restriction enzymes, their types and target sites, cutting and joining DNA molecules, linkers, adapters, homopolymers, enzymes used in genetic engineering. Cloning vehicles and their properties, natural plasmids, in vitro vectors, cosmids and T-DNA based hybrid vectors. Cloning strategies–cloning with single strand DNA vectors, cDNA cloning and gene libraries, recombinant selection and screening methods, expression of cloned genes–problems and solutions, shuffle vectors. DNA sequencing strategies–Sanger's and Maxam–Gilbert's methods and NGS.	**12**

Unit IV:		
4.1	**Amplification & Applications of Genetic Engineering**	
4.1.1 4.1.2 4.1.3 4.1.4	Amplification of DNA by PCR technique and applications. *Insitu* hybridization, analysis of DNA, RNA and protein by blotting techniques. Marker and Reporter genes. Applications of genetic engineering: Transgenic plants and animals, DNA vaccines and Gene therapy	**8**

References

[1] Singh, J.S., Singh, S.P. and Gupta, S. (2006) Ecology Environment and Resource Conservation. Anamaya Publications, New Delhi

[2] Wilkinson, D.M. (2007). Fundamental Processes in Ecology. An Earth System Approach. Oxford.

[3] Daubenmier, R.F. (1970). Plants and Environment: A text book of Plant Autoecology, Wiley Eastern Private Limited

[4] Daubenmier, R.F. (1970), Plant Communities, Wiley Eastern Private Limited

[5] Odum, E. (2008) Ecology. Oxford and IBH Publisher.

[6] Sharma, P.D. (2010) Ecology and Environment, (8th Ed.) Rastogi Publications, Meerut.

[7] Tom Strachan & Andrew P.Read 1999. Human Molecular Genetics (2nd Edition), John Wiley & Sons.

[8] Ricki Lewis, 1998. Human Genetics-Concepts & Applications (3rd Edition), McGraw-Hill.

[9] T. A. Brown, 1999. Genomes, John Wiley & Sons (Asia) PTE Ltd.

[10] Scott Freeman & Jon C. Herron, 2001. Evolutionary Analysis (2nd Edition), Prentice Hall.

[11] Garner E.J, Simmons, M.J. & Snustad, D.P.1991. Principles of Genetics, John Wiley & Sons Inc, N.Y

[12] Watson, J.D., Hopkins, N. H., Roberts, J. W. Steitz & Weiner, A. M., 1987. Molecular Biology of the Genes, The Benjamin/Cummings Publishing Company Inc., Tokyo.

Course Code	Title of the Course	Credits
BCD060	PROJECT WORK OR DISSERTATION	8

COURSE OUTCOME(S):

CO1	Identify the classification and characteristics of literature survey
CO3	Learn in depth define of objective of project work
CO3	Write down the classification and characteristics of design of experimental methods
CO4	Understand the details of result analysis and interpretation

BLUE PRINT OF QUESTION PAPER FOR C1 & C2 COMPONENT

JSS Mahavidyapeetha

JSS COLLEGE OF ARTS, COMMERCE AND SCIENCE

(Autonomous) B N Road, Mysuru - 25

M.Sc. Biochemistry

I/II/III/IV Semester First/Second Internal Assessment Test (Component 1/2)

Title of the Course & Code

Duration: 1hr **Max Marks: 20**

A) Answer any FOUR of the following **4X2=08**

1.
2.
3.
4.
5

B) Answer any ONE of the following **1X4=04**

1.
2.

C) Answer any ONE of the following **1X8=08**

1.
2.

BLUE PRINT OF QUESTION PAPER FOR C3 COMPONENT

JSS Mahavidyapeetha

JSS COLLEGE OF ARTS, COMMERCE AND SCIENCE

(Autonomous), Ooty Road, Mysuru – 570025

M.Sc Degree

I/II/III/IV Semester Examination, _____

BIOCHEMISTRY

Course Title & QP Code

Time: 3 Hours Max. Marks: 70

Instructions to Candidates: **Answer any Five questions from Part – A**
Any Four questions from Part – B
Any Three questions from Part – C

Part – A 5X2=10

1.
2.
3.
4.
5.
6.
7.

Part – B 4X6=24

8.
9.
10.
11.
12.
13.

Part – C 3X12=36

14.
15.
16.
17.
18.

CHOICE BASED CREDIT SYSTEM AND
CONTINUOUS ASSESSMENT AND GRADING PATTERN

SYLLABUS FOR

MASTER'S DEGREE PROGRAM IN BIO-TECHNOLOGY

(2018-19 ONWARDS)

JSS COLLEGE OF ARTS COMMERCE AND SCIENCE
(An Autonomous College of University of Mysore; Re-Accredited by NAAC with 'A' Grade)

POSTGRADUATE DEPARTMENT OF STUDIES IN BIO-TECHNOLOGY
Ooty Road, Mysore – 570 025, India

POSTGRADUATE DEPARTMENT OF STUDIES IN BIOTECHNOLOGY

Choice Based Credit System and Continuous Assessment and Grading Pattern Syllabus

M.Sc., PROGRAM IN BIOTECHNOLOGY

Scheme of Study – 2018-19 onwards

Credit matrix for Master's Degree Program in Biotechnology

Credits to be earned	I Sem	II Sem	III Sem	IV Sem	Total Credits
Hard Core Course	12	12	12	16	52
Soft Core Course	08	08	04	–	20
Open Elective Course	–	–	04	–	04
Semester Total	**20**	**20**	**20**	**16**	**76**

I SEMESTER			
Course title	**Hard Core(HC)/ Soft Core(SC)**	**Credit pattern (L:T:P)**	**Credits**
Biomolecules and Bioenergetics	HC	3:1:0	4
Bioanalytical Techniques	HC	3:1:0	4
Lab – I	HC	0:0:4	4
Choose any TWO from the following 1. Molecular Genetics 2. Microbiology 3. Cancer Biology 4. Cell Biology	SC	3:1:0	4
	SC	3:1:0	4
NON CREDIT COURSES			
Communication Skills			
		Total credits	**20**

II SEMESTER			
Course title	**Hard Core(HC)/ Soft Core(SC)**	**Credit pattern (L:T:P)**	**Credits**
Molecular Biology	HC	3:1:0	4
Immunology and Immunotechnology	HC	3:1:0	4
Lab – II	HC	0:0:4	4
Choose any TWO from the following 1. Cell Signalling and communication 2. Metabolomics 3. Food and Environmental Biotechnology 4. Pharmaceutical Biotechnology	SC	3:1:0	4
	SC	3:1:0	4
NON CREDIT COURSE			
Employability Skills			
		Total credits	**20**

III SEMESTER			
Course title	**Hard Core(HC)/ Soft Core(SC)/ Open Elective(OE)**	**Credit pattern (L:T:P)**	**Credits**
Bioprocess Engineering and Technology	HC	3:1:0	4
Genetic Engineering	HC	3:1:0	4
Lab – III	HC	0:0:4	4
Choose any ONE from the following 1. Biostatistics, Bioinformatics and Bioentrepreneurship 2. Clinical and Advanced Techniques in Biotechnology	SC	4:0:0	4
Applied Biotechnology * **(For other discipline students)**	OE	4:0:0	4
		Total credits	20
IV SEMESTER			
Course title	**Hard Core(HC)**	**Credit pattern (L:T:P)**	**Credits**
Plant Biotechnology	HC	3:1:0	4
Animal Biotechnology	HC	3:1:0	4
Project Work/Dissertation	HC	0:4:4	8
		Total credits	**16**
		Total credits to be earned for M.Sc. Biotechnology	**76**

∗ Open Elective Course shall be from different discipline of study

1. A student opting I, II and III semester has to appear for at least 12 credits. (Soft core course may be studied any time).
2. Minimum number of students per Soft core course is 15.

L – Lecture – 1 credit = 1 hour

T – Tutorial – 1 credit = 2 hours

P – Practical – 1 credit = 2 hours

ASSESSMENT:

Continous Assessment: C1 – 15% & C2 – 15% (at the end of 8th and 16th week respectively)

Assessment	**IA Test (20 Marks)**	**Assignment (5M)**		**Total (25 Marks)**	**Total reduced to 15 Marks**
		a - Collection of material - 2.5 Marks	b - Prepartion of report - 2.5 Marks		
C1					
C2					

Semester End Assessment: C3 – 70% – By written exam.

Conversion of grades in to credits should be based on relative evaluation calculations.

Program: M.Sc. Biotechnology

Program outcomes (PO):

PO1: To make the students develop interpersonal skills, written and oral communication and also to improve their body language and eye contact during presentations.

PO2: To train the students in group discussions to develop leadership qualities and to respect the others idea and take the decisions for the welfare of society.

PO3: To teach the students not to demoralize the others ideas and not to differentiate the intelligent and the ignorant, poor and the rich and to uphold the moral values in the society.

PO4: Upon completion of course students will have the ability to design the experiments to solve the current problems in the society related to health, environment and industries.

PO5: To make the students competent enough to write the research papers, project proposals and application of mathematics in understanding biological science.

Program Specific Outcomes (PSO):

PSO1: To make the students understand the nature, bio-molecules, their analysis and application in day to day life, so that we are transforming knowledge from nature to lab and lab to beside.

PSO2: Higher studies like M.Phil and Ph.D can be pursued to attain research positions.

PSO3: Various examinations such as CSIR-NET, ARS-NET GATE, ICMR, DBT and many other opens channels for career development.

PSO4: Students have various opportunities in different industrial sector.

PSO5: Several career opportunities are available for students with biotechnology background abroad

PSO6: In practical we teach the students to follow the standard operating procedures of the equipment, troubleshooting the problems and analyse and interpretation of data.

PSO7: To train the students regarding bio-safety in handling corrosive, explosive and radioactive and bio-hazardous compounds.

I SEMESTER

BIOMOLECULES AND BIOENERGETICS (HARD CORE) - 48 Hrs

COURSE CODE: BTA040

Course Outcome

CO1-Study of different biomolecules

CO2-Metabolism and their regulation

CO3-Enzymes and their role in metabolism

CO4- Application of thermodynamics to understand the basic concepts of life.

Unit – I **12 Hrs**

Chemical basis of life; Composition of living matter; Water – properties, pH, ionization and hydrophobicity; Emergent properties of biomolecules in water; Biomolecular hierarchy; Macromolecules; Molecular assemblies; Structure-function relationships

Amino acids – structure and functional group properties; Peptides and covalent structure of proteins; Ramchandran's plot; Elucidation of primary and higher order structures; Evolution of protein structure; Structure-function relationships in model proteins like ribonuclease A, myoglobin, hemoglobin and chymotrypsin.

Unit – II **12 Hrs**

Enzyme catalysis – general principles of catalysis; Quantitation of enzyme activity and efficiency; Enzyme characterization and Michaelis-Menten kinetics; activation, inhibition (reversible & irreversible) and covalent modification; Single substrate enzymes; Bisubstrate reaction (ping-pong and sequential), Applications of enzymes (food& Pharmacy).

Unit – III **12 Hrs**

Sugars - mono, di, and polysaccharides; Suitability in the context of their different functions-cellular structure, energy storage, signaling; Glycosylation of other biomolecules - glycoproteins and glycolipids; Lipids - structure and properties of important members of storage and membrane lipids; lipoproteins

Unit – IV **12 Hrs**

Bioenergetics-basic principles; Equilibria and concept of free energy; Coupled processes; Glycolytic pathway; Kreb's cycle; Oxidative phosphorylation; Photophosphorylation; Elucidation of metabolic pathways; Logic and integration of central metabolism; entry/ exit of various biomolecules from central pathways; Principles of metabolic regulation; Regulatory steps;

Nucleosides, nucleotides, nucleic acids - structure, diversity and function

Texts/References

1. V.Voet and J.G.Voet, Biochemistry, 3rd edition, John Wiley, New York, 2004.
2. A.L. Lehninger, Principles of Biochemistry, 4th edition, W.H Freeman and Company, 2004.
3. L. Stryer, Biochemistry, 5th edition, W.H. Freeman and Company, 2002.

BIOANALYTICAL TECHNIQUES (HARD CORE) - 48 HRS

COURSE CODE: BTA050

Course Outcome

CO1-To understand the separation of molecules by different chromatography, centrifugation and electrophorotic techniques

CO2-Analysis and characterization of molecules by spectroscopy techniques

CO3-Use of radioactive material in understanding metabolic pathways

Unit- I **12 Hrs**

Basic Techniques

Buffers; Methods of cell disintegration; Enzyme assays and controls; Detergents and membrane proteins; Dialysis, Ultrafiltration and other membrane techniques

Spectroscopy Techniques

UV, Visible and Raman Spectroscopy; Theory and application of Circular Dichroism; Fluorescence; MS, MALDI-TOF; NMR and Plasma Emission spectroscopy; Protein crystallization; Theory and methods; API-electrospray; Peptide Synthesis.

Imaging techniques: Compound microscope, fluorescent, phase contrast, TEM, SEM, cryo-electron microscope

Unit-II **12 Hrs**

Chromatography Techniques

TLC and Paper chromatography; Chromatographic methods for macromolecule separation - Gel permeation, Ion exchange, Hydrophobic, Reverse-phase and Affinity chromatography; HPLC and FPLC; Criteria of protein purity

Electrophorotic techniques

Theory and application of Polyacrylamide and Agarose gel electrophoresis; Capillary electrophoresis; 2DElectrophoresis; Gradient electrophoresis; Pulsed field gel electrophoresis

Unit- III **12 Hrs**

Centrifugation

Basic principles; (RCF, Sedimentation coefficient etc); Types of centrifuge -Microcentrifuge, High speed & Ultracentrifuges; Preparative centrifugation; Differential & density gradient centrifugation; Applications (Isolation of cell components); Analytical centrifugation; Determination of molecular weight by sedimentation velocity & sedimentation equilibrium methods

Unit- IV **12 Hrs**

Radioactivity

Radioactive & stable isotopes; Pattern and rate of radioactive decay; Units of radioactivity; Measurement of radioactivity; Geiger-Muller counter; Solid & Liquid scintillation counters (Basic principle, instrumentation & technique); Brief idea of radiation dosimetry; Cerenkov radiation; Autoradiography; Measurement of stable isotopes; Falling drop method; Applications of isotopes in biochemistry; Radiotracer techniques; Distribution studies; Isotope dilution technique; Metabolic studies; Clinical application; Radioimmunoassay

Texts/References

1. Freifelder D., Physical Biochemistry, Application to Biochemistry and Molecular Biology, 2nd Edition, W.H. Freeman & Company, San Fransisco, 1982.
2. Keith Wilson and John Walker, Principles and Techniques of Practical Biochemistry, 5th Edition, Cambridge University Press, 2000.

3. D. Holme& H. Peck, Analytical Biochemistry, 3rd Edition, Longman, 1998.
4. R. Scopes, Protein Purification - Principles & Practices, 3rd Edition, Springer Verlag, 1994.
5. Selected readings from Methods in Enzymology, Academic Press.

LAB – I (HARD CORE)

COURSE CODE: BTA060

Course Outcome

CO1 - Course objective is to introduce the students to the fundamental experiments in the field of Biochemistry, Microbiology and Genetics.

CO2 - Students get the insight to operate simple equipments like colorimeter and spectrophotometer.

CO3 - Identification of microorganisms by morphology and staining techniques. Study of growth kinetics.

CO4 - In genetics students are exposed to know about culture and maintenance of *Drosophila melanogaster* (model organism), Study of mutants, salivary gland chromosome and karyotyping techniques.

Practicals/ Experiments

1. Good laboratory practices
2. Measurement of pH
3. Preparation buffers and solutions
4. Determination of pKavalues of amino acids
5. Estimation of reducing sugar by DNS method
6. Estimation of proteins by Lowry's method
7. Ascending, descending and circular paper chromatography for separation of amino acids (1D & 2D)
8. TLC of amino acids/lipids (1D & 2D)
9. HPLC
10. Estimation of ascorbic acid by DNPH method
11. Estimation of urea
12. Estimation of Phosphate
13. Gel electrophoresis- native and SDS-PAGE and determination of molecular weight of proteins
14. Salivary amylase assay, time kinetics, specific activity, determination of optimum temperature and pH; Effect chloride ions on salivary amylase activity
15. Determination of Km and Vmax. and activation energy for an acid phosphatase (from potato)
16. Effect of inhibitors on enzyme activity
17. Purification of amylase from sweet potatoes: Extraction, ammonium sulphate fractionation, gel filtration. Monitoring of enzyme activity, % activity and % recovery during purification
18. Preparation of liquid and solid media for growth of microorganisms
19. Isolation and maintenance of organisms by plating, streaking and serial dilution methods, slants and stab cultures, storage of microorganisms
20. Isolation of pure cultures from soil and water
21. Growth, growth curve; measurement of bacterial population by turbidometry and serial dilution methods. Effect of temperature, pH, carbon and nitrogen sources on growth.
22. Microscopic examination of bacteria, yeast and molds and study of organisms by gram stain, acid fast stain and staining for spores.
23. Assay of antibiotics and demonstration of antibiotic resistance.
24. Culture of Drosophila melanogaster and Observation of drosophila mutants
25. Isolation of salivary gland chromosomes
26. Biotech Industry and/ or R & D institution visit/s

MOLECULAR GENETICS (SOFT CORE) – 48 Hrs

COURSE CODE: BTA230

Course Outcome

CO1- To understand the molecular mechanism of inheritance

CO2-Mutation and DNA repair mechanism

CO3-Gene mapping and study of chromosomal abnormalities

CO4-Phylogenetics and micro-evolution

CO4-Development of an organism

Unit- I **12 Hrs**

Laws of inheritance in haploid organisms- *Chlamydomonas* and *Neurospora*, uniparental, maternal and cytoplasmic inheritance in yeast, *Neurospora*, paramecium and plants

Genomic organization: Prokaryotes, eukaryotes, viral genome, extrachromosomal genome-plasmids, mitochondria & chloroplast, repetitive elements- LINES and SINES, simple sequence repeats

Mobile genetic elements: discovery, insertion sequence in prokaryotes, complex transposons (Tn10, Tn5, Tn9 and Tn3 as examples), mechanisms, control, consequences and applications of transposition by simple and complex elements.

Unit – II **12 Hrs**

Mutation: Types, causes and detection, mutant types – lethal, conditional, biochemical, loss of function, gain of function, germinal verses somatic mutants, Molecular basis of mutations,insertional mutagenesis

Recombination: Homologous and non-homologous recombination, Holliday model, site-specific recombination

DNA Repair: Mechanism of genetic repair- direct repair, photo reactivation, excision repair, mismatch repair, post-replicative recombination repair, SOS repair

Unit-III **12 Hrs**

Gene mapping methods: Linkage maps, tetrad analysis, mapping with molecular markers, mapping by using somatic cell hybrids, development of mapping population in plants.

Microbial genetics: Methods of genetic transfers – transformation, conjugation, transduction and sex-duction, mapping genes by interrupted mating, fine structure analysis of genes.

Quantitative genetics: Polygenic inheritance, heritability and its measurements, QTL mapping.

Unit-IV **12 Hrs**

Genes and development: Model systems for studying development- *Drosophila, Caenorhabditis, Arabidopsis*.Genetic control of development in Drosophila: anterioposterior axis specification, role of maternal genes, segmentation of larval body, gap genes, pair rule genes, homeotic genes, complex gene interaction in development, sequential gene action. Floral meristems and floral development in *Arabidopsis.*

Human Genetics: Human chromosomes, karyotype – construction, characteristics, staining techniques and nomenclature; chromosomal abnormalities – sex chromosomal and autosomal, inherited disorders, genetic counselling, gene therapy; Human Genome Project, Human Genome Map.

Population Genetics: Genetic variation, Hardy-Weinberg Law, random mating, genetic frequency, natural selection, genetic drift, migration, genetic equilibrium.

Evolution:Molecular basis of evolution, Molecular clock, Molecular phylogenetics

Reference Books

1. Genetics. Strickberger, M. W., Prentice Hall of India Pvt. Ltd.
2. Genetics – A Molecular Approach. Brown, T. A. Chapman and Hall.
3. Genes VII. Lewin, B. Pearson Education International. 2003.
4. Genetics- A Conceptual Approach. Benjemin A Pierce.

CANCER BIOLOGY (SOFT CORE) – 48 Hrs

COURSE CODE:

Course Outcome

CO1**-**Understanding the normal and cancerous cell

CO2-Protooncogens, tumor suppressor genes and apoptotic genes – regulation

CO3-Diagnosis and treatment of cancer

Unit-I

Cancer Biology: **12 Hrs**

Introduction, historical perspective, classification, Carcinogenesis, cancer initiation, promotion and progression, Cancer cell cycles, Genomic instability, Apoptosis, Genes and proteins as players in apoptosis, DNA viruses/ cell immortalization.

Unit-II **12 Hrs**

Cancer Genes I: Oncogenes and signal transduction

Cellular proto-oncogenes, oncogene activation, Growth factors, growth factor receptors, signal transduction , Transcription, Transcription factors and cancer, Retroviral oncogenes, Tumor suppressor, Tumor suppressor gene pathways, DNA methylation, epigenetic silencing of suppressor genes.

Unit-III **12 Hrs**

Understanding Cancer as a Disease: natural history of cancer development

Free radicals, antioxidants and metabolic oxidative stress and cancer, Epidemiology of selected cancers, Gene rearrangements, detecting oncogene abnormalities in clinical specimens, Cell: cell interactions, cell adhesion, angiogenesis, invasion and metastasis, Antiangiogenic therapy of cancer.

Unit-IV **12 Hrs**

Current concepts in cancer therapy

Strategies of anticancer chemotherapy, Strategies of anticancer gene therapy/translating therapies from the laboratory to the clinic, Gene discovery in cancer research, cancer genome anatomy project , Cancer immunity and strategies of anticancer immunotherapy, stem cells and their applications in cancer therapy.

Reference Books

1. Molecular Biology of the Cell. Bruce Alberts

MICROBIOLOGY (SOFT CORE) – 48 Hrs

COURSE CODE: BTA240

Course Outcome

CO1- To understand the microbial taxonomy

CO2-Handling, preservation and sterilization of microbes

CO3-Microbial interactions with different hosts

CO4-Application of microorganisms in the field of agriculture, environment and health sciences

Unit-I **12 Hrs**

Microbial Diversity & Systematics

The beginning of microbiology: The discovery of the microbial world – Hook, Anton van Leeuwenhoek and Cohn; Contribution of Pasteur and Koch. Development of pure culture methods; the enrichment culture methods. Methods in Microbiology: Pure culture techniques; the theory and practice of sterilization.

Classical and modern methods and concepts; Domain and Kingdom concepts in classification of microorganisms; Criteria for classification; Classification of Bacteria according to Bergey's manual; Molecular methods such as Denaturing Gradient Gel Electrophoresis (DGGE), Temperature Gradient Gel Electrophoresis (TGGE), Amplified rDNA Restriction Analysis and Terminal Restriction Fragment Length Polymorphism (T-RFLP) in assessing microbial diversity; 16S rDNA sequencing and Ribosomal Database Project.

Unit-II **12 Hrs**

Microbial Growth & Physiology

Ultrastructure of Archaea (Methanococcus); Eubacteria (*E.coli*); Unicellular Eukaryotes (Yeast) and viruses (Bacterial, Plant, Animal and Tumor viruses); Microbial growth: Batch, fed-batch, continuous kinetics, synchronous growth, yield constants, methods of growth estimation, stringent response, death of a bacterial cell. Factors affecting growth like temperature, acidity, alkalinity, water availability and oxygen. Microbial physiology: Physiological adoption and life style of Prokaryotes; Unicellular Eukaryotes and the Extremophiles (with classical example from each group)

Unit-III **12 Hrs**

Microbial Interactions and Infection

Host–Pathogen interactions; Microbes infecting humans, veterinary animals and plants; Pathogenicity islands and their role in bacterial virulence. Chemotherapy/antibiotics: Types, mode of action, resistance to antibiotics.

Unit-IV **12 Hrs**

Microbes and Environment

Role of microorganisms in natural system and artificial system; Influence of Microbes on the Earth's Environment and Inhabitants; Ecological impacts of microbes; Symbiosis (Nitrogen fixation and ruminant symbiosis); Microbes and Nutrient cycles; Microbial communication system; Quorum sensing; Microbial fuel cells; Prebiotics and Probiotics.

Texts/References

1. Pelczar MJ Jr., Chan ECS and Kreig NR., Microbiology, 5th Edition, Tata McGraw Hill, 1993.
2. Maloy SR, Cronan JE Jr., and Freifelder D, Microbial Genetics, Jones Bartlett Publishers, Sudbury, Massachusetts, 2006.

3. Crueger and A Crueger, (English Ed., TDW Brock); Biotechnology: A textbook of Industrial Microbiology, Sinaeur Associates, 1990.
4. G Reed, Prescott and Dunn's, Industrial Microbiology, 4th Edition, CBS Publishers, 1987.
5. M.T. Madigan and J.M. Martinko, Biology of Microorganisms, 11th Edition, Pearson Prentice Hall, USA, 2006.

CELL BIOLOGY (SOFT CORE) – 48 Hrs

COURSE CODE:

Course Outcome

CO1-Understanding the structure and function of bacterial, plant and animal cell

CO2-Cell signalling and communication

CO3-Study of growth factors and their function

CO4-Tumor biology of a cell

Unit-I **12 Hrs**

Membrane and membrane phenomenon: Membrane structure and principles of organization, Membrane proteins, glycoproteins and glycolipids, specialization of plasma membrane, transport across cell membrane – types of transport, ion channels, active transport and ion pumps, symport, antiport, plant and prokaryotic membrane transport proteins. Cell organelle and membrane proteins: Mechanism and regulation of vesicular transport, Golgi and post golgi storing, receptor mediated endocytosis.

Unit-II **12 Hrs**

Microfilament, cell motility and cell shape: actin, actin architecture and assembly, myosin, muscle contraction, microtubules structure and dynamics, microtubule associated protein, cilia, flagella, intermediate filaments.

Multicellularity: Extracellular matrix, hyaluronan and proteoglycan, matrix proteins and their receptors, adhesive proteins, cell junctions, structure and function of plant cell wall.

Cellular signaling: Extra cellular signaling, G-protein linked receptors, role of cAMP, receptor tyrosine kinases, Ca^{2+} as a second messenger, multiplex signaling pathways, insulin receptor and regulation of blood glucose, regulation of cell surface receptors and transcription factors in signaling pathways, Chemical messenger – peptide and steroid hormones, mechanism of hormone action.

Unit-III **12 Hrs**

Growth factor: Growth factor structure (PDGF, VEGF), mechanism of action (PDGF, VEGF), receptors, signal transduction, plant growth factors and hormones – auxins, cytokinins and other

Cell Cycle: General strategy of cell cycle, discrete cell cycle events, cell cycle control, early embryonic cell cycle, yeast cell cycle, molecular genetics of cell cycle control, cyclins, cyclin dependent kinase, inhibitors, cell division control in multicellular organism, apoptosis.

Unit-IV **12 Hrs**

Tumor biology: Retroviruses, retro viral transformation of host, development and causes of cancer, proto-oncogene, conversion from proto-oncogene to oncogene, tumor suppressor gene, role of p53 in cancer, cell culture uses in research, molecular medicine and cancer.

Nerve cells: Action potential, voltage gated ion channels, nicotinic acetylcholine receptor, other neurotransmitters and their transporters, sensory transduction – the visual and olfactory system.

Reference Books

1. Molecular Biology of the Cell. Alberts, B., *et al.,* 4th Edition. Garland Publ. Inc.
2. Molecular Cell Biology. 5th Edn. Lodish, H., *et al.,* W H Freeman.
3. Genes VII. Lewin, B. Pearson Education International.
4. Cell and Molecular Biology. Karp, J. John Wiley and Sons Inc.

NON CREDIT COURSE

COURSE CODE:

Course Outcome

CO1-Interpersonal skills (body language, eye contact)
CO2-Presentation skills
CO3-Writing emails, research papers and proposals and business reports

Communication Skills Module

Business Etiquette – Video Conferencing (VC): Introduction to Video Conferencing; Concept & uses of VC; VC Etiquette

Business Communication: Seven Cs of communication: Complete, Courteous, Considerate, Clear, Concise, Concrete, Correct; Verbal/ Nonverbal Communication

Writing Process: Identifying objective; Categorizing Information; Organizational Patterns; Designing document; Memo writing; Revision checklist; Releasing document

Business Proposal & Report Writing: Types of Proposals; Top-Down & Bottom-Up Approach; Study of Technical Bid & Cost Bid; Transmittal Letters; Formal Reports (Short and Long); Types of graphics & illustrations; Business Report Templates; Study of Sample Proposals;

Project Report Writing: Project Charter; Project Plan; Gant Chart; Activities List; Resources List; Risks List, Project Status Report; Project Closure Report; Types of graphics & illustrations; Study of Project Report Templates

Email Writing: Problems resulting out of emails; Contents of email, Importance of a good subject line; Dos and Don'ts; Using your email software to its maximum; Setting up signatures; Setting up accounts; Creating HTML stationary; Creating email templates for common emails; Using short mails for internal communication; Importance of acknowledging emails; Creating folder structure for easily accessing emails; Care to be taken while deleting emails, Archiving emails; Comparison of emails and letters; Writing typical emails, sending point-wise reply to emails

Cross-Cultural Training: Cross-Cultural Sensitivity; American, European, Australian, Middle-east and South-East Asian countries culture training; Cultural Foundations; Cross Cultural Communication; Communication Styles; Comparative Values (American – Indian); Regional Dialects; Cross-Cultural Customer Attitude & Expectations

Interpersonal Skills: Introduction & Importance of Interpersonal Skills; Cost of Poor interpersonal skills; Standing up for self assertiveness; Strategies to achieve self-assertiveness; Managing conflicts, disputes; Dealing with Diversity Interpersonal Relationship and influence

II SEMESTER

MOLECULAR BIOLOGY (HARD CORE) – 48 Hrs

COURSE CODE: BTB020

Course Outcome

CO1- The student will get an idea about the genomic organization of prokaryotes and eukaryotes.

CO2-Obtain in depth knowledge of genetic code, DNA replication and transcription.

CO3-Understand principles, concepts of translation, post translation mechanism

CO4-Regulation of gene expression in prokaryotes and eukaryotes

CO5-Gain the insight into molecular mechanism of antisense molecules, inhibition of splicing and application of antisense and ribozyme technologies.

Unit-I **12 Hrs**

Genome organization:Organization of bacterial genome; Structure of eukaryotic chromosomes; Role ofnuclear matrixin chromosome organization and function; Matrix binding proteins; Heterochromatin and Euchromatin; DNA reassociation kinetics (Cot curve analysis); Repetitive and unique sequences; Satellite DNA;DNA melting and buoyant density; Nucleosome phasing; DNase I hypersensitive regions

DNA topology: Closed and super coiled DNA, DNA topoisomerases,

DNA replication: Enzymes in DNA replication, DNA Pol I, II III, replication in single stranded DNA viruses, replication in prokaryotes, eukaryotic DNA replication, eukaryotic polymerases, role of other proteins and enzymes in replication, fidelity of replication, replication of mitochondrial DNA, inhibitors of replication.

Unit- II **12 Hrs**

Genetic code: Elucidation, Contributions of Khorana and others, triple binding assay, Wobble hypothesis.

Transcription: Transcription unit, RNA polymerase in prokaryotes, mechanism of transcription-initiation, elongation and termination. Eukaryotic transcription - eukaryotic RNA polymerase, transcription factors, initiation, elongation and termination of transcription, inhibitors of transcription; post transcriptional modifications – capping, polyadenylation, splicing, introns and exons. Structural organization of mRNA, tRNA and rRNA, nuclear export of mRNA and mRNA stability

Unit-III **12 Hrs**

Translation: Molecular anatomy and biogenesis of ribosome, partial reconstitution experiments; Amino acid activation- amino acylation of tRNA; prokaryotic and eukaryotic translation– mechanism of initiation, elongation and termination, inhibitors of translation, post translational modifications, protein glycosylation.

Protein localization: Synthesis of secretory proteins and membrane proteins; import into nucleus, mitochondria, chloroplast and peroxisomes.

Regulation of gene expression in Prokaryotes: Basic control circuits, positive and negative regulation; Operon concept – *lac*, *ara* and *trp* operons- catabolite repression, regulatory elements in prokaryotes, attenuation, antitermination, regulation of gene expression in Bacteriophage.

Unit-IV **12 Hrs**

Regulation of gene expression in Eukaryotes: *cis* control elements – promoters, enhancers, *trans* acting factors, DNA binding motifs of transcription factors, mechanism of regulation by transcription factors, NFkB histone acetyl transferase and deacylase, hormonal regulation of gene expression, post transcriptional control.

Antisense RNA and ribozymes: Molecular mechanism of antisense molecules, inhibition of splicing, disruption of RNA structure, hammerhead, hairpin ribozymes, Application of antisense and ribozyme technologies. RNA interference, RNA induced gene silencing.

Reference Books

1. Molecular Biology. Freifelder, D. Narosa Pub House.
2. Advance Molecular Biology. Twyman, R. M. Viva Book Pvt. Ltd.
3. Molecular Biology. JD Watson
4. Molecular Biology of the Cell. Bruce Alberts.
5. Genes, Benjamin XII ,2017

IMMUNOLOGY AND IMMUNOTECHNOLOGY (HARD CORE) – 48 Hrs

COURSE CODE: BTB050

Course Outcome

CO1- Study basic concepts of immunology

CO2- MHC and their role in transplantion

CO3-Cytokines and their role in immune system

CO4-Tumor immunology

CO5-Autoimmune diseases

CO6-Hypersensitivity

CO7-Vaccine production.

Unit-I **12 Hrs**

Immune system: Structure, functions and organization of cells and organs involved in immune systems – T cells, B-cells, macrophages, Eosinophils, Neutrophils, Mast cells; bone marrow, spleen, thymus, lymph node, peyer's patch; Infections and immune responses – Innate immunity, acquired immunity; clonal nature of immune response; Immunohaematology – blood groups antigens, blood transfusion and Rh incompatibilities.

Antigens: Types, haptens, adjuvants, antigenic specificity.

Antibodies:Structure of immunoglobulins, heterogeneity, sub-types – iso-, allo- and idio- types and their properties

Unit-II **12 Hrs**

Complements: Structure, components, properties and functions of complement pathways, biological consequences of complement activation; Immunological diversity;

Effector mechanism: T-cell cloning, mechanism of antigen recognition by T-cells and B-lymphocytes and their properties, receptors and related diseases.

Role of class II MHC molecules in T-cell cloning, antigen specific and alloreactive T-cell cloning, applications of T-cell cloning in understanding relevant antigens and T-cell subtypes; T-cell cloning in vaccine development

MHC and Tumor immunology: Structure and function of MHC and the HLA system; regulation of Ir-genes; Tumor immunology– Tumor specific antigens, Immune response to tumors, theory of surveillance, immune diagnosis of tumor; Tumor markers – Alpha fetofoetal proteins, carcinoembryonic antigen

Unit-III **12 Hrs**

Immune responses and Transplantation: HLA and tissue transplantation; Tissue typing methods for organ and tissue transplantation in humans; Graft versus host rejection, Host versus graft rejection; Xenotransplantation; Immunosuppression theory; Autoimmune diseases – Hashimoto's disease, Systemic lupus erythematosis, Multiple sclerosis, Myasthenia gravis, Rheumatoid arthritis and the remedies.

Allergy: Type I – Antibody mediated – Anaphylaxis, Type II – antibody dependent – Cytolytic and Cytotoxic, Type III – Immune complex mediated reactions**–** Arthus reaction, serum sickness, Type IV– Cell mediated hypersensitivity reaction– Tuberculin type.

Unit-IV **12 Hrs**

Lymphokines and Cytokines– assay methods, related diseases; Immunological tolerance; production of interleukins and interferons– applications.

Immunizations: Conventional vaccines, sub-unit vaccines, DNA vaccines, toxoids, antisera; common immunization – small pox, DPT, hepatitis, polio, measles

Reference Books

1. Immunology. Roitt, Gower Medical Publisher.
2. Fundamental Immunology. Paul W E Raven Press.
3. Immunology. Kuby
4. Immunology, JanewasTraves, Walpart, SHlomehik. Churchill Livingstone.
5. An introduction to Immunology. Rao, C. V. Nasora pub house.
6. Immunology – A short course. Coico, R., Sunshine, G. and Benjamini, E. John Wiley and sons.
7. Cellular Interactions and Immunobiology. BIOTOL series. Butterworth-Heinemann.

LAB – II (HARD CORE)

COURSE CODE: BTB060

Course Outcome

CO1-Students are trained to get the skills in the field of Molecular biology and Genetic engineering

CO2- , Isolation and purification of nucleic acids and their quantification

CO3-Study of antigen and antibody interactions.

CO4 -Preparation of wine and analysis of food samples

Practicals/ Experiments

1. Identification of normal and abnormal human karyotype
2. Localization of Barr bodies
3. Estimation of free fatty acids by titrametric method
4. Saponification value for commercial oil samples
5. Determination of iodine value of an oil
6. Determination of total carbohydrates by phenol-sulphuric acid method
7. Estimation of cholesterol
8. *In vitro* transcription
9. Total RNA extraction
10. Estimation of DNA by Diphenylamine (DPA) method
11. Estimation of RNA by orcinol method
12. Isolation of DNA different samples: plant leaves, coconut endosperm, yeast, animal tissues
13. Determination of purity and concentration of isolated DNA using spectrophotometer
14. Agarose gel electrophoresis of DNA
15. Analysis of microbial quality of foods – Litmus test, catalase test and dye reductase test in milk, estimation of lactic acid in milk
16. Preparation of wine
17. Estimation of percentage of alcohol in wine
18. Chemical method to differentiate between ethanol from methanol
19. Estimation of total acids in wine
20. Conjugation
21. Phage titration
22. Preparation of antigen and antibody production
23. Purification of IgG/IgY
24. Slide agglutination test/blood grouping
25. Antibody labeling
26. Immunoprecipitation test- ODD
27. ELISA for quantification of an antigen
28. Lymphocyte preparation
29. Rossette assay
30. Rocket immunoelectrophoresis

Biotech Industry and/ or R & D institution visit

CELL SIGNALLING AND COMMUNICATION (SOFT CORE) – 48 Hrs

COURSE CODE: BTB220

Course Outcome

CO1- Understanding the multi-cellularity of organisms

CO2-role of extracellular matrix in signalling

CO3-various signalling pathways from the cell surface to the nucleus

CO4-cell signalling in plants

CO5-microbe-plant and insect-plant interaction.

Unit-I **12 Hrs**

Multicellularity: Role of Extracellular matrix - hyaluronan and proteoglycan. Matrix proteins and their receptors, adhesive proteins and cell junctions in multicellularity. Structure and function of plant cell wall

The importance of the matrix in signal transduction: Cell surface receptors as reception of extra-cellular signals, Amplification of signal during transmission - a quantitative study,Tyrosine kinase and tyrosine phosphatase, Cell membrane components and adapter proteins required for signal transmission, Upstream and downstream signal transduction without cell surface receptor activation, G-protein coupled signaling; the secondary messengers in signal transduction pathways cAMP, Ca^{2+}, Reactive Oxygen Species and Hypoxia Signalling, Apoptosis Signaling Transduction Pathway, PI3K/AKT Cell Survival Pathway.

Unit-II **12 Hrs**

Various signal transduction pathways from cell surface to nucleus: MAP kinase pathway, SAP/JNK pathway, p38 pathway, ERK pathway, NFkB pathway, Cell survival pathway, Wnt signaling pathway, Jak/Stat pathway, Smad pathway,TGF β Signaling, EGFR, VEGF And their Signalling, Cytoskeleton And Cell Signalling, Carbohydrate Recognition Signaling, MMPs And Cell Signalling, Cross talk among cell surface receptors, Cross talks among cytoplasmic components, Translocation of signal components during signal transmission, From cytoplasm to cell membrane, NF-κB Signaling from cytoplasm to nucleus, Cell cycle and its Signalling.

The end point of signal transduction--- gene transcription: Nuclear receptors and transcription factors in signalling, Signalling from single gene expression to multiple gene expression: Super array as a tool for the study of multiple gene transcription, Practical application of the signal transduction research, RNA Interference And Cell Signalling, Senescence and Its Signaling Pathways.

Unit-III **12 Hrs**

Signal transduction in plants: Cross-talk with the environment- wound and mechanical signalling - fatty acid signalling, peptide signalling, oligosaccharide signalling; protein kinases and signal transduction. Abiotic stresses - Dehydration-stress, salt-stress, cold acclimation, heat-stress

Role of active oxygen species (AOS) in plant signal transduction: AOS in plants, AOS as signal molecules, AOS-part of a signalling network.

Action of phytohormones: Multiple signals regulating growth and development of plant organs and their adaption to environmental stresses.

Unit-IV **12 Hrs**

Symbiotic plant-microbe interaction: Rhizospheric signals (PGPR) and early molecular events in the ectomycorrhizal symbiosis; Lipo-chito-oligosaccharides (LCO) signalling in the interaction between rhizobia and legumes; endophytes.

Recognition and defencesignalling in plant-microbe interaction: Resistance genes - gene-for-gene resistance; co-evolution and specificity of R genes; the TIR domain, the NBS domain; genetic organization of resistance genes; quorum sensing.
Plant-insect interaction: Induction of direct and indirect defence

Reference Books

1. Animal Cell Biotechnology – Methods and Protocols. Nigel Tenkins.
2. Molecular biology of the Cell –Alberts et al.
3. Molecular Cell Biology. 5th Edn. Lodish, H, et al., W H Freeman
4. Cell and Molecular Biology. Karp, J.JohnWiey and Sons In.
5. The Cell-Molecular approach. 4th Ed. Geoffrey M Cooper and Robert E Hausman.
6. Cell Biology- A Laboratory Handbook. 3rd Ed, 4th Vol, Julio E Celis

METABOLOMICS (SOFT CORE) – 48 Hrs

COURSE CODE:

Course Outcome

CO1-Understanding the basic metabolism of plants

CO2-Different pathways involved in secondary metabolite production

CO3-Altering the metabolic pathways by changing the precussors

CO4-Purification of useful secondary metabolites and their kinetics and dynamics

CO5-Applications in food and pharmaceutical industries

Unit-I **12 Hrs**

Plant Metabolomics: Developments and history of plant metabolomics, Nature and prospecting of metabolism-related secondary plant products, tools and techniques, production in culture: optimization; selection, hormonal kinetics for secondary metabolites, production, mechanism and control.

Unit-II **12 Hrs**

Production of secondary metabolites: Induction, Alkaloids, antitumor compounds, food additives, steroids and saponins, detoxification of secondary metabolites, production of secondary metabolites by bioconversion, genetic transformation for production of secondary metabolites, large-scale production in bioreactors, Metabolomics-assisted breeding.

Unit-III **12 Hrs**

Microbial metabolomics: Systems biology of microbial metabolism; microbe sensors, *In silico* metabolomes, Food and Applied metabolomics, Biomarker discovery. Experimental Approaches-Genome sequencing, Gene expression arrays, Nuclear Magnetic Resonance, Mass spectroscopy, Capillary electrophoresis, Two dimensional gel electrophoresis, Gene expression arrays, Pathway analysis, HPLC, Protein sequencing, Bench-scale fermentation, AFLP/RLFP analysis.

Unit-IV **12 Hrs**

Pharmacometabolomics: personalized medicine and future of health system, Pathways discovery and disease pathophysiology, Bioinformatics analysis of targeted metabolomics; Environmental metabolomics, Bioactive compounds and Pharmacognosy, Clinical Applications of Metabolomics, Nutrigenomics and Metabolomics, Novel Technologies for Metabolomics, Data Handling for Metabolomics.

Reference Books

1. V.Voet and J.G.Voet, Biochemistry, 3rd edition, John Wiley, New York, 2004.
2. A.L. Lehninger, Principles of Biochemistry, 4th edition, W.H Freeman and Company, 2004.

FOOD AND ENVIRONMENTAL BIOTECHNOLOGY (SOFT CORE) – 48 Hrs

COURSE CODE: BTB210

Course Outcome

CO1-Comprehensive insight into the fermented foods and enzymes in food industry

CO2-Obtain knowledge of functional foods, genetically modified foods and nutraceuticals.

CO3-Students will be able to understand current status of biotechnology in environment protection.

CO4-Understand the principles of bioremediation and significance of GMO to the environment.

Unit-I **12 Hrs**

Fermented foods, milk-based products, fermented vegetables, fermented meats, fish, beverages, vinegar, mould fermentation - tempeh, soysauce, rice wine.

Enzymes in dairy industry, cheese making and whey processing, impact of enzyme technology (protein hydrolysates, bioactive peptides), Enzymatic processing of fruit juices; role of enzymes in baking, meat and meat processing, phytase in animal feeds, DNA-based methods for food authentication, comparative methods of toxicity testing in (novel) foods, biological approach to tailor-made foods, application of generic technologies in food and nutritional sciences; anti-cancer components in foods.

Unit-II **12 Hrs**

Functional foods and Biotechnology: applying molecular, biochemical, cellular and bioprocessing concepts, use of specific phenolic metabolites from botanical species. Pre- and Pro-biotics, single cell protein, single cell lipids. Manipulation of fruit ripening process.

Food processing, principles and practices, food ingredients and processing aids from biotechnological processes, corn sweeteners, bacterial starter cultures, Food spoilage, preservation, mycotoxins in food commodities. Genetically modified foods, designer foods, Nutraceuticals, detection of GM foods.

Unit-III **12 Hrs**

Renewable and non-renewable resources, current status of biotechnology in environment protection. Characterization of waste. Waste water management: Bioreactors for waste-water treatment, Aerobic biological treatments, anaerobic biological treatments, treatment of industrial effluents-dairy, distillery, paper and sugar industries. Membrane-based waste water treatment.

Oil pollution – treatment with microorganisms.

Unit-IV **12 Hrs**

Bioremediation: Concepts and principles, bioremediation using microbes, in situ and ex situ bioremediation, biosorption and bioaccumulation of heavy metals.

Xenobiotics: Degradation capabilities of microorganisms with reference to toxicology, pesticides, herbicides, polyaromatic hydrocarbons.

Renewable energy: Relevance of GMO to the environment.

Solid waste management: Waste as a source of energy, biotechnology in paper and pulp industry, production of oil and fuels from wood waste, anaerobic and aerobic composting, vermiculture, biofuels.

Reference Books

1. Food Microbiology. Frazier, W. C. and Westhoff, D. C. Tata McGraw Hill.
2. Agriculture Bio-technology. Purohit. Agrobios India.
3. Food Bio-technology. Knorr, D. Marcel Dekker Inc.
4. Environmental Bio-technology. Jogand, S. N. Himalaya Publishing House, New Delhi.

PHARMACEUTICAL BIOTECHNOLOGY (SOFT CORE) – 48 Hrs

COURSE CODE:

Course Outcome

CO1-Rules and regulation regarding development of drugs

CO2- Study of Pharmacodynamics and pharmacokinetics of drugs

CO3-Different phases of clinical trials and drug toxicity studies.

CO4-GMP and GLP in production management and quality control and assessment

Unit- 1 **12 Hrs**

Introduction to pharmaceuticals and Drug development process: Introduction to pharma industry, history of the pharmaceutical industry, traditional pharmaceuticals of biological origin (animal, plant and microbial)biopharmaceuticals and pharmaceutical biotechnology, age of biopharmaceuticals, biopharmaceuticals: current status and future prospects.

Steps involved in drug development process, drug delivery systems, preclinical studies and principles practices, phases of clinical trials. Regulatory authorities in India, USA and Europe and Japan, prescription, non- prescription drugs and orphan drugs.-

Unit-II **12 Hrs**

Drug Receptors, Pharmacodynamics and pharmacokinetics.: Different types of drug receptors, second messengers (cAMP, Ca2+ and phosphoinositides) and their signalling mechanism, relation between drug concentration and respose, concentration effect curves, concentration- effect curves, relation between drug dose and clinical responses.Volume of distribution of drug, clearance, drug accumulation, bioavailability, alternative routes of administration and the first pass effect, therapeutic drug monitoring

Unit-III **12 Hrs**

Drug biotransformation and drug toxicity:The role of biotransformation in drug disposition, phase I metabolism (microsomal oxidation, hydroxylation, dealkylation), phase II metabolism (Drug conjugation pathway) CYP families, clinical relevance of drug metabolism, drug-drug interaction.

Mechanisms of toxicity, production of toxic metabolites, harmful immune response, idiosyncratic toxicity, contexts of drug toxicity, drug overdose, drug- drug interactions, pathology of drug toxicity. Cellular toxicity, organ and tissue toxicity.

Unit-IV **12 Hrs**

The drug manufacturing process and drugs of biopharmaceutical origin: Guides to good manufacturing practice, manufacturing facility. Clean rooms, cleaning, decontamination and sanitations (CDS), CDS of the general manufacturing area, CDS of the Process equipment, generation of purified water, water for injection, documentation, specifications, Concept and testing of pre- formulations & their parameters. Tablets: Compressed, granulation, coatings, pills and capsules, parenteral preparations, herbal extracts, oral liquids, Ointments. Processing and packing instructions.

Therapeutic enzymes: asparginase, DNAse, Glucocerebrosidase, galactosidase and urate oxidase, superoxide dismutase, Lactase.

Reference Books

1. Textbook of Pharmaceutical Biotechnology. Chandrakant Kokate, Pramod H.J, SS Jalalpure. Elsevier Health Sciences, 2012
2. Pharmaceutical Biotechnology: Concepts and Applications. Gary Walsh. John Wiley & Sons, 2013
3. Pharmaceutical Biotechnology, Second Edition. Michael J. Groves. Taylor & Francis, 2005

NON CREDIT COURSE

EMPLOYABILITY SKILLS MODULE

COURSE CODE:

Course Outcome

CO1- Concepts of corporate communication
CO2- English grammar skills
CO3- Develop strategies for negotiation and marketing
CO4- Personality development and interview skills
CO5- This course will enable students to learn about the project management, entrepreneurship.

Campus to Corporate: Transition from College to Corporate world; Perceptions v/s Real Corporate life; Working in Teams; Basics of corporate communication

Corporate & Office Etiquette: Elements of a good handshake; Visiting cards exchange & How to manage business cards; Small Talk & Networking; Basics dining etiquette

English Grammar: A quick round up: Nouns, Pronouns, Adjectives, Verbs, Adverbs, Tenses, Prepositions, Clauses, Subject and Predicate, Punctuations, Subject- verb agreement, Confusing prepositions, Missing Articles, Editing paragraphs

Negotiation Skills: Introduction to Bargaining and Negotiation; The Negotiation Process: Four Stages; An Analytical framework of Negotiation; Bargaining Approaches; Strategy for Value Added Negotiation

Selection & Interviewing Skills: Current market for talent & methods for attracting & sourcing; Best practices for different hiring situations - Campus, Market, Head hunter agencies; Selection process design & assessment centers; Effective interview

Personality Development: Self assessment: SWOT; Understanding Personality - Identifying different personalities; Levels of Human Learning; Change v/s Transformation; Sensitivity - Sharpen your senses; Creativity and Lateral thinking; Developing Positive Mental Attitude; Emotional Quotient; Handling Criticism; Positive Health; Food habits and Meditation; Goal setting - Creative Visualization - Law of Attraction; Living a created life - Personal Leadership

III Semester

BIOPROCESS ENGINEERING AND TECHNOLOGY (HARD CORE) – 48 Hrs

COURSE CODE:

Course Outcome

CO1-To have the **c**omprehensive insight into the different type of fermenter
CO2-To obtain knowledge of media design and industrial culture
CO3-Students will be able to understand different type of fermenter and bioreactor.
CO4-Understand the principles of downstream processing
CO5- To understand the enzyme technology and their applications in industry.

Unit-I **12 Hrs**

Basic principle of Biochemical engineering and Microbial Growth Kinetics:

General Introduction to metabolic pathways involved in microbial products, concepts of over production, primary and secondary metabolites, estimation of biomass. Isolation, screening and maintenance of industrially important microbes; Microbial growth kinetics, Strain improvement for increased yield and other desirable characteristics.

Batch culture, continuous culture, fed batch culture, the growth cycle, effect of nutrients, growth rate and cell cycle.

Unit II **10 Hrs**

Media design and industrial cultures: Introduction, typical media, Oxygen requirement, antifoams, media formulation, energy sources, carbon and nitrogen source, other components, media optimization , Media sterilization, Batch process (thermal death kinetics), continuous sterilization process. Sterilization of fermenter and other ancillaries, filter sterilization of air and media. Rheological properties of medium. Screening for industrial useful metabolites, maintenance of stock cultures

Unit III **10 Hrs**

Types of fermenters and bioreactors: design, control system, operation, optimization, control and monitoring of variables such as temperature, agitation, pressure, pH, online measurements and control, Scale up of bioreactors. Bubble column, airlift reactor, packed bed, fluidized bed, trickle bed, Membrane reactor, Photobioreactor, Solid state fermenter, Animal and plant cell bioreactors. Scale up and Scale down studies of bioreactors. Biosensor

Unit IV **16 Hrs**

Downstream processing (Recovery and purification of products) of biologicals: Separation of cells, foam separation, disintegration of micro organism, mechanical and non mechanical methods,flocculation, filtration, plate filters, rotary vacuum filters, centrifugation, Stoke's law, continuous centrifugation, basket centrifuge, bowl centrifuge, , membrane filtration, ultra filtration and reverse osmosis, chromatographic techniques, absorption, spray drying, drum drying, freeze drying.

Enzyme Technology: production, recovery, stability and formulation of bacterial and fungal enzymes-amylase, protease, penicillin acylase, glucose isomerase; Immobilised Enzyme and Cell based biotransformation steroids, antibiotics, alkaloids.

Texts/ References

1. Jackson AT., Bioprocess Engineering in Biotechnology, Prentice Hall, Engelwood Cliffs, 1991.
2. Shuler ML and Kargi F., Bioprocess Engineering: Basic concepts, 2nd Edition, Prentice Hall, Engelwood, Cliffs, 2002.

3. Stanbury RF and Whitaker A., Principles of Fermentation Technology, Pergamon press, Oxford, 1997.
4. Baily JE and Ollis DF., Biochemical Engineering fundamentals, 2nd Edition, McGraw-Hill Book Co., New York, 1986.
5. Aiba S, Humphrey AE and Millis NF, Biochemical Engineering, 2nd Edition, University of Tokyo press, Tokyo, 1973.
6. Comprehensive Biotechnology: The Principles, Applications and Regulations of Biotechnology in Industry, Agriculture and Medicine, Vol 1, 2, 3 and 4. Young M.M., Reed Elsevier India Private Ltd, India, 2004.
7. Mansi EMTEL, Bryle CFA. Fermentation Microbiology and Biotechnology, 2nd Edition, Taylor & Francis Ltd, UK, 2007.

GENETIC ENGINEERING (HARD CORE) - 48 Hrs

COURSE CODE:

Course Outcome

CO1-To have the **c**omprehensive insight into the different enzymes used in Genetic engineering lab

CO2-To obtain knowledge of construction of vectors

CO3-Students will be able to understand different type ofcloning methods.

CO4-Understand the principles of PCR& types

CO5- To know the different sequence methods

Unit I **10 Hrs**

Basics Concepts: DNA Structure and properties; Restriction Enzymes; DNA ligase, Klenow enzyme, T4 DNA polymerase, Polynucleotide kinase, Alkaline phosphatase; CRISPR- cas9, Cohesive and blunt end ligation; Linkers; Adaptors; Homopolymeric tailing; Labeling of DNA: Nick translation, Random priming, Radioactive and non-radioactive probes, Hybridization techniques: Northern, Southern and Colony hybridization, Fluorescence in situ hybridization; Chromatin Immunoprecipitation; DNA-Protein Interactions-Electromobility shift assay; DNaseI footprinting; Methyl interference assay

Unit II **10 Hrs**

Cloning Vectors: Plasmids; Bacteriophages; M13 mp vectors; PUC19 and Bluescript vectors, Phagemids; Lambda vectors; Insertion and Replacement vectors; Cosmids; Artificial chromosome vectors (YACs; BACs); Animal Virus derived vectors-SV-40; vaccinia/bacculo & retroviral vectors; Expression vectors; pMal; GST; pET-based vectors; Protein purification; His-tag; GST-tag; MBP-tag etc.; Intein-based vectors; Inclusion bodies; Methodologies to reduce formation of inclusion bodies; Baculovirus and pichia vectors system, Plant based vectors, Ti and Ri as vectors, Yeast vectors, Shuttle vectors

Unit III **6 Hrs**

Cloning Methodologies: Insertion of Foreign DNA into Host Cells; Transformation; Construction of libraries; Isolation of mRNA and total RNA; cDNA and genomic libraries; cDNA and genomic cloning; Expression cloning; Jumping and hopping libraries; Southwestern and Far-western cloning; Protein-protein interactive cloning and Yeast two hybrid system; Phage display; Principles in maximizing gene expression

Unit IV **22 Hrs**

PCR and Its Applications: Primer design; Fidelity of thermostable enzymes; DNA polymerases; Types of PCR – multiplex, nested, reverse transcriptase, real time PCR, touchdown PCR, hot start PCR, colony PCR, cloning of PCR products; Tvectors; Proof reading enzymes; PCR in gene recombination; Deletion; addition; Overlap extension; and SOEing; Site specific mutagenesis; PCR in molecular diagnostics; Viral and bacterial detection; PCR based mutagenesis, Mutation detection: SSCP, DGGE, RFLP, Oligo Ligation Assay (OLA), MCC (Mismatch Chemical Cleavage, ASA (Allele-Specific Amplification), PTT (Protein Truncation Test)

Sequencing methods: Enzymatic DNA sequencing; Chemical sequencing of DNA; Automated DNA sequencing; RNA sequencing; Chemical Synthesis of oligonucleotides; Introduction of DNA into mammalian cells; Transfection techniques; Gene silencing techniques; Introduction to siRNA; siRNA technology; Micro RNA; Construction of siRNA vectors; Principle and application of gene silencing; Gene knockouts and Gene Therapy; Creation of knock out mice; Disease model; Somatic and germ-line therapy- in vivo and ex-vivo; Suicide gene therapy; Gene replacement; Gene targeting; Transgenics; cDNA and intragenic arrays; Differential gene expression and protein array.

Text/References

1. S.B. Primrose, R.M. Twyman and R.W.Old; Principles of Gene Manipulation. 6th Edition, S.B.University Press, 2001.
2. J. Sambrook and D.W. Russel; Molecular Cloning: A Laboratory Manual, Vols 1-3, CSHL, 2001.
3. Brown TA, Genomes, 3rd ed. Garland Science 2006
4. Selected papers from scientific journals.
5. Technical Literature from Stratagene, Promega, Novagen, New England Biolab etc.
6. Genes, Benjamin XII , 2017

LAB-III (HARD CORE)

COURSE CODE:
Course Outcome
CO1 -
CO2 -
CO3 -
CO4 -
CO5 -

Practicals/ Experiments

1. Animal cell culture: preparation of media, culture and maintenance of cell lines, trypsinization
2. Culture of transformed cells
3. MTT assay for cytotoxicity
4. Western blotting and detection
5. Study of fermenter (demo)
6. Immobilization of yeast by calcium alginate, gel entrapment and assay for enzyme *invertase*
7. Assay of catalase.
8. Study of alcohol fermentation – alcohol from different substrates – estimation of alcohol content
9. Solid state fermentation
10. Determination of the activity of enzyme protease
11. Determination of the activity of enzyme amylase
12. Estimation of Vitamin E
13. Estimation of Vitamin C
14. Estimation of aminoacid by ninhydrin method
15. Preparation of MS media
16. Induction of callus
17. Micropropagation
18. Suspension culture- production of secondary metabolites
19. Preparation of synthetic seeds
20. Database search for nucleotide and aminoacid sequences using BLAST
21. Study of sequence alignment
22. Construction of trees/dendrogram using sequence analysis
23. Structure prediction using homology searches
24. RAPD
25. Transformation
26. Bacterial gene expression
27. RFLP mapping
28. Isolation of plasmid DNA from *E.coli*
29. Restriction digestion of DNA
30. DNA ligation
31. production of citric acid by *A.niger* by submerged fermentation.
32. Estimation of citric acid by titrametric method
33. PCR
34. Isolation of antibiotic producing actinomycetes from soil sample

CLINICAL AND ADVANCED TECHNIQUE IN BIOTECHNOLOGY (SOFT CORE) – 48 Hrs

COURSE CODE:

Course Outcome

CO1**-**Diagnosis of diseases using enzymes as markers
CO2-analysis of blood and urine sample to interpret the diseases
CO3-Study of metabolic disorders and their diagnosis
CO4- Clinical trails of designed drugs/ biomolecules
CO5-Tools of Histopathalogy, Immunotechnology, microarray and DNA chips in understanding the diseases

Unit I **16 Hrs**

Diagnostic Enzymology: Mechanisms of elevated enzyme activities. Some important enzymes – alkaline phosphates, creatine kinase, LDH, AST, ALT – isozyme changes

Blood: Composition, cells, functions of plasma proteins and lipo proteins in diseases. Disorders of hemoglobin – Thalassemia, sickle cell anemia. Anemias – Microcytic, normocytic and macrocytic.

Advanced methods in clinical analysis: Blood, urine and quantitative determination of metal ions in body fluids

Liver: Biochemical indices of hepatobiliary diseases. Bile pigments – formation of bilirubin, urobilinogen bile acids, jaundice – pre-hepatic, hepatic and post-hepatic; liver function tests, diseases of the liver – hepatitis, cholestasis, cirrhosis, Gallstones.

Unit II **8 Hrs**

Kidney: Assessment of renal function – creatine clearance, renal calculi, uremia, laboratory investigation of kidney disorders.

Cardiovascular Disorders: major cardio vascular system – Atherosclerosis – risk factors, pathogenesis. Diagnosis and prognosis

Disorders of Amino Acid and nucleotide metabolism: Gout Lesch – Nyhan syndrome, orotic acid urea phenyl ketonuria, alkaptonuria, maple-syrup urine.

Clinical trails of designed drugs/biomolecules.

Molecular detection of diseases, Amniocentesis

Unit III **12 Hrs**

Microscopy: Phase Contrast Microscopy, Fluorescence Microscopy, Confocal and Inverted Microscopy), Electron Microscopy (Transmission Electron Microscopy, Scanning Electron Microscopy)

Diagnostics and immunological techniques: applications of immunological and molecular diagnostic methods (RIA, ELISA, PCR, DNA finger printing) in forensic science and disease diagnosis. *In vitro* antigen-antibody reactions, Coombs' test, complement titration test (Direct and indirect), Immunoflourescence, Immuno-enzymatic and ferritin technique, Immuno-electromicroscopy. Immuno-electrophoresis, Western blot analysis. Hybridoma technology – Monoclonal and polyclonal antibodies and their application

Unit IV **12 Hrs**

Nanobio-technology: Introduction, types and synthesis of nanomaterial, protein – based nano structures, DNA-based nano structures. Applications of nanomaterials, nano biosensors, drug and gene diversity, disease diagnostics, cancer therapy, risk potential of nanomaterials.

DNA chip technology and micro arrays: Types of DNA chips and their production, hybridization, application of micro arrays on DNA chips.

Genomic research: Methods for whole genome sequencing, genome sequence data, e-PCR, genome sequence to annotation- methods for annotation of genome sequence.

Reference Books

1. Biochemistry – With Clinical Correlations. Devlin.
2. Clinical Biochemistry. Latner.
3. Principles of Instrumental Analysis. 5th Ed. Douglas A Skoog, James Holler and Timothy A Nieman.
4. Analytical and Preparative Separation Methods of Biomacromolecules. Hassan Y Aboul – Enein.
5. Microbiology – Principles and Explorations. 5th Ed. Jacquelyn G Black.
6. Genetic Engineering: Primose, S. B.
7. An introduction to molecular Bio-technology (Ed.) Wink.
8. Principles of gene manipulation and genomics. Primose, S. B. and Twyman, R. M.
9. Gene cloning and DNA analysis an Introduction. Brown, T. A. Blackwell Science Company.
10. Molecular Biology and Biotechnology. Walker, J. M. and Rapley, R. Panima Publishing Corporation.
11. Molecular Biotechnology – Principles and application of Recombinant DNA. Glicks, R. Bernard and Pasternak, J. Jack. Panima Publishing Corporation.
12. Molecular Biomethods Hand Book. Rapley, R and Walker, M. Jhon. Humana Press.
13. Genes (VIII edition) Benjamin Lewin, Pearson Education International

BIOSTATISTICS, BIOINFORMATICS AND BIOENTREPRENEURSHIP (SOFT CORE) – 48 HRS

COURSE CODE:

Course Outcome

CO1-Application of statistics to understand and analyse the experimental results of biological sciences
CO2-retrival of biological data
CO3-phylogenetic analysis
CO4-primer designing
CO5-drug discovery and molecular docking

Unit I **12 Hrs**

Statistical concept: Data structure, sampling methods, collection, classification and tabulation of data, graphical and diagrammatic representation, histogram, frequency polygon, frequency curve, bar graph, pie chart.

Measure of central frequency: **Mean, median, mode, mean deviation, standard deviation, standard error**

Types of distribution of data: Normal, binomial, Poisson, Z-test, t-test and ANOVA.

Correlation and regression

Unit II **18 Hrs**

Bioinformatics: Introduction, history, internet and bioinformatics, knowledge, discovery and data mining, problems faced in bioinformatics area, opportunities in bioinformatics, human genome project.

Biological databases and their management: database concept, introduction, history of databases, databases management systems, types of database, Codd rules, data normalization biological databases – introduction, application and its importance, biological database and their functioning, types of biological database, microbiological database, primary sequence database, carbohydrate database, RNA database, genome database, organism database, biodiversity.

Sequence database: Introduction, nucleotide sequence database, protein sequence database, the EMBL nucleotide sequence database, structure databases.

Bioinformatics software: Clustal V Multiple sequence alignment, Clustal W Version 1.7, Ras Mol, Oligo, Mol script, TREEVIEW, ALSCRIPT, genetic analysis software, Phylip.

Computational biology: Introduction, data mining and sequence analysis, database similarities searches, practical aspects of multiple sequence alignment, phylogentic analysis, predictive methods using nucleic acid and protein sequences, submitting DNA sequences to the databases.

Unit III **10 Hrs**

Innovation: Idea to enter into business, Designing and development of new products as per market demands and their future prospective. Needs of customer, branding, distribution, promotion and advertising.

Types of bio-industries and IPR: biopharma, bioagri and bioservices. IP protection & commercialization strategies- freedom to operate.

Accounting and Finance : Business plan preparation, contracts, partnerships, business feasibility analysis by SWOT, socio-economic costs benefit analysis; funds/support from Government agencies like MSME/banks and private agencies like venture capitalists:/angel investors for bio entrepreneurship; business plan proposal for virtual start up company. statutory and legal requirements for starting a company/venture; basics in accounting practices: concepts of balance

sheet, profit and loss statement, Valuation, Cash flow, double entry. Information technology for business administration and expansion. Technology transfer.

Incubation centres: Govt. (C-CAMP, KBITS, CFTRI) and Private incubation centres for start-ups.

Unit IV **8 Hrs**

Marketing : Market conditions, segments, prediction of market changes; identifying needs of customers; Market linkages, branding issues; developing distribution channels - franchising; policies, promotion, advertising; branding and market linkages for virtual start-up company.

Business Strategy & HR: Entry and exit strategy; pricing strategy; negotiations with financiers, bankers, government and law enforcement authorities; dispute resolution skills; external environment/ changes; avoiding/managing crisis; broader vision–global thinking; mergers & acquisitions.

Regulatory understanding:- GLP, GMP, GCP, PCB, IBSC, ISO

Bioentrepreneurship and case study: Importance of entrepreneurship; advantages of being entrepreneur - freedom to operate; introduction to bioentrepreneurship – biotechnology in a global scale; Scope in bioentrepreneurship; innovation – types, out of box thinking; skills for successful entrepreneur – creativity, leadership, managerial, team building, decision making, Risk assessment, opportunities for bioentrepreneurship- development programs of public and private agencies (MSME, DBT, BIRAC, Start-up & Make in India).

References:

1. Singh Narendra, Project management and control, (Himalaya publishing house)
2. Prasanna Chandra, Projects: Planning, Analysis, selection, implementation& review (Tata McGrow Hill)
3. P. GopalaKrishna& V.E. Rama Moorthy, Project management (Mac Millan India)
4. Chandra prasanna, proect preparation, Appraisal and Implementation (Tata Mcgrow Hill)
5. A. N. Desai, The dynamics of Entrepreneurial development and management (Himalaya publishing house)
6. Biostatistical Analysis. Zar J. H. Printice-Hall International.
7. Methods in Biostatistics. Mahajan, B. K. Smt. Hindu Mahajan
8. Bioinformatics. David W. Mount.
9. Bioinformatics A Practical Guide to the Analysis of Genes and Proteins Andreas D. Baxevanis and B. F. Francis Ouellette. A John Wiley & Sons, Inc., Publication.
10. Biostatistics. Daniel.
11. Handbook of Biostatistics A Review and Text. Christopher and Carvounis.

APPLIED BIOTECHNOLOGY (OPEN ELECTIVE) – 48 Hrs

Unit I **12 Hrs**

Scope of Biotechnology in India and Karnataka.

Structure of plant,animal and bacterial cells. Biomolecules and their importance.

Enzyme Biotechnology

Introduction to application of enzymes in industry: Food & beverage, detergent, textile pharmaceutical and leather.

Unit II **14 Hrs**

Applications of Plant Cell and tissue culture technology

Improvement of hybrids, encapsulated seeds, production of disease resistant, stress resistant plants, secondary metabolites from cell cultures

Transgenic plants for crop improvement, molecular farming from transgenic plants, edible vaccines. Bioethics in plant genetic engineering**.**

Unit III **10 Hrs**

Animal Cell Culture Techniques

Manipulation of reproduction in animals: Artificial insemination,embryo transfer, embryo splitting, embryo sexing

In vitro fertilization technology(IVF): Embryo cloning, embryonic stem cells Invitro-fertilization and embryo transfer in humans. Transgenic animals

Valuables products from animal cell culture (Tissue plasminogen activator, Blood factor VIII, erythropoietin.)

Hybridoma technology: Production of monoclonal and polyclonal antibodies and their applications. Bioethics in animal genetic engineeringcryopreservation, quantitation of cells, cytotoxicity assays.

Unit IV **12 Hrs**

Industrial and microbial biotechnology

Growth media, sources of nutrition, sterilization, design of fermenter, batch, fed batch and continuous culture.

Production of primary metabolites (vitamins, organic acids, alcohols and aminoacids). Production of secondary metabolites (antibiotics)

Biopesticides (Biological control of plant pathogens, pests and weeds.).

Biofertilizers (microbial inoculants)

Food Biotechnology – Genetically modified foods, Nutraceuticals, detection of genetically modified foods. Production of single cell proteins and mycoproteins.

Reference Books

1. Biotechnology. B. D. Singh
2. Biotechnology. R. C. Dubey

OPEN ELECTIVE –FUNDAMENTALS OF BIOINFORMATICS

Contact Hours/ Week	:	4	Credits	:	4
Total Lecture Hours	:	48			

Course Outcomes:

- Ability to use popular bioinformatics tools to generate biologically meaningful results
- Ability to interpret biological results generated by a bioinformatics tool
- Application of some basic models and algorithms
- The students will gain an understanding of the computational challenges (and their solutions) in the analysis of large biological data sets; they will understand how some of the commonly used bioinformatics tools work, how to use these tools effectively

Unit I **12 Hrs**

Introduction to Bioinformatics and Biological Database:

Introduction to bioinformatics, Review of Central Dogma, Genome organization -Prokaryotic and Eukaryotic. Overview of Genome Projects – Human genome project. Introduction to DNA and protein databases and their classification, file formats, information retrieval tools – Entrez, SRS, ARSA. Nucleotide and Protein sequence and structure databases (NCBI, EMBL, DDBJ and PDB). Focus on GenBank, UniProt, and Gene Ontology.

Unit II **12 Hrs**

Sequence Alignment and Database Similarity Searching:

Pairwise alignment: Alignment algorithm: Pairwise: Dot matrix method, Dynamic programming Method (Needleman-Wunsch & Smith Waterman), Scoring Matrices – PAM and BLOSUM, Database Similarity Searching: FASTA and BLAST. BLAST variants, Statistical parameters for BLAST output – e value, p value and Bit Score.

Unit III **12 Hrs**

Multiple sequence alignment:

Iterative, Progressive alignment. Application of MSA – 1. Phylogenetics – Phylogenetics Basics, Terminologies, Gene versus species phylogeny, Forms of tree representation: Maximum Parsimony and Distance methods 2. Gene prediction: Gene prediction in prokaryotes and eukaryotic 3. Protein Motif and Domain Prediction: Identification of Motif and Domains in MSA – PSSM and Profile HMMs.

Unit IV **12 Hrs**

Protein sequence analysis:

Analysis of Scalar parameters: Protparam and pepstats: Hydropathy analysis (Membrane protein prediction): Kyte-Doolittle plot, Helical Wheel representation. Secondary structure prediction, Protein structure building-Homology modelling (Comparative modelling only) – SWISS MODEL server and MODELLER, Protein Structure Visualization: Rasmol, Pymol, CN3D, Swiss PDB viewer, Chimera and Discovery studio visualizer

Applications of Bioinformatics: Bioinformatics in pharmacy: overview of drug discovery process, structure based and ligand-based drug design (CADD). Pharmacokinetics: absorption, distribution, metabolism, excretion and toxicity of drugs.

REFERENCE BOOKS:

1	David W Mount	"Bioinformatics sequence and Genome analysis", Cold Spring Harbor Laboratory Press, 2nd Edition, 2013, 9989332257358
2	Jin Xiong	Essentials Bioinformatics, Cambridge university press,3rd Edition, 2006, 9789335657325
3	Neil C. Jones and Pavel A. Pevzner	An Introduction to Bioinformatics Algorithms, MIT Press,5th Edition, 2005, 8789432449328
4	Steffen Schulze-Kremer	Molecular Bioinformatics: Algorithms and Applications, Walter de Gruyter, 4th Edition, 1996, 9789432449327
5	Attwood T K, D J Parry-Smith	Introduction to Bioinformatics, Pearson Education, 3rd Edition, 2005, 9789332447329
6	Michael R Barnes and Ian C grey	Bioinformatics for Geneticists, John Wiley & Sons Ltd, The Atrium, Southern Gate, Chichester, West Sussex PO19 8SQ, England
7	Rui Jiang, Xuegong Zhang. Michael Q. Zhang	Basics of Bioinformatics, Springer Heidelberg New York Dordrecht London,
8	Supratim Choudhuri	Bioinformatics for Beginners, Academic Press.
9	Peter Lake and Paul Crowther	Concise Guide to Databases. Springer London Heidelberg New York Dordrecht
10	Arthur M. Lesk	Introduction to Bioinformatics, Oxford University Press Inc., New York
11	Mahmood A. Mahdavi	Bioinformatics –Trends and Methodologies, InTech Janeza Trdine 9, 51000 Rijeka, Croatia
12	Catherine Hack and Gary Kendal	Bioinformatics: Current Practice and Future Challenges for Life Science Education: Biochemistry and Molecular Biology Education Vol. 33, No. 2, pp. 82–85, 2005
13	Teresa K. Attwood	The Babel of Bioinformatics, SCIENCE, Volume 290, Number 5491, Issue of 27 Oct 2000, pp. 471-473.

IV SEMESTER

PLANT BIOTECHNOLOGY (HARD CORE) – 48 Hrs

Unit I **10 Hrs**

Plant tissue culture-General: Historical background: Requirements for in-vitro culture- Tissue culture laboratory, Preparation of media, sterilization. Conventional plant breeding and plant tissue culture.

Cell and Tissue Culture Technology: **Role of hormones in growth and development of plants, tissue-specific hormones. Callus Induction, Organogenesis, Somatic embryogenesis, cell suspension culture and synthetic seeds**

Somaclonal variations: Isolation of somoclonal variants, Factors affecting somoclonal variants – applications

Micropropagation: Propagation from pre-existing meristem, shoot apical meristem, shoot and node culture, micropropagation stages and applications

Unit II **15 Hrs**

Germplasm preservation: cryopreservation, cryoprotectant, warming rate and recovery, gene banks, applications.

Seed Health Technology

Introduction: Importance of Seed health, important seed-borne diseases; Seed Health diagnostics; Management of seed-borne diseases.

Haploid Technology: Methods of haploid culture, Factors affecting anther and microspore cultures, applications. Cytoplasmic male sterility in Indian Mustard.

Protoplast Technology: Isolation, purification and culture of protoplasts, protoplast fusion and somatic hybridization, applications of somatic hybrids/ cybrids.

Secondary metabolite production: Induction of secondary metabolites by plant cell culture, technology of plant cell culture for production of chemicals, biotransformation using plant cell culture. Bioreactor systems and models for mass cultivation of plant cells.

Unit III **7 Hrs**

Plant transformation techniques: Methods of gene transfer in plants, *Agrobacterium* mediated transfer- mechanism of DNA transfer, general features of Ti and Ri plasmids, role of *vir* genes, design of expression vectors, use of promoters and reporter genes; viral vectors, direct gene transfer methods- electroporation, microinjection, particle bombardment, selection of transformants, screening and field trials.

Unit IV **16 Hrs**

Transgenic plants: Herbicide resistance, resistance against biotic stress- bacterial, viral, fungal and insect resistance, abiotic stress, improved crop productivity, improved nutritional quality, transgenic plants for floriculture, Qualitative trait loci and marker studies.

Growth- promoting bacteria in plants: Biological nitrogen fixation, genetic manipulation for nitrogen fixation. Biocontrol of phytopathogens.

Molecular farming: Transgenic plants as production systems-production of alkaloids, steroids, colouring agents, flavoring agents, biodegradable plastics, industrial enzymes, therapeutic proteins, biopharmaceuticals, edible vaccines, plantibodies.

Intellectual Property Rights (IPR): IPRs and agricultural technology- implications for India, WTO, WIPO, GATT, TRIPS. Plant Breeder's Rights, legal implications, commercial exploitation of traditional knowledge, protection. Ethical issues associated with consumption of GM food, labelling of GM crops and foods.

Reference Books

1. Plant Signal Transduction. Scheel D and Wasterpack C. Oxford University Press.
2. Introduction to Plant Pathology. Strange R N. John Wiley and Sons Ltd.
3. Applied plant virology. Walkey. Chapman and Hall London.
4. Molecular Plant Pathology by Agrios.
5. Plant Tissue Culture Concepts and Laboratory Exercise. Trigiano R. N. and Gray, D. L. CRC Press.
6. Plant Tissue culture – Supplement-7. Lindsey, K. Springer International Edition.
7. Introduction to Plant Tissue Culture. Razdon, M. K. Oxford and IBH Publishing Co. Pvt Ltd.
8. Introductory to plant physiology. Noggle, R., Fritz, J. G. Prentice Hall of India Pvt. Ltd.
9. Plant Molecular Biology – A Practical Approach. Shaw, C. H. Panima Publishing Corporation.
10. A Laboratory Manual of Plant Biotechnology. Purohit. Publisher Agrobios.
11. Introduction to Plant Biotechnology. Chawla, H. S.
12. Practical Application of Plant Molecular Biology. Henry, R. J. Chapman and Hall.
13. Plant Biotechnology – Laboratory manual. Chawla, H. S. Oxford and IBH publishing Co. Pvt. Ltd.
14. Biotechnology. Gupta, P. K. Rastogi Publications.
15. Biochemistry and Molecular Biology of Plants. Buchanan, Gmissem and Jones.
16. Genetic Engineering of Crop Plants. Lyrett, G. W., Grierson, D.
17. Plant Molecular Biology. Grierson and S. N. Covey.

ANIMAL BIOTECHNOLOGY (HARD CORE) – 48 Hrs

Unit I **10 Hrs**

Culture of animal cells: Advantages and limitations of tissue culture, aseptic handling, facilities required, media and cell lines. Primary culture: Isolation of mouse and chick embryos, human biopsies, methods for primary culture, nomenclature of cell lines, sub culture and propagation, immoretalization of cell lines, cell line designation, selection of cell line and routine maintenance.

Cloning and Selection: Cloning protocol, stimulation of plating efficiency, suspension cloning, isolation of clones, isolation of genetic variants, interaction with substrate, selective inhibitors.

Unit II **16 Hrs**

Cell separation and characterization: Density based, antibody based, magnetic and fluorescence based cell sorting. Characterization of cells based in morphology, chromosome analysis, DNA content, RNA and protein, enzyme activity, antigenic markers, cytotoxicity assays, cell quantitation, cell culture contamination: monitoring and eradication, cryopreservation.

Culturing of specialized cells: Epithelial, mesenchymal, neuro ectodermal, hematopoietic gonad and tumor cells, Lymphocyte preparation, culture of amniocytes, fish cells, confocal microscopy. Stem cell culture and its applications

Organic and embryo culture: Choice of models, organ culture, histotypic culture, filter-well inserts, neuronal aggregates whole embryo culture eggs, chick and mammalian embryos.

Unit III **16 Hrs**

Cell and Tissue engineering: Growth factors for *in situ* tissue regeneration, biomaterials in tissue engineering, approaches for tissue engineering of skin, bone grafts, nerve grafts. Hemoglobin based blood substitutes, bio antificial or biohybrid organs. Limitations and possibilities of tissue engineering.

In vitro **fertilization and Embryo transfer:** *In vitro* fertilization in Humans, Embryo transfer in Humans, Super ovulation and embryo transfer in farm animals e.g: Cow.

Cloning of Animals: Methods and uses. Introduction, nuclear transfer for cloning, cloning from-embryonic cells, adult and fetal cells. Cloning from short term cultured cells: cloning of sheep, monkeys, mice, pets, goats and pigs. Cloning from long term cultured cells: Cloning of cows from aged animals. Cloning efficiency, Cloning for production of transgenic animals, gene targeting for cloned transgenic animals, cloning for conservation, human cloning: ethical issues and risks.

Unit IV **6 Hrs**

Transfection methods and transgenic animals: Gene transfer or transfection, transfection of fertilized eggs or embryos, unfertilized eggs, cultured mammalian cells, targeted gene transfer. Transgenic animals and applications: mice and other animals, sheep, pigs, goats, cows and fish.

The legal and socio-economic impact of biotechnology at national and international levels, public awareness. Biosafety regulations- guidelines for research in transgenic animals, public awareness of the processes of producing transgenic organisms

Reference Books

1. Anthony Atala, Robert P Lanza. 2002, Methods of tissue engineering, Academic press
2. Ian Freshney R. 2005, Culture of animal cells–A manual of basic techniques, John Wiley and Sons Inc. Hoboken, New Jersey
3. Animal Cell Culture – A Laboratory Manual. Frushney.
4. Animal Biotechnology. Ballinic, C. A., Philip, J. P and Moo Young, M. Pergamon Press.
5. Genetic Engineering of Animals. Puhler, A. VCH Publisher.
6. Methods of Tissue Engineering. Anthony Atala, Robert P. Lanza.
7. Animal Cell Biotechnology – Methods and Protocols. Nigel Tenkins.

PROJECT WORK/DISSERTATION (HARD CORE)

COURSE CODE:

Course Outcome

CO1-Review of recent research articles published in high impact journals and presentation by students.

CO2-Students do conduct review of literature followed by hands on training to do piece of research work.

CO3-They would be skill full to understand the experiment and interpret the result.

CO4-They get an idea to compile the data and present in the form of dissertation.

- Includes exhaustive review of literature on the topic selected, design of work, standardization of techniques and execution of work
- Compiling of the data generated in the form of thesis. Interpretation of the result correlating with the advanced information available in the literature.
- Research Paper presentation.

JSS COLLEGE OF ARTS COMMERCE AND SCIENCE

(An Autonomous College of University of Mysore; Re-Accredited by NAAC with 'A' Grade)

OOTY ROAD, MYSURU- 25

PG DEPARTMENT OF BOTANY

Choice - Based Credit System (CBCS)

BOTANY

M.Sc. DEGREE SYLLABUS

2018-19 ONWARDS

(MODIFIED ON 2022)

JSS MAHAVIDYAPEETHA
JSS COLLEGE FOR ARTS, COMMERCE AND SCIENCE
(AUTONOMOUS) OOTY ROAD, MYSURU- 25

POST GRADUATE DEPARTMENT OF BOTANY

M.Sc., Botany Choice - Based Credit System (CBCS) Syllabus
(CBCS-CGPA-Modified (2018-19)
CORE SUBJECT: BOTANY – [POST GRADUATE]

DEGREE: M.Sc., BOTANY

1st and 3rd semester Changes made at BOS meeting held on 13.01.2022 (in %)
HC 1.3 Systematics of Angiosperms (5.17%)
HC 3.3 Plant Biotechnology (40.22%)
SC 3.3 Plant Propagation and Plant Breeding (1.7%)
OE 3.1 Plant Propagation Techniques (1.35%)
(CHANGES MADE ARE HIGHLIGHTED IN THE TEXT)

FIRST SEMESTER				**Credits: 22**
No.	**Course/Paper Code**	**Title of the Course/ Paper**	**Hrs/Week L:T:P**	**Credits**
1	**HARD CORE 1.1**	**Virology, Bacteriology, Mycology and Plant Pathology**	**2:2:2**	2:1:1
2	**HARD CORE 1.2**	**Phycology, Bryophytes, Pteridophytes and Gymnosperms**	**2:2:2**	2:1:1
3	**HARD CORE 1.3**	**Systematics of Angiosperms**	**2:2:2**	2:1:1+ (2 credits for submission of tour report) 2:1:3
4	**SOFT CORE 1.1****	**Fungal Biology and Biotechnology**	**2:2:2**	2:1:1
5	**SOFT CORE 1.2****	**Algal Biology and Biotechnology**	**2:2:2**	2:1:1
6	**SOFT CORE 1.3****	**Lichenology and Mycorrhizal Technology**	**2:2:2**	2:1:1
7	**SOFT CORE 1.4****	**Phytopathology**	**2:2:2**	2:1:1

*Field Study/Tour: The student shall undertake a field trip for a minimum of 2-3 days and shall submit the herbaria and tour report for evaluation-2 credits.
**Any two soft core papers shall be studied.

SECOND SEMESTER			Credits: 18	
No.	**Course/Paper Code**	**Title of the Course / Paper**	**Hrs/Week L:T:P**	**Credits**
1	**HARD CORE 2.1**	**Reproductive Biology of Angiosperms and Plant Morphogenesis**	**2:2:2**	2:1:1
2	**HARD CORE 2.2**	**Cell Biology and Genetics**	**2:2:2**	2:1:1
3	**HARD CORE 2.3**	**Plant Breeding and Evolutionary Biology**	**2:2:2**	2:1:1
4	**SOFT CORE 2.1***	**Plant Anatomy and Histochemistry**	**2:0:2**	2:0:1
5	**SOFT CORE 2.2***	**Ethno-Botany and Intellectual Property Rights (IPR)**	**2:0:2**	2:0:1
6	**SOFT CORE 2.3***	**Economic Botany**	**2:0:2**	2:0:1
7	**OPEN ELECTIVE 2.1**	**Medicinal Plants**	**2:2:0**	2:1:0
	** Any two soft core papers shall be studied.			

THIRD SEMESTER			Credits: 16	
No.	**Course/Paper Code**	**Title of the Course /Paper**	**Hrs/Week L:T:P**	**Credits**
1	**HARD CORE 3.1**	**Biochemistry and Plant Physiology**	**2:2:2**	2:1:1
2	**HARD CORE 3.2**	**Molecular Biology**	**2:2:2**	2:1:1
3	**HARD CORE 3.3**	**Plant Biotechnology**	**2:2:2**	2:1:1
4	**SOFT CORE 3.1***	**Molecular Genetics of Plants**	**2:2:2**	2:1:1
5	**SOFT CORE 3.2***	**Molecular Plant Pathology**	**2:2:2**	2:1:1
6	**SOFT CORE 3.3***	**Plant Propagation and Plant Breeding**	**2:2:2**	2:1:1
7	**SOFT CORE 3.4***	**Phyto-chemistry and Herbal Technology**	**2:2:2**	2:1:1
8	**OPEN ELECTIVE 3.1**	**Plant Propagation Techniques**	**2:2:0**	2:1:0
	* Any one soft core courses/papers shall be studied.			

FOURTH SEMESTER				Credits: 16
No.	**Course/Paper Code**	**Title of the Course /Paper**	**Hrs/Wk L:T:P**	**Credits**
1	**HARD CORE 4.1**	**Ecology, Conservation Biology and Phytogeography**	**2:2:2**	2:1:1
2	**HARD CORE 4.2**	**Project Work ***	**4:2:2**	8
3	**SOFT CORE 4.1***	**Seed Technology**	**2:2:2**	2:1:1
4	**SOFT CORE 4.2***	**Seed Pathology**	**2:2:2**	2:1:1
5	**SOFT CORE 4.3***	**Bio -Analytical Techniques**	**2:2:2**	2:1:1
6	**OPEN ELECTIVE 4.1**	**Plant Diversity and Human Welfare**	**2:2:0**	2:1:1
	***Project Work:** The student shall undertake a Project Work in the Department or in any other University or Institute under the guidance of a Research Supervisor and shall submit a Project Report duly signed by Student and Research Supervisor for Evaluation.			

Semester- Wise Credit Pattern:
I Semester= 22 [HC- 12+2=14 + 08 (SC)]
II Semester= 24 [HC- 12 + 08 (SC) + 04 (OE)]
III Semester= 18 (HC- 08 + 06 (SC) + 04 (OE)]
IV Semester= 20 (HC-12 +04 (SC) + 04 (OE)]

In total= 46 HC + 26 (SC) + 12 (OE)= The Department is offering 84 Credits of B.Sc. Honors/ M.Sc. Botany (CBCS) Course including three Open Elective Course to the outside Department Students/

Important Note:
Student is required to earn the credit for qualifying B.Sc. Honors/ M.Sc. Botany from Department of Botany as follows:

Hard Core offered by the Department= 46 (Against maximum of 56)
Soft Core offered by the Department = 26 (Against minimum of 16)
Minimum Open Elective to be earned by the Student (Outside the Department) = 04
A total of 76 Credit is required for qualifying B.Sc. Honors/ M.Sc. Botany Course.

SCHEME OF EXAMINATION/ASSESSMENT
MODEL QUESTION PAPER (THEORY)
JSS COLLEGE FOR ARTS, COMMERCE AND SCIENCE
(AUTONOMOUS) OOTY ROAD, MYSURU- 25
POST GRADUATE DEPARTMENT OF BOTANY
M.Sc., Degree ------Semester Examination May/June-20--
BOTANY
Course/Paper: ……
Course/Paper Code……..

Time: 3 Hrs **Max Marks: 70**

Instructions: 1) Answer all questions.
2) Draw neat and labelled diagrams wherever necessary.

I. Answer the following; (10MCQs of 1 Marks each) **10 X 1 = 10**
2 from Unit I
3 from Unit II
2 from Unit III
3 from Unit IV

II. Answer the following; **4 X 5 = 20**
2 from Unit I with internal choice
2 from Unit II with internal choice
2 from Unit III with internal choice
2 from Unit IV with internal choice

III. Answer the following; **4 X10 = 40**
2 from Unit I with internal choice
2 from Unit II with internal choice
2 from Unit III with internal choice
2 from Unit IV with internal choice

SCHEME OF PRACTICAL EXAMINATION/ASSESSMENT
MODEL QUESTION PAPER (PRACTICALS)

JSS COLLEGE FOR ARTS, COMMERCE AND SCIENCE
(AUTONOMOUS) OOTY ROAD, MYSURU- 25
POST GRADUATE DEPARTMENT OF BOTANY
M.Sc., Degree I Semester Examination May/June-2018
BOTANY
Course/Paper: ……
Course/Paper Code……..

Time: 3 Hrs **Max Marks: 70**

Q I. Conducting Experiment/Micro-preparation /Plant identification 15
Q II. Minor experiment/ Demonstrations/ Procedure Writing 10
Q III. Critically comments (3x5 Marks) 15
Q IV. Identification 5x2 Marks) 10
Q V. Viva-voce examination 10
Q VI. Class Records/ Submissions 10

PO M.SC. BOTANY

Sl. No.	PO
1.	Conduct investigations of complex problems by the use of research-based knowledge on an independent term project.
2.	Transfer of appropriate knowledge and methods from one topic to another within the subject.
3.	Carry out practical work, in the field and in the laboratory, with minimal risk.
4.	Able to think logically and organize tasks into a structured form and assimilate knowledge and ideas based on wide reading of text books and through the internet.
5.	Apply the scientific knowledge of basic science, life sciences and fundamental process of plants to study and analyse any plant form.
6.	Knowledge and understanding of the range of plant biology in terms of structure, function and environmental relationships.
7.	Apply reasoning informed by the contextual knowledge to assess plant diversity, and the consequent responsibilities relevant to the biodiversity conservation practice.

PSO M.SC. BOTANY

Sl. No.	COURSE	PSO
1.	Algal Biology and Biotechnology	Phylogeny, thallus organisation, economic and ecological importance of alagal community
2.	Biochemistry and Plant Physiology	Biomolecules, metabolic pathways and stress physiology in plants
3.	Cell Biology and Genetics	Cell originals and Mendelian principles
4.	Ecology, Conservation Biology and Phytogeography	Diversity of vegetation, distribution and its conservation
5.	Economic Botany	Economic values of different crop plants and their applications
6.	Major Project	Hands on experience in various fields of plant science
7.	Molecular Biology	Molecular level organisation in prokaryotes and eukaryotes with respect to various mechanisms involved
8.	Plant Anatomy and Histochemistry	Anatomical features and organisation of cells in plants
9.	Plant Breeding and Evolutionary Biology	Plant breeding methods, procedures and their application for crop improvement
10.	Plant Biotechnology	Tissue culture techniques and its application in development of resistant varieties
11.	Plant Propagation and Plant Breeding	Propagation methods and plant breeding procedures and their application in different fields
12.	Plant Propagation Techniques	Propagation methods and procedures and their application in different fields
13.	Phycology, Bryophytes, Pteridophytes and Gymnosperms	Distribution, classification and phylogeny of lower plant communities
14.	Phytopathology	Concepts of plant diseases defence mechanisms in plants and study of plant diseases
15.	Reproductive Biology of Angiosperms and Plant Morphogenesis	Embryological study of growth and development using plant models
16.	Seed Technology	Industrial scale processing of seeds up to marketing

17.	Systematics of Angiosperms	Angiospermic plant family study with their phylogeny
18.	Virology, Bacteriology, Mycology and Plant Pathology	Diversity, distribution of microorganism with respect to their economic aspects

CO M.SC. BOTANY

Sl. No.	COURSE	CO
1.	Algal Biology and Biotechnology	Specify in depth of thallus organization and phylogeny in algae
2.	Algal Biology and Biotechnology	Understand the details of toxins, blooms and distributions of algae
3.	Algal Biology and Biotechnology	Deliberate in depth about cultivation and marketing algae
4.	Algal Biology and Biotechnology	Specify the details of Algal products and uses
5.	Biochemistry and Plant Physiology	Learn in details with biomolecules and their function
6.	Biochemistry and Plant Physiology	Understand in depth about solute transport and photosynthesis in plants
7.	Biochemistry and Plant Physiology	Specify the details of metabolism of nitrogen, lipids and plant hormones
8.	Biochemistry and Plant Physiology	Understand in depth about Stress physiology
9.	Cell Biology and Genetics	Learn in detail about cell membranes transport and proteins
10.	Cell Biology and Genetics	Deliberate the Functions of cell organelles, programed cell death
11.	Cell Biology and Genetics	Specify the extensions of Mendelian principles
12.	Cell Biology and Genetics	Learn about Sex determination and dosage compensation
13.	Ecology, Conservation Biology and Phytogeography	Understand the diversity of ecosystem and types of ecosystems
14.	Ecology, Conservation Biology and Phytogeography	Learn the in details of pollution and environmental biology
15.	Ecology, Conservation Biology and Phytogeography	Study the importance of biodiversity and conservation biology
16.	Ecology, Conservation Biology and Phytogeography	Detailed study of phytogeography and crop distribution
17.	Economic Botany	Specify the details of cereals, millets, pulses, oil yielding plants and study of horticultural plants and floriculture
18.	Economic Botany	Deliberate the characteristics of sugar yielding plants, spices and condiments
19.	Economic Botany	Understand the importance of fibre, timber and gum yielding plant
20.	Economic Botany	Deliberate on the medicinal plants and their applications
21.	Major Project	Learn the details of literature survey and methodology in research
22.	Molecular Biology	Identify the characteristics of genetic materials and its replication
23.	Molecular Biology	Learn the details of molecular basis of mutation, repair and recombination
24.	Molecular Biology	Deliberate the details of RNA formation, processing of RNA and post-RNA
25.	Molecular Biology	Understand in depth of gene regulation in prokaryotes and eukaryotes
26.	Plant Anatomy and Histochemistry	Learn in details of primary vegetative body of the plants
27.	Plant Anatomy and Histochemistry	Deliberate in details of differentiation in vascular tissues and study of apical meristems in shoot and root
28.	Plant Anatomy and Histochemistry	Deliberate the characteristics of secondary growth
29.	Plant Anatomy and	Understand the details of plant histochemistry

	Histochemistry	
30.	Plant Breeding and Evolutionary Biology	Learn in depth about plant breeding methods and techniques
31.	Plant Breeding and Evolutionary Biology	Understand the details of breeding for specific purposes
32.	Plant Breeding and Evolutionary Biology	Learn the details of Nature of evolution
33.	Plant Breeding and Evolutionary Biology	Identify the characteristics of variation and speciation
34.	Plant Biotechnology	Understand in depth about plant tissue culture and its techniques
35.	Plant Biotechnology	Specify the genetic engineering and tools used in it
36.	Plant Biotechnology	Understand the details of genetic manipulation, transgenic approaches to produce resistant plants
37.	Plant Biotechnology	Learn the details of engineering of crop plants for production of secondary metabolites
38.	Plant Propagation and Plant Breeding	Learn the details of importance of plant propagation, vegetative propagation and micro propagation
39.	Plant Propagation and Plant Breeding	Understanding of basic concepts of plant breeding and genetics
40.	Plant Propagation and Plant Breeding	Study types, purposes of plant breeding
41.	Plant Propagation and Plant Breeding	Deliberate study of advanced breeding aspects
42.	Plant Propagation Techniques	Learn the details of importance of plant propagation
43.	Plant Propagation Techniques	Understand in depth about types of vegetative propagation
44.	Plant Propagation Techniques	Learn the techniques of budding and layering
45.	Plant Propagation Techniques	Deliberate in details with examples of micro propagation in forestry and horticulture plants
46.	Phycology, Bryophytes, Pteridophytes and Gymnosperms	Understand the details of diversity, distribution, pigmentation and life cycle of algae
47.	Phycology, Bryophytes, Pteridophytes and Gymnosperms	Deliberate in depth of Bryophytes life cycle, classification, phylogeny and Economic importance
48.	Phycology, Bryophytes, Pteridophytes and Gymnosperms	Understand the details of Pteridophytes life cycle, phylogeny, classification, economic importance and anatomy
49.	Phycology, Bryophytes, Pteridophytes and Gymnosperms	Write down in details with examples Gymnosperms history, reproduction, edconomic importance and interrelationship
50.	Phytopathology	Learn the details of the concept, causative agents and disease cycle of plant pathogens
51.	Phytopathology	Deliberate the details of defense mechanisms in plants and its genetics
52.	Phytopathology	Study of Management of plant diseases
53.	Phytopathology	Identify in details with examples of diseases in crop plants
54.	Reproductive Biology of Angiosperms and Plant Morphogenesis	Understanding the microsporogenesis and historical overview
55.	Reproductive Biology of Angiosperms and Plant Morphogenesis	Specify in details with examples about megasporogeneis, fertilization, endosperm and embryo
56.	Reproductive Biology of Angiosperms and Plant Morphogenesis	Specify the details of models and concepts of plant morphogenesis
57.	Reproductive Biology of Angiosperms and Plant Morphogenesis	Understand in details with examples of plant growth and development, photomorphogenesis
58.	Seed Technology	Understand the seed science and concepts
59.	Seed Technology	Study the seed production and processing methods

60.	Seed Technology	Learn about seed quality parameters and tests
61.	Seed Technology	Deliberate the procedure of seed certification
62.	Systematics of Angiosperms	Understand the principles and applications of Taxonomy of angiosperms
63.	Systematics of Angiosperms	Specify the details of taxonomic literature
64.	Systematics of Angiosperms	Deliberate in details with examples Dicot and monocot family and features of classification systems
65.	Systematics of Angiosperms	Specify in details molecular systematics with examples of softwares and databases
66.	Virology, Bacteriology, Mycology and Plant Pathology	Learn the classification and characteristics of viruses, viroids, prions and diseases of it
67.	Virology, Bacteriology, Mycology and Plant Pathology	Deliberate in details with examples of Bacteria, archeabacteria, actinomycetes and mycoplasma and its economic importance
68.	Virology, Bacteriology, Mycology and Plant Pathology	Specify the Fungal diversity, life cycle and economic importance of fungi
69.	Virology, Bacteriology, Mycology and Plant Pathology	Understand in details of etiology, distribution and management of plant disease

BOTANY: I SEMESTER- HARD CORE 1.1

VIROLOGY, BACTERIOLOGY, MYCOLOGY AND PLANT PATHOLOGY

Theory-32 Hrs

Unit-1: Virology: Origin and evolution of viruses; Classification of viruses-ICTV and Baltimore Systems; Genome diversity in viruses; Methods of cultivation of viruses; Purification and detection of viruses; Transmission of viruses; Mechanism of replication of DNA and RNA viruses; Viroids - Structure and multiplication; Prions - structure and multiplication; Prion diseases.

Unit-2: Bacteriology: Introduction and classification of Bacteria by Bergey's Manual of Determinative and Sytematic Bacteriology; C. R. Woese- Three domain classification of Bacteria; Archaebacteria and Eubacteria - diversity and evolution; Nutritional types of bacteria; Bacterial growth; Recombination in bacteria (conjugation transformation, and transduction); Brief account on actinomycetes; Structure and multiplication of Mycoplasma and Phytoplasmas; Economic importance of bacteria.

Unit -3: Mycology: Present status of fungi; Outline classification of fungi (Ainsworth-1973). Vegetative organization in fungi; Nutrition in fungi (saprotrophs, biotrophs, necrotrophs; symbiotrophs); Methods of reproduction in fungi - Asexual and sexual methods; Spore liberation in fungi; Evolution of sex in fungi; Heterothallism and parasexuality; Life cycle pattern and phylogeny of Myxomycotina, Mastigomycotina, Zygomycotina, Ascomycotina, Basidiomycotina and Deuteromycotina; Fungi and their economic importance.

Unit-4: Plant Pathology: Concepts and scope of plant pathology; Plant diseases and crop losses; Classification of plant diseases; Parasitism and disease development; Effect on physiology of host; Host range of pathogens; Defence Mechanisms in Plants; Plant Disease epidemics and plant disease forecasting; Methods of plant disease management; Study of plant diseases- Sandal Spike, Citrus Canker, Bacterial Blight of Paddy, Late Blight of Potato, Downy Mildew of Bajra, Tikka Disease of Ground nut, Grain Smut of Sorghum. Phloem Necrosis of Coffee, Root Knot Disease of Mulberry.

Practicals-32 Hrs

1) Laboratory guidelines, design, tools, equipments and other requirements for studying microorganisms.
2) Measuring the dimensions of microorganisms using Micrometry.
3) Determining total count of microbes using Haemocytometer.
4) Gram and special staining of bacteria.
5) Preparation of NA, PDA, sterilization, pouring, inoculation and culturing of bacteria/fungi.
6) Staining of fungi including VAM fungi.
7) Identification of fungi.
8) Measurement of bacterial growth by Spectrophotometer.
9) Recording environmental factors (Temperature, RH, and Rainfall and wind velocity).
10) Splash liberation of spores from diseased tissue.
11) Estimation of total phenols in diseased and healthy plant tissues.
12) Study of the following diseases: Sandal Spike, Citrus canker, Bacterial Blight of paddy, Late Blight of Potato. Downy Mildew of Bajra, Tikka disease of ground nut, Grain smut of Sorghum, Phloem Necrosis of Coffee, Root Knot disease of Mulberry.

References

1) Madigan, M .T. 2012. Brock Biology of Microorgasms, 13t edn. Benjamin Cummings.
2) Willey, J, Sherwood, L. and Woolverton, C.J. 2013. Prescott`s Microbilogy 9th edn. Mc Graw- Hill Educations.
3) Wagner, E.K, and Hewlett, M.J. 2009. Basic Virology. Blackwell Science Ltd. 2nd edn. USA.
4) Kodo, C.I. and Agarwal, H.O. 1972. Principles and Techniques in Plant Virology, Van Nostrand, Reinhold Company, New York.
5) Conrat, F.H., Kimball, P.C. and Jay, L. 1988.V irology. Prentice Hall, Englewood Chiff, New Jercy.
6) Jawaid, A. Khan and Jeanne Dijkstra. 2002. Plant Viruses as Molecular Pathogens. Food Products Press, NY
7) Alexopoulos, C.J. Mims, C.W. and Blackwell, M. 2013. Introductory Mycology 4th edn. Wiley.
8) Singh, R. S. 2009. Plant Disease. 9th edn. Oxford and IBH Pub.Co., New Delhi.
9) Agrios, G. N. 2005. Plant Pathology 5th edn. Academic Press, San Diego.
10) Rangaswamy, G. and Mahadevan, A. 2002. Diseases of crop plants in India, Prentice Hall of India Pvt.Ltd. New Delhi.
11) Mehrotra, R. S. 2003. Plant Pathology. 2nd edn. Tata Mc Graw-Hill Pub. Co. Ltd., New Delhi.
12) Cann, A.J. 2012. Principles of Molecular Virology 5th edn. Elsevier Ltd, USA.
13) Flint, S.J. Enaquist, L.W., Rancnicllo, V. R. and Skalka, A.M. 2009. Principles of Virology pathogenesis and control. 3rd edn. APS Press, USA.
14) Hall, R. 2014. Plant Virology, 5th edn. Elsevier, USA.
15) Aneja, K.R. 2003. Experiments in Microbiology plant Pathology and Biotechnology, 4th edn. New Age International Publishers, New Delhi.
16) Holt, J.G., Krige, N.R., Sneath., P.H.A. Stuley, J.T. and Williams, S.T. 2010. Bergey`s Manual of Determinative Bacteriology, 9th edn. Williams and Wilkins, USA.

BOTANY: I SEMESTER - HARD CORE 1.2

PHYCOLOGY, BRYOPHYTES, PTERIDOPHYTES AND GYMNOSPERMS

Theory-32 Hrs

Unit-1: Phycology: Diversity and distribution of algae; Unicellular, colonial, filamentous, heterotrichous, parenchymatous, pseudoparenchymatous, siphonous forms; General characteristics, classification and phylogeny of algae; Pigmentation in algal groups; Role of photosynthetic and accessory pigments; Life cycles in algae - haplontic, diplontic, isomorphic, heteromorphic; Economic importance of algae.

Unit -2: Bryophytes: Introduction, general characteristics, classification and phylogeny of Bryophytes; Distribution, habitat, external and internal morphology and reproduction; Comparative account on gametophytes and sporophytes of bryophytes; Economic and ecological importance.

Unit -3: Pteridophytes: Introduction, classification and phylogeny; Morphology, anatomy reproductive biology and phylogeny; Psilophytes, Lycophytes, Sphenophytes, Filicophyta; Evolution of sorus; evolution of sporangium; Gemetophyte development - homosporous and heterosporous ferns; Heterospory and seed habit; Stelar evolution in Pteridophytes; Ecology of Pteridophytes; Economic importance.

Unit- 4: Gymnosperms: Distribution, general characteristics, classification and phylogeny of Gymnosperms; Range in morphology, anatomy, reproduction and interrelationships of - Cycadales, Ginkgoales, Coniferales, Gnetales; Pteridosperms; Economic importance of Gymnosperms.

Practicals-32 Hrs

1-4) Algae: Study of Cyanophyceae: *Anabaena, Oscillatoria*; Study of Chlorophyceae: *Oedogonium*, *Pediastrum;* Study of Phaeophyceae: *Turbinaria, Ectocarpus*; Study of Rhodophyceae: *Gracilaria*, *Batrachospermum*; Economic products of algae.

5-7) **Bryophytes:** Study of morphology, anatomy and reproductive morphology - Hepaticopsida- *Marchantia, Dumortiera*; Anthocerotopsida- *Anthoceros, Notothylas*; Bryopsida- *Bryum* and *Polytrichum*.

8-10) **Pteridophytes:** Study of vegetative habit, anatomy and reproductive morphology of *Psilotum, Lycopodium, Isoetes, Ophioglossum, Botrychium, Angiopteris, Pteris, Hymenophyllum, Marselia, Salvinia, Azolla;* **Paleobotany**- Study of Lepidodendrales, Calamitales, Sphenophyllales and Coenopteridales (Fossil Pteriodophytes).

11-12) **Gymnosperms:** Study of morphology, anatomy and reproductive morphology of *Zamia, Pinus* and *Ephedra, Ginkgo, Auracaria, Podocarpus, Gnetum, Agathis, Cupressus*, *Thuja*; Economic importance of Gymnosperms.

References:

1) Bower, F.O. 1935. Primitive land plants, Macmillan, London.
2) Campbell, D. H. 1972. Evolution of land plants (Embryophytes), Central Book Department Allahabad.

3) Watson, E.V. 1971. The structure and life of Bryophytes Hutchinson and Co. Ltd. London.
4) Parihar, N.S. 1970 An Introduction to Embryophyta Vol. 1. Bryophyta. Central Book Department, Allahabad.
5) Prempuri, 1981. Bryophytes, Morphology, Growth and Differentiation. Atmaram and sons, New Delhi.
6) Nayar, M.C., Rajesh, K.P. and Madhusoodanan, P.V. 2005. Bryophytes of Wyanad.
7) Murthy, A.V.S.S. 2005. A text book of algae. IK International Pvt., Ltd., New Delhi.
8) Bold, H. C. and Wynne, M.J. 1978. Introduction to the algae. Structure and reproduction. Prentice Hall.
9) Chapman and Chapman. 1973. The Algae. Macmillan Co., New York.
10) Fritsch, F. E. 1935. Structure and Reproduction of Algae Vol. I & II. Cambridge Univ. Press, London.
11) Odum, E.P. Fundamentals of Ecology. 3rd edn. Toppan Co., Ltd., Japan.
12) Round, F. E. 1973. Biology of the algae. Edward Arnold Ltd., London.
13) Smith, G.M. 1951. Manual of Phycology. Pub. Co. Waltham., Mass.
14) Venkataraman, G.S. 1974. Algae form and function. Today & Tomorrow's Pub., New Delhi.
15) South, G. R. And Whittick, A. 1987. Introduction to Phycology. Blackwell Scientific Publication, UK.
16) Hoek, V., Mann, D. G. And Jahns, H. M. 1995. An introduction to Phycology. Cambridge University Press, UK.
17) Biswas, C. and Johri, B. M. 1997. The Gymnosperms. New Age Publishers, New Delhi.
18) Rashid A. 1986. An Introduction to Pteridophytes. Vikas, New Delhi.
19) Sporne K. R. 1969. Morphology of Gymnosperms. Hutchinson University Library, London.
20) Sporne, K. R. 1969. Morphology of Pteridophytes. Hutchinson University Library, London.
21) Chase, M.W. and Reveal, J.L. 2009. A phylogenetic classification of the land plants to accompany APG III. Botanical Journal of the Linnean Society, 161: 122-127.
22) Sundararajan, S. 2007. Introduction to Pteridophyta. New Age International Publishers, New Delhi.
23) Vashishta, P.C. (2008). Botany for Degree Students: Pteridophyta. S. Chand & Co. Ltd., New Delhi.

BOTANY: I SEMESTER - HARD CORE 1.3
SYSTEMATICS OF ANGIOSPERMS

Theory-32 Hrs

Unit-1: Introduction to plant systematics; Plant classification systems-artificial, natural and phylogenetic systems; Contributions of Carolus Linnaeus, Michel Adanson, de Jussieu, de Candolle to plant classification; Concepts of taxonomic hierarchy; Taxonomic Categories-Genus concept; Species concept; Intraspecific categories; subspecies; varieties and forms; History of botanical nomenclature; ICBN and ICN aims and principles; Rules and recommendations; Rule of priority; Typification; Author citation, Legitimate and illegitimate names; Name changes and synonyms; Effective and valid publication; Herbarium and its significance; Botanical gardens.

Unit-2: **Taxonomic Literature:** General taxonomic indices, world floras and manuals; Monographs and revisions; Bibliographies, catalogues and reviews; Periodicals, glossaries and dictionaries; Hortus Malabaricus; Taxonomic websites-IPNI, Plant List, Tropicos, Botanico-Periodicum-Huntianum (BPH); Biodiversity Heritage Library (BHL); Botanicus, Index Herbariorum; Taxonomic Keys- bracketed keys, indented keys, numbered keys, edge punched and body punched keys.

Unit-3: Study of plant classification Systems; Broad outlines of Bentham and Hooker's system, Engler and Prantl's system, Hutchinson's system, Takhtajan's system, and Cronquist's system; Numerical Taxonomy-principles, selection of characters, merits and demerits; Angiosperm Phylogeny Group (APG) III & IV classification; Study of angiosperm families-Magnoliaceae, Nympheaceae, Urticaceae, Papaveraceae, Euphorbiaceae, Acanthaceae, Rubiaceae, Alismataceae, Cyperaceae, Commelinaceae, Zingiberaceae, Liliaceae, Dioscoreaceae and Orchidaceae.

Unit-4: Molecular Systematics: Nuclear, mitochondrial and chloroplast genes. Gene sequencing, analysis of molecular data, alignment of sequences; Phylogenetic tree construction-Maximum Likelihood and Neighbour Joining Methods; Phylogenetic analysisrooted and unrooted trees; Data analysis- alignment, substitution, model building; Phylogentic softwares-CLUSTAL W, MEGA, Mesquite, PAUP, PHYLIP, Treefinder, TreeBase.

Practicals-32 Hrs

1) Methods of preparation and maintenance of Herbaria.
2-4) A field trip of three days to a floristically rich area to study plants belonging to different families (Every student shall submit a report for evaluation for two credits).
5-10) Identification of the flowering plants in and around Mysore using keys, floras and monographs.
11-12) Construction of phylogenetic tree based on molecular data of plant species retrieved from GenBank.

References:

1. Cronquist, A. 1981. An Integrated system of classification of flowering plants. Columbia University Press, New York.
2. Simpson, M.G. 2006. Plant Systematics. Elsevier, Amsterdam.

3. Judd, W.S., Campbell, C.S., Kellogg, E.A., Stevens, P.A. and Donoghue, M.J. 2002. Plant Systematics: A phylogenetic Approach. Sinauer Associates, Inc., Massachusetts.
4. Gurucharan Singh. 2004. Plant Systematics: Theory and Practice, Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi.
5. Jeffrey, C. 1982. An introduction to Plant Taxonomy. II Edn., Cambridge Uni. Press.
6. Mondal, A.K. 2009. Advanced Plant Taxonomy. New Central Book Agency Pvt. Ltd., Kolkata, WB.
7. Pullaiah, T. 1998. Taxonomy of Angiosperms. Regency Publications, New Delhi.
8. Johri, B.M. and Bhatacharjee, S.P. 1994. Taxonomy of Angiosperms. Narosa Publishers, New Delhi.
9. Lawrence, G.H.M. 191. Taxonomy of Vascular Plants. MacMillan, London.
10. Chase, M.W. and Reveal, J.L. 2009. A phylogenetic classification of the land plants to accompany APG III. Botanical Journal of Linnaean Society, 161: 122-127.
11. Nei, M. and Kumar, S. 2000. Molecular Evolution and Phylogenetics. Oxford Univ. Press, New York
12. APG-IV. 2016. An update of the Angiosperm Phylogeny Group classification for the orders and families of flowering plants APG-IV. Botanical Journal of Linnaean Society, 181: 1-20.

BOTANY: I SEMESTER - SOFT CORE 1.1
FUNGAL BIOLOGY AND BIOTECHNOLOGY

Theory-32 Hrs

Unit-1: Introduction and historical overview of mycology; General characteristics and importance of fungi in human life; Fungi –Taxonomy and Systematics; Fungi in genetic and applied research; Estimation of Fungal diversity; Quantitative Indices- species richness, species evenness and species abundance; Molecular methods used for fungal diversity estimation-nuclear genome, messenger RNA transcripts, Ribosomal/DNA sequence comparisons and mitochondrial genome.

Unit-2: Macro fungi and micro fungi living on plant substrata; Lignicolous macrofungi; Lichenized fungi; Sequestrate fungi; Endophytic fungi; Saprobic soil fungi; Fungi in stressful environment; Mutualistic, arbuscular, and endomycorrhizal fungi; Yeasts; Fungicolous fungi; Fungi in fresh and marine water habitats; Fungi associated with aquatic animals; Fungi as parasites of humans and plants; Fungi associated with animals, insect, arthropod and nematodes; Coprophilous fungi.

Unit-3: Fungal Fermentation and Food Products: Food and Beverages; Single cell proteins-Myco-proteins; Food processing by fungi-bread, soybean products, cheese and fermented milk; Fungal secondary metabolites-antibiotics, immunosuppressive agents, anti-tumour agents, fungal toxins as medicines; Fungal pigments; Steroid transformation; Fungal enzymes; Bio-control agents; Application of molecular biology in fungal biotechnology.

Unit-4: Mushrooms and fungi in medicine; Toxic macromycetes; Mushroom cultivation; Model organisms- *Saccharomyces cerevisiae*/*Neurospora crassa*; Bio-deterioration of food grains and mycotoxins; Fungal communities of herbivore dung; The fungal communities of composts; Fungal interactions and practical exploitation; Heavy metals in fungi-accumulation and sorption; Biotechnology of wood rotting fungi.

Practicals-32 Hrs

1) Study of Myxomycetes and Chytridiomycetes
2) Study of Plasmodiophoromycetes and Oomycetes
3) Study of Zygomycetes
4) Study of Ascomycetes
5) Study of Basidiomycetes
6) Study of Deuteromycetes 7)Study of Lichens
8) Study of VAM fungi
9) Detection of aflatoxin B1
10) Cultivation of Oyster mushroom.
11) Alcoholic fermentation of grape juice by *Saccharomyces*.
12) Cultivation of *Penicillium* and testing antibiotic principle.
13) Study of edible and poisonous mushrooms.
14) Study of fungal model organisms - *Saccharomyces cerevisiae*/*Neurospora crassa*

References:

1) Alexopoulos, C. J., Mims, C. W. and Blakwell, M. 2007. Introductory Mycology 4th edn. Wiley India, New Delhi.
2) Deacon, J. W. 1997. Modern Mycology 3rd edn. Blackwell Science publishers, London.

3) Mehrotra, R.S. and Aneja, K.R. 1990. An Introduction to Mycology, New Age International (P) Limited, New Delhi.
4) Mueller, G M; Bills, GF and Foster, M.S. 2004. Biodiversity of Fungi, Elsevier Academic Press, New York.
5) Rai, M. and Bridge, P.D. 2009. Applied Mycology, CABI International, UK.
6) Carlile, M.J. Watkinson,S.C. and Gooday, G.W. 2001.The Fungi, 2nd edn. Academic Press, USA.
7) Webster, J. and Weber, R.W.S. 2007. Introduction to Fungi. 3rd edn. Cambridge University Press, Cambridge.

BOTANY: I SEMESTER - SOFT CORE 1.2
ALGAL BIOLOGY AND BIOTECHNOLOGY

Theory-32 Hrs

Unit-1:Algal Biology: Historical development of Phycology and contributions of Phycologists; Thallus organization in algae-Cyanophyceae, Chlorophyceae, Charophyceae, Euglenophyceae, Xanthophyceae, Bacillariophyceae, Phaeophyceae and Rhodophyceae; General characteristics, algal classification, affinities and phylogeny- polyphasic approach; Molecular markers for phylogenetic study; Algal physiology- ultra-structure of cells; Photosynthesis and respiration.

Unit-2: Algal blooms and Toxins: Blooms produced by algal groups; Toxins produced by cyanobacteria, diatoms, dinoflagellates, prymnesiophytes and eugleoids; bioaccumulation and biomagnification; effects of toxins on aquatic life and humans; Scenario in coastal waters of India- monitoring and safety measures; Algal communities of extreme environments- Thermal hot springs, cold springs, snow and ice; **Fresh water algae**-Ecological classification of fresh water organisms; Lentic communities of algae (pond, lake, bog, swamp); Lotic communities (streams, rivers, rapids; **Marine algae-** Marine biota; zonation; quantitative study of phytoplanktons, marine communities of algae.

Unit-3: Algal Biotechnology: Algal culture techniques; general principles; physical parameters; culture media; strain improvement; **Algal cultivation methods-**conventional, advanced; **Cultivation of microalgae-*Spirulina*** and ***Dunaliella***; Media, seeding, cultivation systems, harvesting; processing, drying methods, packaging, marketing; Algal cultivation and production in India; **Cultivation of macroalgae- *Porphyra;*** Nutritional value; importance of life cycle; methods of cultivation in advanced countries; Pillar, semi raft floating and open sea cultivation.

Unit-4: Applications of algae/products: Pollution indicators, treatment of waste water plants, heavy metal toxicity and phyco-remediation; Bio-fouling and biofuel production; Algal products as sources of nutraceuticals; Food colorants; Aquaculture feed; Therapeutics and cosmetics; Medicines; Dietary fibres from algae and uses; Biotechnological applications of algal silica and oils.

Practicals-32 Hrs

1) Study of fresh water planktonic forms in the lake samples.
2) Study of fresh water diatoms.
3) Chlorophyceae: *Ulva, Caulerpa, Halimeda, Acetabularia.*
4) Xanthophyceae: Mounting of *Botrydium* from soils.
5) Phaeophyceae: *Dictyota, Sargassum, Cystophyllum.*
6) Rhodophyceae: *Gracilaria, Gelidium.*
7) Cyanophyceae: *Microcystis*, *Nostoc, Spirulina.*
8) Estimation of carotene content in algal cells .
9) Culturing of microalgae: *Spirulina/ Chlorella/Scenedesmus/Dunaliella.*
10) Applications of algal products: Agar, spirulina tablets/powder, beta-carotene, phycobiliproteins, triglycerides, Mycosporine like amino acids (MAA), diatom silica as nanoparticles.
11) Visit to National Institute of Oceanography, Goa.
12) Study of algal herbaria.

References

1) Bold, H. C. and Wynne, M. J. 1978. Introduction to the algae. Structure and reproduction. Prentice Hall, New York.
2) Chapman and Chapman, V.J. 1973. The Algae. Macmillan Co., New York.
3) Fritsch, F. E. 1935. Structure and reproduction of Algae Vol. I and II. Cambridge University Press, London.
4) Hoek, V., Mann, D. G. and Jahns, H. M. 1995. An introduction to Phycology, Cambridge University Press, UK.
5) Murthy, A.V.S.S. 2005. A text book of algae. I.K. International Pvt., Ltd., New Delhi.
6) Odum, E. P. Fundamentals of Ecology. 3rd edn. Toppan Co., Ltd., Japan.
7) Round , F. E. 1973. Biology of the algae. Edward Arnold Ltd., London.
8) Southcott, G. R. and Whittick, A. 1987. Introduction to Phycology. Blackwell Scientific Publication, UK.
9)Venkataraman, G.S.1974. Algae form and function. Today and Tomorrow's Pub., New Delhi.
10) Bux *et al.* (eds.). 2016. Algae Biotechnology: Products and Processes, Springer, ISBN 9783319123332 (P), 9783319123349 (Online).
11) Chu, W. 2012. Biotechnological Applications of Microalgae. IeJSME 6(1): S24-S37.

BOTANY: I SEMESTER - SOFT CORE 1.3
LICHENOLOGY AND MYCORRHIZAL TECHNOLOGY

Theory-32 Hrs

Unit-1: Introduction: Photobionts- identification, reproduction, and taxonomy of photobionts; Occurrence within lichens; Mycobionts- Lichenized versus nonlichenized fungi; Bryophilous and folicolous lichens; Thallus morphology and anatomy; Growth forms - crustose lichens, foliose lichens, fruticose lichens; Vegetative structures- Homoiomerous thallus, stratified thallus, cortex, epicortex, and epinecral layer, photobiont layer and medulla, lower cortex, Attachment organs and appendages; Cyphellae and pseudocyphellae; Cephalodia (Photosymbiodemes); Reproductive structures- sexual reproduction in lichen-forming ascomycetes; Mating systems, dikaryon formation, Ascomal ontogeny, Ascosporogenesis; Ascus structure and function; Generative reproduction: ascoma, perithecia, apothecia, Thallinocarpia, Pycnoascocarpia, Hysterothecia, Asci, Basidioma; Vegetative reproduction- aposymbiotic propagules, symbiotic propagules; Systematics of lichenized fungi- History, classification and phylogeny.

Unit-2: Morphogenesis- Acquisition of a compatible photobiont; Recognition and specificity; Structural and functional aspects of the mycobiont–photobiont interface; Genotypes and phenotypes, growth patterns; Biochemistry and secondary metabolites- intracellular and extracellular products; The fungal origin of the secondary metabolites; Major categories of lichen products; Application to pharmacology and medicine; Harmful properties of lichen substances, lichens in perfume, lichens in dyeing; Stress physiology and the symbiosis- stress tolerance, limits to stress tolerance; harmful effects of stress, constitutive and inducible stress tolerance, evolution of stress tolerance in lichens; Modes of water uptake, light, temperature, carbon dioxide; The carbon economy of lichens.

Unit-3: Nitrogen, its metabolism and potential contribution to ecosystems, Methods of determination of nitrogen fixation; Nutrients- chemical and physical properties of nutrients and metals; Nutrient requirements, sources of nutrients, accumulation mechanisms, compartmentalization of elements within lichens; Metal toxicity, metal tolerance; Environmental role of lichens- dispersal, establishment, pedogenesis and biodeterioration; Community structure, succession, ecosystem dynamics; Animal and lichen interactions; Forest management, conservation, environmental monitoring; Lichen sensitivity to air pollution- lichens in relation to sulfur dioxide, oxidants and lichens, hydrogen fluoride and organopollutants.

Unit-IV: Mycorrhizal fungi: Introduction and classification; Types of mycorrhizas- Arbutoid mycorrhizas, ectomycorrhizas, vesicular arbuscular mycorrhizas or arbuscular mycorrhizas, ectendomycorrhizas, ericoid mycorrhizas, monotropoid mycorrhizas and orchid mycorrhizas; Phoshate solubilisation; Ecological significance of AM fungi; Importance of mycorrhiza in evolution of land plants; Role of mycorrhiza in agriculture, horticulture and forestry.

Practicals-32 Hrs

1-3) Survey of lichen vegetation in the study area: Frequency, density and abundance.
4) Determination of species richness and species diversity.
5) Isolation and maintenance of cyanobionts and phycobionts
6) Isolation and maintenance of mycobionts

7) Analysis of secondary metabolites of lichens.
8) Biological activity of secondary metabolites of the lichens.
9) Culture methods for lichens and lichen symbionts.
10) Root clearing and staining technique to study arbuscular mycorrhizal fungi.
11) Assessment of % root colonization of arbuscular mycorrhizal fungi.
12) Isolation and identification of arbuscular mycorrhizal fungi.

References:

1) Thomas H. Nash , 2008. Lichen Biology, 3rd edn. Cambridge University Press, The Edinburgh Building, Cambridge CB2 8RU, UK
2) Awasthi D.D. 2000. Lichenology in Indian subcontinent: A supplement to "A hand book of lichens". Publisher: M/s Bishen Singh Mahendra Pal Singh, Dehra Dun.
3) Awasthi D. D. 2013). A hand book of lichens , Publisher: M/s Bishen Singh Mahendra Pal Singh, Dehra Dun.
4) Sally E. Smith and David J. Read (2008). Mycorrhizal Symbiosis. 3rd edn. Academic Press, New York.
5) Larry Peterson R., Hugues B. Massicotte, Lewis H. Melville, 2004. Mycorrhizas: Anatomy and Cell Biology, CAB International, UK.

BOTANY: I- SEMESTER - SOFT CORE 1.4
PHYTOPATHOLOGY

Theory-32 Hrs

Unit-1: Concept of plant disease, Economic aspects of plant diseases; Types of plant diseases- Infectious diseases and non-infectious diseases; Causative agents of plant diseases; Angiospermic parasites; Development of plant pathology; Plant pathology in practice- Plant Clinic and Plant Doctor Concept; Parasitism and pathogenicity; Disease triangle; Infections and colonization; Weapons of plant pathogens; Effect of pathogen on physiology of host plant (photosynthesis, translocation and transpiration, respiration, permeability, transcription and translation).

Unit-2: Defence mechanisms in Plants- Pre-existing structural and chemical defences, induced structural and biochemical defences; Plant disease epidemiology- Elements of an epidemic and development of epidemics; Plant Disease forecasting; Genes and Diseases, Gene for gene concept, non-host resistance; Types of plant resistance to pathogens (Horizontal and Vertical Resistance); 'R' Genes and 'avr' genes; Genetics of virulence in pathogens and resistance in host plants; Breeding for disease resistance.

.

Unit-3: Management of Plant Diseases: Exclusion, eradication, cross protection, direct protection, integrated disease management, chemical methods of plant disease control; Biotechnological approaches to plant disease management; Gene silencing and disease control; Mechanism of gene silencing and control of viral diseases; Engineered resistance to viral, bacterial, fungal and insect diseases of crop plants.

Unit-4:Study of diseases of crop plants: Potato Spindle Tuber Disease, Tobacco Mosaic Disease, Sandal Spike Disease, Bacterial blight of Paddy, Citrus Canker, Late Blight of Potato, Downy Mildew of Maize, Blight of Paddy, Angular leaf spot of Cotton, Tikka disease of ground nut, Rust of coffee, Grain and Head smut of Sorghum. Leaf blight of Paddy, Blast of Paddy, Powdery mildew of cucurbits, Wilt of Tomato, Phloem Necrosis of Coffee, Root Knot of Disease of Mulberry and Vegetables; Non-parasitic diseases of plants; Seed-borne diseases.

Practicals-32 Hrs

1) Isolation of bacterial, fungal, and nematode plant pathogens of crop plants.
2) Study of mineral deficiency diseases of Tomato and French bean.
3) Estimation of foliar infection by Stover's method.
4) Study of spore germination.
5) Estimation of total phenols in diseased and healthy plant tissues.
6) Mycoflora analysis by Standard Blotter Method SBM/agar plating method.
7)-9) Study of Tobacco mosaic, Bacterial blight; Downy mildew of Maize; Powdery mildew of cucurbits; Grain smut of sorghum; Leaf rust of Coffee; Root Knot of Mulberry. Bunchy top of banana, Grassy shoot of sugar cane, Little leaf of Brinjal; Potao Spindle Tuber Disease (PSTVd)
10) Study of effect of pathogens on seed germination and vigour index.
11) Study of effect of fungicide on seed-borne pathogens.
12) Study of Fungal bio-control agents.

References:

1) Agrios, G. N. 2005. Plant Pathology 5th edn. Academic Press, San Diego.
2) Dickinson, M. 2003. Molecular Plant Pathology, Garland Publishing Inc, CT.
3) Ingram,D.S. and Robertson, N.F. 1999. Plant Diseases, Collins Publishers, London.

4) Johnston, A and Both, C. 1983. Plant Pathologists Pocket-book. 2nd edn. Commonwealth Mycological Institute, Oxford and IBH Pub. Co. Calcutta.
5) Lane, C.R., Beales P.A. and Hughes, K.J.D. 2012. Fungal Plant Pathogens, CABI Publishing, Wallingford.
6) Mehrotra, R. S., 2003. Plant Pathology, 2nd edn. Tata Mc. Graw Hill Pub. Co. Ltd., NewDelhi.
7) Rangaswamy, G. and Mahadevan, A. 2002. Diseases of crop plants in India, Prentice Hall of India Pvt.Ltd. New Delhi.
8) Schumann, G. L. and D'Arcy, C. J. 2012. Hungry Planet: Stories of Plant Diseases, APS Press, USA.
9) Singh, R. S., 2009. Plant Diseases. 9th edn. Oxford and IBH Pub.Co. New Delhi.
10) Vidhyasekaran, P. 2004. Encylopedia of Plant Pathology.Viva Books Pvt. Ltd. New Delhi.

BOTANY: II- SEMESTER- HARDCORE 2.1

REPRODUCTIVE BIOLOGY OF ANGIOSPERMS AND PLANT MORPHOGENESIS

Theory-32 Hrs

Unit-1: Reproductive Biology of Angiosperms: Historical overview; Contributions of P. Maheshwari; BM Johri; BGL Swamy to the development of embryology in India; Microsporogenesis and Microgametogenesis- wall layers and functions; Tapetum- types, concept of male germ unit and its significance; Pollen morphological features; Unusual features-pollen development in Cyperaceae, pollen embryosac; Concept and scope of palynology.

Unit-2: Megasporogenesis and Megagametogenesis; Ovular structure and types; Development of monosporic, bisporic, tetrasporic and special types of embryo sacs; Ultra structure and nutrition of female gametophyte, concept of female germ unit and its significance; Fertilization- a general account, double fertilization, single fertilization, heterofertilization and polyspermy; Pollen recognition and rejection reactions - types, structures, methods to overcome incompatibility reactions; Endosperm- types, haustorial variations, ruminate and composite endosperm; Embryo- structure, development of monocot, dicot and grass embryo; Significance of embryonal suspensor; Experimental Embryology- scope and applications.

Unit-3: Plant Morphogenesis: Models of morphogenesis- comparison of plant v/s animal morphogenetic pathways: Embryo, *Arabidopsis thaliana*; Concepts- cell fate/ fate maps, gradients, stem cells in plants and their significance in development, polarity, symmetry, totipotency of cell types, pleuripotency, plasticity, differentiation, redifferentiation, dedifferentiation and regeneration in *Acetabularia* and *Arabidopsis thaliana.*

Unit-4: Plant Growth and Development: Types, shoot apical meristems, root meristems; control of cell division in meristems; Quiescent center and meresteme de attente; *Arabidopsis*- vascular patterning and leaf development, abnormal growth; Cellular basis of growth- maintenance of cell shape; Cytoskeletal elements; Photomorphogenesis- definition, history, Hartmann's technique; Photoreceptors and photo morphogenesis, localization and properties; Effect of blue light-mediated photomorphogenesis with suitable examples.

Practicals-32 Hrs

Reproductive Biology of Angiosperms:

1) Study of microsporangium- slides: wall layers, tapetal types, two-celled and three-celled pollen; pollen tetrads.

2) Study of pollen germination: *Balsam, Delonix, Hibiscus* and *Peltaphorum*

3) Study of megasporangium-slides: female gametophyte development in *Penstemon, Xyris pauciflora,* 2, 4, 8-nucleate stages, mature embryo sac.

4) Endosperm mounting- *Cucumis sativus, Grevellia robusta* and *Croton sparsiflorus*

5) Embryo: Slides-monocot, dicot and grass embryo.

6) Embryo mounting : *Crotalaria.*

Plant Morphogenesis:

7) Study of stem cells in plants: SAM, RM.

8) Regeneration abilities of shoot apical meristems of dicots on media with combinations of growth regulators.

9) Study of totipotency in cell types: stomata, epidermal cells, stem and leaf explants on a tissue culture media.

10) Polarity in stem cuttings: *Pothos* spp.

11) Study of regeneration in succulents *Kalanchoe*, *Byrophyllum.*

12) Study of leaf galls of plants: *Pongamia pinnata and Achyranthes aspera*: Morphological observations and histology.
13) Study of *Arabidopsis thaliana* as a model plant.

References:

1) Johri, B. M. 1984. The embryology of Angiosperms. Springer Verlag.
2) Johri, B. M. 1982. The experimental embryology of vascular plants. Springer Verlag, New York.
3) Swamy, B.G.L. & Krishnamurthy, K. V. 1982. From flower to fruit: The embryology of angiosperms. Tata McGraw Hill Co. New Delhi.
4) Eames, 1961. Morphology of Angiosperms. McGraw Hill book Co., Inc., New York.
5) Maheshwari, P. 1950. An introduction to the embryology of Angiosperms. McGraw Hill book Co., Inc., New York.
6) Maheshwari, P. 1963. Recent advances in the embryology of angiosperms. ed. New Delhi
7) Bhojwani, S. S.and Bhatnagar, S. P. 1978. The embryology of Angiosperms. Vikas Publishing House, New Delhi.
8) Turing, A. M. 1952. The chemical basis of morphogenesis. Phil. Trans. R. Soc. Lond. B. 237: 37- 72.
9) Sinnot, E. W. 1960. Plant Morphogenesis. Mc Graw- Hill Book Co. Inc. New York, USA.
10) Steeves, T.A. and Sussex, I. M. 1989. Patterns in Plant development. 2nd edn. Cambridge University Press. UK.
Chasan, R. 1994. Tracing tracheary element development. The Plant Cell 6:917-919.
11) Lyndon, R. F. 1990. Plant Development : The Cellular basis. Unwin Hyman, London.
12) Aloni, R. 1987. Differentiation of vascular tissues. Annu. Rev. Plant Physiol. 38:179- 219.
13) Raman, A. 2007. Insect induced plant galls of India; unresolved questions. Curr. Sci. 92 (6): 748-757.
14) Smith, H. 1975. Phytochrome and Photomorphogenesis- an introduction to the photocontrol of plant development. Mc Graw- Hill Book Co. (UK), Ltd.
15) Mohr, H. 1972. Lectures in photomorphogenesis. Springler- Vohrleg, Berlin, Germany.

BOTANY: II- SEMESTER - HARD CORE 2.2
CELL BIOLOGY AND GENETICS

Theory-32 Hrs

Unit-1: Bio Molecules and Membranes: Structure, composition of bio-molecules and their stabilizing interactions (carbohydrates, lipids, proteins and nucleic acids); Unit membrane structure and functions; Membrane proteins, membrane transport and the electrical properties; Intra-cellular compartments and protein sorting; Intracellular membrane traffic; Cytoskeletons.

Unit-2: Functions of Organelles: Cell wall, membranes, nucleus, mitochondria, Golgi bodies, lysosomes, spherosomes, peroxisomes, ribosomes, endoplasmic reticulum, Plastids, chloroplast, vacuoles and cytoskeleton; Cell cycle and mechanism of cell cycle regulations; A brief account of cell signalling, receptors, second messengers; General mechanism of signal transduction pathway; Programmed cell death in life cycles of plants.

Unit-3: Extensions of Mendelian Principles co-dominance, incomplete dominance, gene interactions, multiple alleles, lethal alleles, pleiotropy, penetrance and expressivity, polygenic inheritance, linkage and crossing over, sex linked inheritance, sex limited and influenced traits, genome imprinting, extra nuclear inheritance; C**oncept of the gene**-classical-alleles, multiple alleles, pseudo-alleles, complementation test, experiments on rII locus and lozenge locus, modern- jumping genes, overlapping and genes within genes, split genes, nested genes, fusion genes; **Gene mapping methods-** linkage maps, tetrad analysis; Recombination in bacteria mapping genes in bacteria by interrupted mating technique, fine structure mapping, transduction and transformation mapping, mapping genes in Bacteriophages**,**

Unit-4: Sex Determination and Dosage Compensation: Chromosomal and genetic basis of sex determination; Mechanism of sex determination in *Melandrium*, *C. elegans*, Drosophila and humans, dosage compensation mechanisms in humans, Drosophila and *C. elegans*. **Transposable elements**- discovery in maize and bacteria, transposal elements in bacteria and bacteriophage, types and functions; Transposable elements in eukaryotes- Plants, *Drosophila* and Humans, mechanisms of transpositions;Transposable elements in research.

Practicals-32 Hrs

1) Determination of reducing sugars by Nelson-Somogyim's method.
2) Estimation of total soluble sugars by volumetric method.
3) Quantitative determination of free Amino acid content in germinating seeds.
4) Estimation of ascorbic acid in plant tissues.
5) Estimation of Phospholipids by TLC.
6) Slides/Charts/photos NP (Cytology Genetics and Embryology).
7) Study of mitosis in normal and induced root tips cells of Onion.
8) Study of meiosis in onion flower buds , translocation in Rhoeo.
9) Study of special chromosomes- B chromosomes, and sex chromosomes.
10) Determination of chiasma frequency in onion.
11) -12)To solve genetic problems on linkage, ordered and unordered tetrads.

References:

1) Atherly, A.G. Girton, J.R. Donald, J.R. 1999. The Science of Genetics. Saunders College Publishers. Fortworth .
2) Griffith, A.J.F. Gelbart, W.M. Muller, J.H. and Lewintin, R.C. 1999. Modern Genetic Analysis. W.H. Freeman and Co. New York.

3) Hartl. D. 1991. Basic Genetics. 2edn., Jones and Barlett Publishers Inc. Boston.
4) Fairbanks, D.J. and Anderson, W.R. 1999. Genetics the continuity of Life. Brooks's/Cole publishing Company, California.
5) Brooker. R.J. 1999. Genetics –analysis and principles. Addison Wesley Longman Inc.California.
6) Snustad, D.P., Simmons, M.J. and Jenkins, J.R. 1997. Principles of Genetics. Hohn Wiley & son's inc. New York.
7) Brown, T.A. 1989. Genetics a molecular approach. Van Nostrand Reinhold (intn) Co., Ltd. London.
8) Winchester, A.M. 1969. Genetics. 3rd edn. Oxford and IBH, New Delhi.
9) Strickberger, Monroe W. 2000. Evolution. 3rd Edn. Jones & Bartlett Publishers, Inc. 40 Tall PineDrive Sudbury, MA 01776, USA.
10) Bruce Alberts, Alexander Johnson, Julian Lewis, Martin Rafi, Keith Roberts, and Peter Walter. 2008. Molecular biology of the cell, 5th ed., Garland science, Taylor & Francis Group, LLC, 270 Madison Avenue, NewYork NY f 0016, USA.
11) Alberts, B., Bray, D., Lewis, J , Raff, M., Roberts, K and Watson, J.D. 1999 . Molecular biology of the cell. Garland Publishing, Inc., New York.
12) Kleinsmith, L.J. and Kish, V.M. 1995 .Principles of Cell and Molecular Biology 2nd edn. Harper Collins College Publishers, New York, USA.
13) Lodish, H. Berk, A., Zipursky, S.L., Matsudaira, P., Baltimore, D. and Darnell, J. 2000. Molecular Cell Biology, 4th edn.W.H. Freeman and Co. New York, USA.
14) Buchanan, B.B. W.Gruissem and Jones, R.L. (2000). Biochemistry and Molecular Biology of Plants. ed. ASPP Press.USA.

BOTANY: II SEMESTER HARD CORE 2.3
PLANT BREEDING AND EVOLUTIONARY BIOLOGY

Theory-32 Hrs

Unit-1: Introduction: Objective and role of plant breeding; Evolution of plant breeding, scope of plant breeding, sciences related to plant breeding, Vavilov's concept of origin of centers of origin of crop plants; Recent trends in plant breeding; **Breeding Methods-**plant introduction and acclimatization, domestication and agriculture, pure line, clonal, mass and progeny selections, recurrent selection, pedigree, bulk and back cross methods; Heterosis breeding synthetic and composite varieties; **Breeding Techniques-**Mutation breeding, polyploidy, hybridization, tissue culture techniques in crop improvement, protoplast fusion, electrophoration, electro-fusion, biolistics, somatic hybridization, transgenic plants (GMO's); The role of Gene technology in plant breeding.

Unit-2: Breeding for Specific Purposes: Breeding for disease resistance, insect resistance, drought and salinity, quality trait, multiple cropping systems, ideotype breeding, breeding for Adaptation; **Crop breeding and seed production-** Breeding field crops, seed production techniques, release of new varieties, intellectual property rights, computer application in plant breeding, crop breeding Institutes/Centers; Genetic resources and germplasm conservation; Scientific Plant breeding; Green revolution; The elite crop (Golden rice); Contributions of **Dr.**
M.S. Swaminathan, Dr. Norman E. Borlaug and N.I. Vavilov.

Unit-3: Nature of Evolution : The origin, theories of evolution of life, earth and the universe,; Conditions of the early earth, emergence of the first living cell, origin of prokaryotic and eukaryotic cells, life in the Palaeozoic, Mesozoic and Coenozoic era. **Development of Evolutionary thoughts;** Ecological context, before Darwin, Darwinism, Darwin's evolutionary theory, Neo – Darwinism, modern synthesis: **Fossil evidence of Ancient life,** fossilization,; Interpreting geological time scale and fossil records; Evidences from comparative, morphology, patterns of development, comparative physiology and biochemistry, biogeography, palaeontology, taxonomy, anatomy and embryology, plant and animal breeding; Evidence from changing earth and sea; Extinctions; Evolutionary ecology.

Unit-4: Natural Selection : Types of natural selection, selective forces, selection models, sexual selection, selection and non adaptive characters, Adaptive radiation, artificial selection, **Variation- g**ene flow, genetic drift, gene mutation - Mendelian concept, chromosomal mutation, architectural changes in chromosomes; The Hardy – Weinberg law, polyploidy in plant evolution**;** Speciation and origin of higher categories **-**Types of speciation, models of speciation, pattern of speciation, isolating mechanism and species formation, signification of speciation; Molecular evolution.

Practicals-32 Hrs

(1) Study of floral biology of crops - typical examples of self and cross pollinated plants.
(2) Selfing and hybridization techniques - Bagging and emasculation.
(3) Pollen viability: germination test and TTC test.
(4) Studying of centre's of origin of cultivated crops - N.I. Vavilov Concept.
(5) Mode of pollination study in different crops.
(6) Identification of crop breeding institutes/ centers and logos.
(7) Studying and identification of contributors of plant breeding - M.S. Swaminathan, N.I. Vavilov, Norman . E. Borlaug .
(8) Study of contributions of scientists to evolutionary biology.
(9)-12) Study of models and photographs related to evolution.

References

1) Atherly, A.G. Girton, J.R. Donald, J.R. 1999. The Science of Genetics. Saunders College
2) Publishers. Fortworth.
3) Griffith, A.J.F., Gelbart, W.M. Muller, J.H. and Lewintin, R.C. 1999. Modern Genetic analysis. W.H. Freeman and co. New York.
4) Hartl. D. 1991. Basic Genetics. II edn. Jones and Barlett Publishers Inc. Boston.
5) Fairbanks, D.J. and W.R. Anderson. 1999. Genetics the continuity of life. Brooks's/Cole publishing company. California.
6) Brooker, R.J. 1999. Genetics –analysis and principles. Addison Wesley Longman Inc. California.
7) Snustad, D.P., Simmons, M.J. and Jenkins, J.R. 1997. Principles of Genetics. Hohn Wiley & son's inc. New York.
8) Brown, T.A.1989. Genetics a molecular approach. Van Nostrand Reinhold (intn) Co., Ltd. London.
10) Winchester, A.M. 1969. Genetics. III edn. Oxford and IBH, New Delhi.
11) Strickberger, Monroe W. 2000. Evolution. 3rd Ed., Jones & Bartlett Publishers, Inc. 40 Tall PineDrive Sudbury, MA 01776, United States of America
12) Futuyma, Douglas J. 2005. Evolution. Sinauer Associates, Inc., 23 Plumtree Road, Sunderland, MA 01375, United States of America
13) Dodson E. O. and Dodson P. 1976. Evolution: Process and Product. 2nd Ed., D. Van Nostrand Company, 450 West 33rd Street, New York, N.Y. 10001
14) Chopra, V.L. 2000. Plant Breeding- theory and practices. Oxford and IBH Publishing Co. Pvt. Ltd., Oxford.
15) Chahal, G.S. and Gosal, S.S. 2002. Principles and procedures of Plant Breeding. Narosa Publishing House, New Delhi.

BOTANY: II- SEMESTER - SOFT CORE 2.1
PLANT ANATOMY AND HISTO-CHEMISTRY

Theory-32 Hrs

Unit-1: Plant Anatomy: Primary vegetative body of the plant; Anatomical features of leaf, stem and root (dicot and monocot); leaf of fern and gymnosperm; Structure of modified leaves- Kranz anatomy and C4 photosynthesis; Ultra-structure and chemistry of the cell wall; formation of the cell wall and its uses.

Unit-2: Anatomy of Vascular Tissue: Ultra structure and differentiation of xylem and phloem tissues; Apical meristems- shoot apex in Pteridophytes, Gymnosperms and Angiosperms, theories, root apical meristems.

Unit -3: Secondary Growth: Vascular cambium, secondary xylem of gymnosperms and dicots and secondary phloem of Gymnosperms and dicots; Periderm and bark; Anomalous secondary growth in monocots and climbers; Leaf ontogeny - Dicot- simple, compound, Monocot; Floral anatomy-flower parts, floral meristem, vascular system.

Unit-4: Plant Histochemistry: Tests for minerals, carbohydrates, lignins, polyphenols, proteins, lipids and nucleic acids; Study of instruments: (a) Camera lucida (b) Micrometry (c) Microtome. Principles of histo-chemical stains; Killing, fixing and staining of plant tissues; Double staining- TBA method.

Practicals-32 Hrs

1) Staining of xylem and phloem elements.
2) Study of anatomy of roots in: *Ficus, Musa, Dieffenbachia*, *Vanda.*
3) Study of anamalous secondary growth in the following examples: Stem of *Aristolochia*, *Nyctanthes, Pyrostegia, Peperomia, Tinospora, Achyranthes*.
4) Study of Ecological anatomy.
5) Study of Vasculature in floral organs.
6) Studying double staining technique.
7-11) Embedding: TBA method, embedding for electron microscope, Sectioning**,** Microtomes, whole mounts maceration.
12) Histochemical- PAS Test**,** Sudan black- lipids**,** Feulgen reaction – Nucleic acids.

References:

1) Abraham, F. 1982. Plant Anatomy. 3rd edn. Pergaon Press. Oxford.
2) Cariquist, S. 1967. Comparative Plant Anatomy- Holt Reinert and Winston, New York.
3) Cutter, D. G. 1971. Plant Anatomy- Part 1, Cell and Tissues Edward Arnold London.
4) Cutter, D. G, 1971. Plant Anatomy- Part 1, Cell and Tissues Edward Arnold London. Part- II.
5) Eames and McDaniel, 1947. Plant Anatomy. 2nd edn., McGraw Hill, New York.
6) Esau, K. 1965, Plant Anatomy, Joh Wiley and Sons, New York.
7) James, D. Mauseth, 1998. Plant anatomy The Benzamin/ Cummins Publishing Co.Inc.
8) Esau, K. 1979, Anatomy of seed plants- first Wiley eastern reprint. New Delhi.
9) Krishnamurthy, K. V. 1988. Methods in Plant Histochemistry. S. Viswanathan (Printers and Publishers) Pvt. Ltd. Madras.

BOTANY: II- SEMESTER - SOFT CORE 2.2

ETHNO-BOTANY AND INTELLECTUAL PROPERTY RIGHTS (IPR)

Theory - 32 Hrs

Unit-1: Ethno-botany: Introduction, concept, scope and objectives; Ethno-botany as an interdisciplinary science; The relevance of ethno-botany in the present context; Ethnic groups; Ethno-botany- Major and minor ethnic groups of India and their life styles; Forest Vs. ethnic groups; Plants in tribal life with reference to Magico-religious rituals and social customs; Sacred groves.

Unit-2: Methodology used in the study of Ethnobotany and Ethno pharmacology: Field work, Herbarium, Ancient Literature, Archaeological findings, temples and sacred places, protocols. Preliminary phyto-chemical analysis of ethno-botanical important medicinal plants.

Unit-3: Role of ethno-botany in modern Medicine with special examples; Medico-ethno-botanical Sources in India with special reference to Karnataka; Tribals Vs. Agriculture: Shifting, Podu and Jhum cultivation; Role of ethnic groups on surrounding environment; Crop genetic sources; Endangered taxa and forest management (participatory forest management); Ethno- botany as a tool to protect interests of ethnic groups; Sharing of wealth concept with few examples from India.

Unit-4: Study of Intellectual Property Rights – patents, trademark, geographical indication, copyright; IPR and Traditional Knowledge; Bio-piracy of traditional knowledge; Ethno botany and legal aspects; National and international organizations and treaty related to traditional knowledge – WIPO, TKDL, TRIPS, CBD, Nagoya protocol etc., Ethno botany as a source (recent) of already known drugs: a) *Withania* as an antioxidant and relaxant b) *Sarpagandha* in brain ailments c) *Becopa* and *Centella* in epilepsy and memory development in children d) *Phyllanthus fraternus* in diabetic and viral jaundice e) *Artemisia* as a powerful cerebral anti malarial agent and its possible use in tuberculosis.

Practicals-32 Hrs

1) Survey and collection important ethno botanical plants by using questionnaire and interview.
2) Preliminary phyto- chemical analysis of medicinal plants.
3) Study of biological functional properties of crude drugs – Anti microbial activity.
4) Study of methods of *in-situ* or *ex-situ* conservation of important medicinal plants.
5) Study of techniques used in Pharmacognosy – organoleptic, anatomy and chemical methods.
6) A visit to a Tribal area to conduct field work and collect ethno botanical information / data.
7) Listing of Crude drugs in Pansali shops (local crude drugs shops) and their identification (little known drugs only).
8) -12) Visit to nearby Western Ghats and Sacred Groves.

References:

1) Jain, S.K. 1995. Manual of Ethno-botany, Scientific Publishers, Jodhpur.
2) Jain, S.K. 1981. Glimpses of Indian. Ethno-botany, Oxford and I B H, New Delhi
3) S.K. Jain 1989. Methods and approaches in ethno-botany. (ed.) Society of ethno botanists, Lucknow, India.
4) Jain, S.K. 1990. Contributions of Indian ethno-botany. Scientific Publishers, Jodhpur.

5) Colton C.M. 1997. Ethno botany – Principles and applications. John Wiley and sons –
6) Rama Ro, N and A.N. Henry (1996). The Ethno-botany of Eastern Ghats in Andhra Pradesh, India. Botanical Survey of India. Howrah.
7) Rajiv K. Sinha – Ethno-botany The Renaissance of Traditional Herbal Medicine – INA – SHREE Publishers, Jaipur-1996
8) Faulks, P.J. 1958. An introduction to Ethno-botany, Moredale pub. Ltd. London

BOTANY: II- SEMESTER - SOFT CORE 2.3
ECONOMIC BOTANY

Theory -32 Hrs

Unit- 1: Economic Botany: The origin of cultivated plants and Agriculture; The future role of plants in relation to mankind; Introduction to Green revolution; Study of origin, distribution, cultivation and utility of the useful parts of the following- - rice, wheat, maize, barley, sorghum and millets; Red gram, green gram, black gram, horse gram, pea, cow pea, bengal gram; Oil Yielding plants- sunflower, safflower, groundnut, linseed, rape seed; A brief account of economically important horticultural and floricultural plants.

Unit- 2: Economic Botany: Study and utility of the useful parts of the following- Sugar yielding plants- sugar cane and sweet potato, sugar beet and *Stevia*; Spices and condiments - ginger, turmeric, cardamom, cinnamon, clove, saffron, all spice, black pepper, nutmeg, red pepper, coriander, cumin, fennel and *Vanilla.*

Unit -3: Economic Botany Study and utility of the useful parts of the following- fibre- cotton, jute, flax, hemp, Sunn hemp, China grass, coconut and Kapok; Timber yielding plants- *Tectona* and *Dalbergia*; Dyes- indigo, henna; Masticatories and fumitories-areca nut, betel leaf, tobacco; rubber- Para rubber and other substitutes; Gums- Gum Arabic, Karaya gum.

Unit-4: Medicinal Botany: Scope and importance of medicinal plants; Indigenous medicinal Sciences; Important medicinal plants and their uses; Major exporters and importers of traditional medicinal plants and plant products; Application of natural products to certain diseases- jaundice, cardiac, infertility, diabetics, blood pressure and skin diseases; Poisonous plants.

Practicals-32 Hrs

1) Utility, uses and economic importance of cereals and millets.
2) Utility, uses and economic importance of horticultural and floricultural plants
3) Utility, uses and economic importance of pulses and oil yielding crops.
4) Utility, uses and economic importance of sugar yielding crops.
5) Utility, uses and economic importance of spice and condiments.
6) Utility, uses and economic importance of fiber and timber yielding plants.
7) Utility, uses and economic importance of dye, rubber and gum yielding plants
8) Utility, uses and economic importance of masticatories and fumitories
9) -12) Study of medicinal and poisonous plants.

References:

1) Hill, A.F. 1952. Economic Botany, TataMcGraw Hill, New Delhi.
2) Kochhar, S.L. 1998. Economic Botany of Tropics, Macmillan India Publishers, New Delhi.
4) Pandey, B.P. 2000. Economic Botany. S. Chand & Company, New Delhi.
5) Pandey, S.N. and Chandha, A. 1999. Economic Botany. Vikas Publishing House Pvt. Ltd. New Delhi.

BOTANY: II SEMESTER- OPEN ELECTIVE 2.1
MEDICINAL PLANTS

Theory-32 Hrs

Unit-1: Medicinal Plants: History, scope and importance of medicinal plants; Indigenous medicinal sciences; History, origin, panchamahabhutas, saptadhatu and tridosha concept, Rasayana, plants used in ayurvedic treatments, Siddha: Origin of Siddha medicinal systems, Basis of Siddha system, plants used in Siddha medicine. Unani: History, concept: Umoor-e-tabiya, tumors treatments/ therapy, polyherbal formulations.

Unit-2: Medicinal Plants Conservation: Conservation of endangered and endemic medicinal plants; Endemic and endangered medicinal plants; Red list criteria; *In-situ* conservation- biosphere reserves, sacred groves, national parks; *Ex situ* conservation- botanic gardens, ethno medicinal plant gardens; Propagation of medicinal plants - objectives of the nursery, its classification, important components of a nursery, sowing, pricking, use of green house for nursery production, propagation through cuttings, layering, grafting and budding.

Unit - 3: Funding for Cultivation of Medicinal Plants: Sources of financial aids for medicinal plant cultivation: Aims and objectives, Functions and activities of the board, Schemes and Projects for Financial assistance, Funding of projects; Procedure for processing project proposal for approval, Implementation and monitoring.

Unit- 4: Ethno botany and Folk medicines: Definition; Ethno botany in India: Methods to study ethno botany; Applications of Ethno botany: National interacts. Ethno medicine. Application of natural products to certain diseases- Jaundice, cardiac, infertility, diabetics, Blood pressure and skin diseases. Brief introduction to poisonous plants.

References:

1) Trivedi, P. C. 2006. Medicinal Plants: Ethnobotanical Approach, Agrobios, India.
2) Purohit and Vyas, 2008. Medicinal Plant Cultivation: A Scientific Approach, 2nd edn.
3) Agrobios, India.
4) Yoganarasimhan, S.N. Medicinal Plants of India- Vol 1- Karnataka, Interline Publishing Pvt. Ltd.

BOTANY: III- SEMESTER - HARD CORE 3.1
BIOCHEMISTRY AND PLANT PHYSIOLOGY

Theory -32 Hrs

Unit-1: Biochemistry- Brief account of plant structural and functional molecules-carbohydrates, proteins, lipids and nucleic acids**;** classification, structural and functional properties of bio molecules; Biochemistry of cell membranes; **Lipids-**building and storage molecules, classification and significance; **Proteins-** classification, structure- primary, secondary, tertiary and quaternary structure; properties of proteins; **Enzymes**-Nomenclature, nature and properties of enzymes, active sites, co-enzymes, kinetics of enzyme action, catalysis, specificity and inhibition, allosteric enzymes, ribozyme and abzyme.

Unit-2:Solute transport: Transport of solutes across the membranes Transmembrane proteins, Transport of ions, solutes and macro-molecules, Mechanism of translocations in phloem; Role played in signal transduction pathway stomatal physiology; **Phytosynthesis in higher plants** (i) Photophosphorylation - Calvin cycle; **Photorespiration** - C4 – Pathway, CAM in plants; Oxidative Phosphorylations; Glycolysis -TCA – Cycle and terminal oxidation.

Unit-3: Plant Hormones- plant hormones-discovery, biosynthesis, metabolism, transport and physiological effects of plant hormones and their applications; **Nitrogen metabolism** -(i) Molecular mechanism of N2 fixation (ii) Biosynthesis of amino acids (iii) Assimilation of nitrate and ammonium; **Lipid metabolism-** fats and oils biosynthesis and oxidation of lipids; Physiology of seed germination and flowering.

Unit -4: Stress Physiology: Water deficit and its physiological consequences; Drought tolerance mechanisms, Salinity stress and plant responses. Heat stress and heat shock proteins; Metal toxicity in plants. Biotic stress, HR and SAR mechanisms; **Mineral nutrition**-in plants and deficiency diseases; **Plant development-** physiology of flowering; **Phytochrome**- photochemical and biochemical properties of phytochrome; Concept of photoperiodism and vernalization and its influence on flowering;

Practicals-32 Hrs

1) Estimation of protein by Lowry's method
2) Determination of water potential of tissue by plasmolytic method
3) Determination of water potential by Gravimetric method
4) Quantitative estimation of chlorophyll a, chlorophyll b and total chlorophyll in plant tissue
5) Determination of diurnal fluctuation of acid content of CAM plants (TAN)
6) Determination of temperature quotient (Q10) of water uptake
7) Separation of chlorophyll pigments/Anthocyanin by TLC
8) Protein analysis by SDS PAGE method.
9) Estimation of Alpha-amylase activity in germinating seedling.
10) Silver staining of proteins.
11-12) Visit to Molecular Biology Laboratories.

References:

1) Barkla, B.J., and Pantajo, O. 1996. Physiology of ion transport across the tonoplast of higher plants. Ann. Rev. Plant Physiol. 47: 159-184.
2) Clayton, R.K. 1980. Photosynthesis: Physical mechanisms and chemical patterns. Cambridge Uni. Press, Cambridge.
3) Cohn, E.E., and Stumf, P.K. 1992. Outlines of Biochemistry. Wiley Eastern Pvt. Ltd.
4) Kozaki, A., and Takeba, G. 1996. Photorespiration protects C3 plants from

photooxidation. Nature 384: 557- 560.
5) Taiz, L., and Zeiger, E. 1998. Plant Physiology. Sinaur Associates Inc. Publishers, Sunderland Massachusetts.
6) Mukherji, S., and GHosh, A.K. 1996. Plant Physiology. New Central Book Agency Pvt. Ltd. Kolkatta, India.
7) Rabinowithc, E., and Jee, G. 1969. Photosynthesis. Willey Press, New York.
8) Rudier, W., and Thummlar, K. 1994. The Phytochrome, Chromophore I. Photomorphogenesis in Plants, II Edition, Netherlands, 51-69.
9) Spanswick, R.M. 1981. Electrogenic ion pumps. Ann. Rev. Plant Physiol. 32: 267-289.
10) Mc Elroy, W.D. 1995. Cell Physiology and Biochemistry. Prantice Hall of India.
11) Walsh, C.T. 1979. Enzymatic reaction mechanisms. Editors: W.H. Freeman, New York.
12) Webb, E. 1984. Enzyme nomenclature. Academic Press, Orlando Fla.
13) Zimmermann, M.H., and Milburn, J.A. Transport in Plants. 1. Phloem transport (Encyclopedia of Plant Physiology. New Series Vol. 1), Springer, New York.
14) Devline and Witham, 1986. Plant Physiology. CBS Publs. and Distributors, New Delhi.
15) Hopkins, W.G. 1995. Introduction to Plant Physiology, John Wiley & Sons. Inc., NewYork, USA.
16) Moore, T.C. 1989. Biochemistry and Physiology of Plant Hormones. Springer Verlag, New York, USA.
17) Singhal *et al*. 1999. Concepts in Photobiology, Photosynthesis and Phytomorphognesis, Narosa Pub. House, New Delhi.

BOTANY: III- SEMESTER - HARD CORE 3.2
MOLECULAR BIOLOGY

Theory-32 Hrs

Unit-1: Organization of chromosomes and genes in prokaryotes and eukaryotes - Operon, interrupted genes, gene families, unique and repetitive DNA, heterochromatin, euchromatin, transposons, mitochondrial and chloroplast genome organization, Transposable elements in prokaryotes and eukaryotes, genetic and evolutionary significance, **DNA replication**- patterns, Messelson and Stahl's and Taylor's experiment, enzymes of replication, mechanism of DNA replication in prokaryotes and Eukaryotes, proof reading and error correction mechanisms.

Unit-2: Molecular mechanism of mutation, repair and recombination:- Mutation-DNA damage by spontaneous mutations, physical and chemical mutagens and their molecular mechanisms, **Repair mechanisms**- direct reversal of damage, base and excision repair, recombinational repair, SOS repair, translation repair synthesis, transcription coupled repair, **Recombination**- homologous recombination, models of recombination, mechanisms, protein machinery of homologous recombination, genetic consequence of homologous recombination, gene conversion, site specific recombination, mechanism and biological significance, non homologous recombination- transposition, molecular mechanisms of transposition- conservative, replicative and retro-transposition.

Unit-3: RNA synthesis, processing and translation: transcription activators and repressors, promoters, RNA polymerases and transcription factors, mechanism of transcription in prokaryotes and eukaryotes, **RNA processing**- capping, polyadenylation, splicing, alternative splicing, RNA editing, exon shuffling and RNA transport, **Translation and processing**- ribosomes, tRNA aminoacylation, aminoacyl tRNA synthetase, genetic code, wobble hypothesis, deciphering of the code, translation mechanism , translation proof reading, translation inhibitors and post translational modifications.

Unit-4: Regulation of gene expression in Prokaryotes: Operon concept, regulation at transcription initiation- lac and trp operon control, regulation of lytic and lysogenic cycles in lambda phage, regulation beyond transcription initiation-premature termination- trp operon, ribosomal proteins as translational repressors, riboswitches, **Regulation of gene expression in eukaryotes**-transcription activators and repressors, regulation after transcription initiation- alternative splicing, translational control in ferretin and tranferrin mRNA, RNA interference, role of chromatin in regulation of gene expression and gene silencing.

Practicals-32 Hrs

1) Isolation of DNA from CTAB method.
2) Isolation of DNA from Onion.
3) Isolation of DNA from mulberry leaves.
4) Estimation of DNA by DPA method.
5) Extraction of RNA by trizol/ phenol-chloroform methods.
6) Estimation of proteins by Biuret method.
7) Estimation of protein by Bradford method.
8) Determination of Tm value of DNA.

9-12)Photo graphs/ charts related to molecular biology/Molecular Biologists.

References:

1) Bruce Alberts, Alexander Johnson, Julian Lewis, Martin Rafi, Keith Roberts, and Peter

Walter. 2008. Molecular biology of the cell, 5th edn., Garland science, Taylor & Francis Group, LLC, 270 Madison Avenue, NewYork ,USA.
2) Alberts, B., Bray, D., Lewis, J , Raff, M., Roberts, K and Watson, J.D. 1999 . Molecular biology of the cell. Garland Publishing, Inc., New York
3) Kleinsmith, L.J. and Kish, V.M. 1995 .Principles of Cell and Molecular Biology 2nd Edition Harper Collins College Publishers, New York, USA.
4) Lodish, H. Berk, A., Zipursky, S.L., Matsudaira, P., Baltimore, D. and Darnell, J. 2000. Molecular Cell Biology 4th Edition. W.H. Freeman and Co. New York, USA
5) Malaciniski, G.M. and Freidfelder, D. 1998. Essentials of Molecular Biology 3rd Edition. Jones and Bartlet Publishers, Inc., London.
6) Gunning.B.E.S. and Steer, M.W.1996. Plant Cell Biology; Structure and Function. Jones and Bartlett Publishers, Boston, Massachusetts.
7) Harris,Nand Oparka, K.J. 1994. Plant Cell Biology A Practical Approach. IRL Press, Oxford University Press, U.K.
8) F.M. Ausubel, R.Brent, R.E. Kingston, D.D. Moore, J.G. Seidman, J.A. Smith, K. Struhl, (Current Edition) (2005). Current Protocols in Molecular Biology.
9) B.B. Buchanan, W.Gruissem and R.L. Jones . USA (2000) .Biochemistry and Molecular Biology of Plants. Ed. ASPP Press.
10) T.A. Brown, 2000. Essential of Molecular Biology, Vol-I & 2 Oxford University Press.
11) James D. Watson, Tania,. A. Baker, Stephen, P. Bell, Alexander ,Gannm, Michael Levine.2004. Molecular Biology of the gene. 5th Edition, Pearson Education.Philip M Gilmartin and Chris.
12) Bowle.2002. Molecular Biology of Plants. Vol 1 & 2 Oxford University Press.

BOTANY: III-SEMESTER - HARD CORE 3.3
PLANT BIOTECHNOLOGY

Theory-32 Hrs

Unit-1: Plant Tissue Culture: Scope and importance of plant tissue culture - Media composition and types, hormones and growth regulators, explants for organogenesis; Micro propagation, embryo and endosperm culture, somatic embryogenesis, variation and cell line selection, adrogenesis and microspore culture, significance of haploids, diploidization and bulbosum technique; Cryopreservation, germplasm collection; Somatic Hybrids- Isolation and protoplast culture and somatic hybridization and its significance, Synthetic seed production and somaclonal variations.

Unit-2: Genetic Engineering: Milestones in plant recombinant DNA technology; Importance of gene manipulation in future perspectives; **Tools in Genetic Engineering-** Enzymes in genetic engineering - restriction endonucleases, types and their actions, other DNA modifying enzymes; Cloning vectors- plasmids isolation and purification - Ti Plasmid, pBR322, pUC-series. Phage vectors-M13 phage vectors, Cosmids -types, phasmids or phagemids, shuttle vectors-types; YAC and BAC vectors, Lambda phage vectors, Lamda phage DNA as a vectors; Cloning vectors and expression vectors; Vectors for plant cells; Vectors for animal cells, baculovirus vectors- adenoviruses, retroviruses, transposons as vectors, Synthetic construction of vectors.

Unit 3: Applications of Genetic Engineering for pest, disease and stress tolerance: The genetic manipulation of herbicide resistance with suitable examples; The genetic manipulation of pest and disease resistance with suitable examples; Transgenic approaches to viral and bacterial disease resistance. Engineering for stress tolerance and Metabolic Engineering of Plants; Future prospects for GM crops.

Unit 4: Biofertilizers: Preparation and applications of biofertilizers such as Rhizobium, Azotobacter, Blue Green Algae and VAM. Single Cell proteins (SCP): Health benefits and advantages of single cell proteins- *Spirulina.* Biofuels: Ethanol and Biofuel production from plants. Mushroom cultivation and its advantages. Bioremediation: Phytoremediation; Biodegradation, Xenobiotics. Biotechnology of medicinal and aromatic plants for human welfare.

Practicals-32 Hrs

1) Preparation of plant tissue culture media and types.
2) Organ culture (Shoot tip, nodal and leaf culture) for callus Initiation and regeneration.
3) Anther culture for the production of haploids.
4) Suspension culture and production, separation and estimation of secondary metabolites.
5) Encapsulation of somatic embryos and production of Synthetic seed.
6) Extraction of secondary metabolites using Soxhlet extractor and Identification of In vitro secondary metabolites-alkaloids, steroids and flavonoids.
7) Restriction digestion of plasmid and genomic DNA and gel electrophoresis.

8) Isolation of genomic DNA from bacteria/plants and purification by agarose gel electrophoresis.
9) Restriction analysis of plasmids, gel purification of DNA, small and large scale purification of plasmids.
10) Preparation of competent *E. coli* cells. Bacterial transformation and recovery of plasmid clones.
11) Gene cloning in plasmids, analysis of recombinant plasmids.
12) DNA amplification by PCR, RT-PCR, Real Time PCR.
13) Analysis of DNA and RNA and Protein by Southern, Northern and Western blotting.
14) Primer design for PCR.

References:

1) Slater, N. Scott and M. Fowler. Plant Biotechnology 2003: The genetic manipulation of plants. Oxford University Press, Oxford.
2) Plant Biotechnology. 2000. J.H. Hammond, P. Mcgarvey, and V. Yusibov (eds). Springer Verlag, Heidelberg.
3) Text Book of Biotechnology. 2004. H.K. Das (ed). Wiley India Pvt. Ltd., New Delhi.
4) Plant Biotechnology -The Genetic Manipulation of Plants, Adrian Slater, Nigel Scott and Mark Flower, Oxford University Press, (2000).
5) Plant Genetic Transformation and Gene Expression by (eds) J.Draper *et.al*. Blackwell Scientific Publications, Oxford (1988).
6)Reinert, J. 1982. Plant Cell and Tissue Culture: A Laboratory Manual. Narosa Publishing House, New Delhi.
7)Chawla H.S., 2009, Plant Biotechnology. Oxford and IBH Publishing Co. Pvt. Ltd, New Delhi.
8)Bhojwani, S.S. and Razdan, M.K. 2004. Plant Tissue Culture: Theory and practice. Elsevier Science Publishers, New York, USA.
9)PUROHIT S. D., 2012. Introduction To Plant Cell Tissue And Organ Culture PHI Learning Pvt. Ltd., New Delhi
10) Roberta, H. Smith, 2012. Plant Tissue Culture: Techniques and Experiments 3 edition. Academic Press; US.

BOTANY: III- SEMESTER- SOFT CORE 3.1
MOLECULAR GENETICS OF PLANTS

Theory-32 Hrs

Unit-1: Plants as genetic tools in Biology: *Arabidopsis, Rice, Maize, Saccharomyces;* Genome organization in plants; *Arabidopsis thaliana*- an experimental model for understanding plant development and functions; Plant genes and regulation; nucleus and chromatin organization; Histones and histone modifications; DNA packaging, organization and types of DNA sequences; functional and non- functional sequences, organization of plant nuclear genes, plastid genes and mitochondrial genes.

Unit-2: Genes responding to hormones, phytochrome, responses to abiotic stresses; Genes induced by water stress and freezing stress; Genes involved in photosynthesis and nitrogen fixation and their regulation; Molecular development of leaf and flower - ABC and revised model of flower development; Genes involved in fertilization, seed development, embryo development.

Unit-3: Genetics of *Agrobacterium:* Biology and genetics of *Agrobacterium tumefaciens;* The Ti- plasmid, *Vir* genes and expression, Mechanism of T-DNA transfer and integration; Basic features of vectors for plant transformation; Proteomics, genomics and bioinformatics; Structural and functional genomics, comparative genomics - biochemical, evolutionary, physiological and phylogenomics; Tools to study functional genomics.

Unit-4: Proteomics- functional and comparative proteomics; Protein distribution, characterization and identification, differential display proteomics, detection of functional linkages; Pharmacogenomics; Bioinformatics- tools of bioinformatics, data bases and data base management, bioinformatics in taxonomy, biodiversity, agriculture; Bioinformatics in drug design and drug discovery.

Practicals-32 Hrs

1) *Arabidopsis thaliana*- study of plant system and its biology.
2) *Arabidopsis* RNA extraction (total and polysomal) for Northern blotting.
3) Expression of foreign genes in plant cells through *Agrobacterium tumefaciens* (Chart)
4) Production of tobacco transgenic plants and assay for the introduced transgenic (Chart)
5) Co-cultivation of tobacco *Agrobacterium tumefaciens*
6) -12) Learning gene bank formats- EMBL format, FASTA format, Swiss- PROT, Ex PASy

References:

1) Buchmann, B.B., Gruissem, W., and Jones, R.L. 2000. Biochemistry and Molecular Biology of Plants. ASPP Press, USA.
2) Ausubel, F.M., Brent, R., Kingston, R.E., Moore, D.D., Seidman, J.G., Smith, J.A., and Struhl, K. 2005. Current protocols in molecular biology. Current Edition.
3) Brown, T.A. 2000. Essentials of Molecular Biology. Vol. I & II, Oxford University Press.
4) Potrykus, I., and Spangenberg, G. 1995. Gene transfer to plants. Springer, Berlin, Heidelberg.
5) Watson, J.D., and Baker, T.A., Bell, S.P. Gannm, A. and Levine, M. 2004. Molecular Biology of Genes. 5th edn., Pearson Education.
6) Gilmartin, P.M., and Bowler, C. 2002. Molecular Biology of Plants. Vol. I & II, Oxford University Press.
7) Karchar, S.J. 1995. Molecular Biology- A Project Approach, Academic Press, New York.
8) Sambrock, J., Fritch, E.F., and Maniatis, T. 1989. Molecular cloning- a laboratory manual.
9) Slater, A., Scott, N., and Flower, M. 2000. Plant Biotechnology- the Genetic Manipulation of Plants, Oxford University Press, Oxford.

10) Lea, P.J., and Leegood, R.C. 1999. Plant Biochemistry and Molecular Biology. John Willey and Sons Press, New York.
11) Draper, J. 1988. Plant Genetic Transformation and Gene Expression. Blackwell Scientific Publications, Oxford.
12) Old, R.W., and Primrose, S.B. 2004. Principles of Gene Manipulation. An introduction to Genetic Engineering. 5th Edition, Blackwell Science Publications.

BOTANY: IV- SEMESTER- SOFT CORE 3.2
MOLECULAR PLANT PATHOLOGY

Theory-32 Hrs

Unit-1: Concepts and scope of physiological and molecular plant pathology; Molecular approaches to plant disease diagnosis; Nucleic acid based probes for detection of plant pathogens including non-culturable organisms; **Pathogenicity and Disease Development**-factors; induced resistance, virulence and pathogenecity factors; Plant-pathogen interactions with emphasis on incompatible interactions and induced resistance.

Unit -2: Pathogenesis: Necrogenic plant pathogenic bacteria with emphasis on hrp and avr genes and virulence factors; Fungal plant pathogens with emphasis on virulence and pathogenicity factors; Plant viruses with emphasis on virus replication, virus transport in plants and control of plant viruses with transgenic plants; **Signal Transuduction-** recognition of the pathogen by the host, transmission of the alarm signal to the host defense providers; Necrotic defense reaction, defense through hypersensitive response; Molecular basis of induced biochemical reaction; Local and systemic acquired resistance (SAR).

Unit-3:Genetics of Plant Diseases and Resistance: Genes and diseases; physiological specialization among plant pathogens; Variability in viruses, bacteria and fungi; Levels of variability in pathogens and loss of virulence in plant pathogens; Genetics of virulence in pathogens and of resistance in host plants; Molecular plant breeding for disease resistance.

Unit-4: Genetics and molecular basis of host-pathogen interaction: Evolution of parasitism; genetics oh host-pathogen interaction; Gene for gene relationship; Criteria for gene for gene type relationship; Molecular basis of host pathogen interaction; Host-parasite-interaction. **Biotechnological methods of plant disease management;** Genetic engineering and crop protection; Cross protection; Gene silencing and disease control- mechanism of gene silencing and control of viral diseases; Engineered resistance to viral, bacterial, fungal and insect diseases of crop plants.

Practicals-32 Hrs

1-2) Testing hypersensitivity reaction on *Nicotiana and Bajra.*
3) Estimation of lypoxygenease in diseased and healthy plants.
4) Estimation of polyphenols in diseased and healthy
plants. 5-7) Studying systemic acquired resistance in
crop plants.
8) Genetic testing of disease resistance in plants.
9-11) Molecular detection of viruses, Mycoplasma, fungi and bacteria from infected plants.
12) In-vitro testing of pathogen virulence.
Visit to agricultural research station to study diseases on different crop plants.

References:

1) Singh, R. S. (1973). Plant Disease. Oxford and IBH Pub.Co. New Delhi.
2) Agrios, G. N. (1994). Plant Pathology 2nd Edn. Academic Press NY.
3) Johnston A and Both, C. 1983-Plant Pathologists Pocket-book. 2nd Edn.
Commonwealth Mycological Institute, Oxford and IBH Pub. Co. Calcutta.
5) Rangaswamy G and Mahadevan A 2002. Diseases of crop plants in India, Prentice
Hall of India Pvt. Ltd. New Delhi.
6) Mehrotra, R. S.1983-Plant Pathology Tata Mc. Graw Hill Pub. Co. Ltd., New Delhi.
7) Vidhyasekaran, P. 2004. Encylopedia of Plant Pathology.Viva Books Pvt.Ltd. New Delhi.

BOTANY: III SEMESTER- SOFT CORE 3.3
PLANT PROPAGATION AND PLANT BREEDING

Theory-32 Hrs

Unit-1: **Plant Propagation:** History, scope and importance of plant propagation; Propagation structures with reference to green house equipment and media; Seed propagation and vegetative propagation; Propagation by cuttings; Biology and techniques of grafting; Techniques of budding; Layering and its natural modifications; Propagation by specialized stems and roots; Micro propagation **–** techniques and applications in forestry and horticulture; Limitations and applications of vegetative propagation; Propagation methods of some selected plants – Citrus, Grape, Mango, Mulberry, Hibiscus, Rose, Croton, Eucalyptus.

Unit-2: Plant Breeding: History of plant breeding, objectives of plant breeding, salient achievements of plant breeding; Centres of origin of crop plants, Exploration and collection of plant genetic resources, evaluation of germplasm collection, documentation, conservation of plant genetic resources, utilization of genetic resources; The theory of pure line selection – Genetic basis, sources of genetic variation in pure lines, the land variety (races); Mendelian experiments of plant hybridization; Quantitative Inheritance; Applications of biometrical genetics in plant breeding.

Unit-3: Plant Breeding: Types of plant breeding; Fertility regulating mechanisms - manual or mechanical control, genetic control, incompatibility, male sterility, genetic engineering for male sterility, chemical control, genetic basis of heterosis; Synthetic and composite varieties **-**genetic basis, procedure for developing synthetic and composite varieties - genetic basis, procedure for developing synthetic varieties; Breeding for resistance to disease and insect pests.

Unit - 4 :Mutation Breeding: Significance of induced mutations in plant breeding; Polyploidy in plant breeding**- t**ypes of polyploids, induction of polyploidy, phenotypic effects of polyploidy, significance of polyploids; Tissue culture in crop improvement; Molecular approaches to crop improvement- probes, gel electrophoration, electrofusion, biolistics, gene cloning, transgenic plants (GMO's), molecular markers, construction of genetic maps, application of DNA makers in plant breeding, the role of gene technology in plant breeding; Crop breeding Institutes/Centers, Molecular biology in relation to intellectual property rights.

Practicals-32 Hrs

1) Study of types of vegetative propagation: Cutting, Grafting, budding, layering.
2) Study of propagation by modified stems and modified roots.
3) Preparation of media, explants, culture, initiation of shoot multiplication.
4) Pot and green house implants (demonstration) (5) Studying of floral biology.
6) Hybridization techniques - bagging and emasculation.
7) Pollen viability test : Seed germination test, TTC test.
8) Mode of pollination study in different crops.
9) Visit to crop breeding stations/institutes / centres.
10) Estimation of protein quality, Amino acid Analysis and determination of oil and fatty acids.
11) Observation of colour and conditions of mature anthers in different crops.
12) Identification of and studying of important plant breeders.

References:

1) Abbottt, A.J. and Atkin, R.K. eds. 1987. Improving vegetatively propagated crops.

Academic press, New York.
2) Bose, T.K., Sadhu, M.K., & Das, P., 1986. Propagation of Tropical and Subtropical Horticultural crops, Nowya Prakash, Calcutta.
4) Hartmann, H.T., Kester E.D., Davis, F.T., and Geneve, R.L. 1997. Plant propagation. Principles and practices. Prentice Hall of India Private Limited, New Delhi.
5) Krishnamurthy. H.M. 1981. Plant Growth substances including application in Agriculture.
6) Pierik, L.M. 1987. In vitro culture of Higher plants Murtinus Nijhoff pub. Dordrecht.
7) Razdan, M.K. 1994. An Introduction to Plant tissue culture, Oxford and IBH Pub. Co., PVT. Ltd., Bombay and Calcutta.
8. Mac Donald, B. 1987. Practical woody plant propagation for nursery growers. Portland, OR: Timber press.
9. Sadhu, M.K. 1989. Plant propagation Wiley eastern Ltd. N. Delhi.

BOTANY: III SEMESTER SOFT CORE 3.4
PHYTOCHEMISTRY AND HERBAL TECHNOLOGY

Theory-32 Hrs

Unit-1: **Phytochemisrty:** Scope of phytochemistry, plants as source of chemical compounds, primary and secondary metabolites and its applications; Definition, source of herbal raw materials, identification, authentication, standardization of medicinal plants as per WHO guidelines and different herbal pharmacopoeias; Natural pigments, natural products as markers for new drug discovery.

Unit-2: Extraction, isolation and purification of phytochemicals: Selection of plant samples, processing and storage of samples for extraction; Factors influencing the choice of extraction, principles of extraction methods, infusion, decoction, digestion, maceration, percolation, solvent extraction, fluid extraction, ultrasound, microwave assisted extraction, advantage and disadvantage involved in each method; Isolation of selected primary and secondary metabolites – amino acids, proteins and carbohydrate; Phenolics, flavonoids, alkaloids, lipids, oils, terpenes and saponins; Purification techniques for primary and secondary metabolites – solvent-solvent fractionation and chromatography techniques.

Unit-3: Characterisation of Phytochemicals: Preliminary, qualitative and quantitative techniques – paper chromatography, thin layer chromatography, column chromatography-HPLC, GC (qualitative and quantitative), colour reactions for amino acids, sugars, phenolics, flavonoids, alkaloids, terpenes, saponins, oils, lipids; Spectroscopic estimations/gravimetric determination of total sugars, amino acids, proteins, phenolics, flavonoids, alkaloids, terpenes, saponins, oils, lipids; Characterisation using spectroscopic techniques - UV/VIS, FTIR, DSC (differential scanning calorimeter), NMR, MS, MALDI. XRD – single crystal and powder.

Unit-4: Standardisation and Validation of Photochemical: Quality determination of herbal drugs; Role of processing methods and storage conditions on quality of drugs; Standardisation parameters- impurity limit, ash content, extractable matter, moisture content, other phytochemicals, microbial contaminants, pesticides; Validation of drug – guidelines, limit of detection and quantification of impurities, organoleptic properties, physical, chemical, biological characteristics, stability testing, storage conditions and packing system/unit.

Practicals-32 Hrs

1) Survey and collection of medicinal plants for analysis.
2) Selection of plant part, processing and storage of samples for further analysis.
3) Extraction methods - aqueous and sequential solvent extraction of compounds.
4) Preliminary phytochemical analysis of active principles from the extracts.
5) Antibacterial/antifungal activity of crude /active principles
6) Identification of secondary metabolites using TLC- phenolics, flavonoids, alkaloids, terpenes, saponins etc.
7) Column chromatographic separation of active principles.
8) Characterisation of active principle using spectroscopy, HPLC, GCMS, LCMS, FTIR, and MALDI TOF.
9) -12) Submission of report on TEN important curative principles of Indian medicinal plants.

References:

1) Braithwaite, A. and Smith, F.J. 1996. Chromatographic Methods. 5th edn., Blackie Academic & Professional, London.
2) Bourne, U.K. Kokate, Purohit, C.K. and Gokhale S.B. 1983. Pharmacognosy. Nivali Prakashan Publication.
3) Braithwaite, A. and Smith, F. J. 1996. Chromatographic Methods. 5th edn. Blackie Academic & Professional, London.
4) Sadasivam. S. and A. Manickam, 0000. Bio Chemical methods 2nd edn. New Age International Pvt Ltd. New Delhi.
5) Harborne, J.B. 1984. Phytochemical Methods, 2nd edn. Chapman and Hall, London. Harborne J.B., 1973. Phytochemical methods a guide to modern techniques of plants analysis. Chapman and Hall Ltd. London.

BOTANY: III SEMESTER- OPEN ELECTIVE 3.1
PLANT PROPAGATION TECHNIQUES

Theory-32 Hrs

Unit-1: History, scope and importance of plant propagation; Propagation structures with reference to green house equipment and media; Seed propagation – the development of seeds, techniques of seed production and handling principles and media.

Unit-2: Vegetative propagation: Techniques of propagation by cuttings; stem cuttings – hard wood, semi hard wood, soft wood and herbaceous, leaf cuttings, leaf bud cuttings, root cuttings; Biology and techniques of grafting: Whip and tongue, wedge and cleft, bark, side grafting, approach.

Unit-3: Techniques of budding: T- budding patch budding, chip budding, ring budding; Layering and its natural modifications- simple layering, tip layering, mound or stool layering, air layering, compound or serpentine layering and trench layering; Propagation by specialized stems and roots.

Unit- 4: Micro propagation – techniques and applications in forestry and horticulture; Advantage, limitations and applications of vegetative propagation, Somaclonal variations; Propagation methods of some selected plants – Citrus, gape, mango, mulberry, hibiscus, rose, Croton, Eucalyptus.

References:

1) Abbott, A.J. and Atkin, R.K. (eds.) 1987. Improving vegetatively propagated crops. Academic press, New York.
2) Bose, T.K., Sadhu, M.K., and Das, P., 1986. Propagation of Tropical and Subtropical Horticultural crops, Nowya Prakash, Calcutta.
3) Hartmann and Kester, 1983. Plant propagation
4) Hartmann, H.T., Kester E.D., Davis, F.T. and Geneve, R.L. 1997. Plant propagation. Principles and practices. Prentice Hall of India Private Limited, New Delhi.
5) Krishnamurthy. H.M. 1981. Plant Growth substances including application in Agriculture.
6) L.M. Pierik 1987. In vitro culture of Higher plants Murtinus Nijhoff pub. Dordrecht.
7) M.K. Razdan 1994. An Introduction to Plant tissue culture, Oxford and IBH Pub. Co., PVT. Ltd., Bombay and Calcutta.
8) Mac Donald, B. 1987. Practical woody plant propagation for nursery growers. Portland, OR: Timber press.
9) Sadhu, M.K. 1989. Plant propagation Wiley eastern Ltd. N. Delhi.

BOTANY: IV- SEMESTER- HARD CORE 4.1
ECOLOGY, CONSERVATION BIOLOGY AND PHYTOGEOGRAPHY

Theory-32 Hrs

Unit-1: Introduction and scope of Ecology: Plants and the environment- plant adaptation, ecotypes, habitat ecology- fresh water and marine water ecology (ecosystems), wetlands and their characteristics; Ecosystem function; The distribution of biomes; Major Terrestrial Biomes; Forests-Tropical Forests-Temperate Forests, Taiga, Grasslands, Savanna, Temperate Grasslands/Prairies, Tundra, Deser and Chaparral.

Unit-2: Environmental Biology: Global warming: Greenhouse gases - causes and consequences; Ozone depletion- causes and consequences; Air, water and soil pollution - major pollutants, their source, permissible limits - and control methods; Radioactive pollution- Ionising radiation, disposal of radioactive waste, nuclear accidents; Environmental Education Programmes - WWF, UNEP, MAB; Role of plants in solving energy crisis and ameliorating global warming.

Unit-3: Biodiversity and Conservation Biology: Science in the service of Biodiversity, biodiversity and its value, biodiversity issues, concerns, management; Biodiversity hot spots; Biodiversity- threats and current status of biodiversity; IUCN categories, Red Data book and Red lists, invasive alien species as threat to biodiversity; Conservation strategies- past, present, and future; Attitudes about conservation; conservation movements; CITES (Convention on international trade in endangered species), WCU (World Conservation Union); Endangered species Act. 2002 (GOI); Protected areas, Network of India- history, size, scale and management; Heritage trees.

Unit-4: Phytogeography: Biogeography of the world, India and Karnataka; Climatic zones, tectonics, continental movements; Types of plant distribution – discontinuous distribution - land bridge theory, continental drift; continuous distribution-cosmopolitan, circumpolar, circumboreal, circumaustral, pantropical; Distribution of plants - islands; Phytochorea of the world, India; Plant dispersal, migrations and isolation; Eendemic plants of Western Ghats and Eastern Himalayas; Origin, distribution and acclimatization of coffee, cardamom, sugarcane, cashew, ragi, maize, wheat, rice and cotton; Remote sensing and GPS, study of vegetation by GIS (Geographical Information system).

Practicals-32 Hrs

1) Study of local vegetation by quadrate method.
2) Water analysis for pollution studies.(Bio-monitoring: TDS, Hardness, Chlorides, CO_2 COD, DO, BOD)
3) Rapid detection of bacteriological quality of water with special reference to feacal coliforms.
4) Morphology and anatomy of plants in relation to habitats - Xerophytes, Mesophytes, Hydrophytes.
5) *In situ* and *Ex situ* method of conservation.
6) Eminent phytogeographers of the world (photos).
7) Continental drift (charts).
8) Application of Remote Sensing, GIS and GPS in Forestry and Wild life management.
9) Biogeography of the world – Oceans, deserts, islands, mountains.

10) Biogeography of India –rivers, mountains, islands.
11) Floristic regions of world – India and Karnataka.
12) Study of endemic plants of India.
13) Origin, acclimatization and distribution of Coffee, Cardamom, Sugarcane, Cashew, Ragi, Maize, Wheat, Rice and Cotton.

References:

1) Polunin, N. 1961. Introduction to plant geography.
2) Good R.D. 1974. Geography of the flowering plants.
3) James H. B. 1998. Biogeography.
4) Cain, S.A. 1944. Foundations of plant Geography.
5) Croiat, 1952. Manual of Phytogeography.
6) Edgar A. 1972. Plants, Man and Life.
7) Valentine, D. H. 1972. Taxonomy, Phytogeography & Evolution.
8) Phil Gibson J. and Gibson Terri, R. 2006. Plant ecology.
9) Primack, R. B. 2006. Essentials of conservation biology.

10) Ricklefs, R. E. 2001. The Economy of Nature.
11)Narasaiah M. L., 2005. Biodiversity and Sustainable Development.
12)Tondon P, Abrol Y. P, Kumaria S., 2007. Biodiversity and its significance.
14) Krishnamurthy K. V. 2007. An Advanced Textbook on Biodiversity: Principles and Practice.
15) Christian Leveque and Jean-Claude Mounolou (2003). Biodiversity.
16) Jeffries Michael J. 2006. Biodiversity and conservation.

BOTANY: IV- SEMESTER- SOFT CORE 4.2

PROJECT WORK

BOTANY: IV- SEMESTER- SOFT CORE 4.1
SEED TECHNOLOGY

Theory-32 Hrs

Unit-1: Seed Technology: Introduction to seed science and technology and its goals; Development of seed technology industry in India; Seed as basic input in agriculture; Seed Biology - Seed development, morphology and anatomy of dicot and monocot seeds; Seed structure and functions; Seed programmes and organizations; Seed village concept, seed production agencies, seed industry and custom seed production in India; International Seed Science and Technology Organizations.

Unit-2:Seed Production: General principles of seed production in self and cross pollinated and vegetatively propagated crops; Hybrid seed production; Maintenance of inbred lines and breeders seeds; Synthetic and composite seeds; Improved seed and their identification; Germplasm banks; **Seed Processing**-Harvesting, seed drying, seed cleaning and grading; Equipments; Seed Storage- types of storage structure; seed factors affecting storage life, effect of storage on relative humidity, temperature and moisture; Seed deterioration; Seed treatment.

Unit-3: Seed Quality Testing: Devices and tools used in seed testing; ISTA and its role in seed testing; Seed sampling- physical purity and heterogeneity test; Seed moisture content-importance and determination and methods; Viability and vigour testing; Genetic purity testing -objective and criteria for genetic purity testing, seed health testing, field and seed standards, designated diseases, objectionable weeds; Significance of seed borne diseases, seed health testing and detection methods for seed borne fungi, bacteria, viruses and nematodes; Preparation and dispatch of seed testing reports, storage of guard samples, application and use of seed standards and tolerances.

Unit- 4: Seed Certification: Principles and philosophy of seed certification, purpose and procedures, national seed programme; National Seed Corporation (NSC) - agencies responsible for achieving self-reliance in seed production and supply of quality of seeds (State Seeds Corporation; National Seed Development Council (NSDC); Central Seed Committee(CSC) ; Seed market surveys, seed industry in relation to global market; Concept of WTO, GATT, IPR, Plant Variety Protection and its significance seed technology; UPOV and its role.

Practicals-32 Hrs

1) Determination of physical purity of seed samples.
2) Determination of density or weight per thousand seeds.
3) Determination of seed Heterogeneity.
4) Visual examination of dry seeds for disease symptoms.
5) Determination of moisture content by hot air oven method.
6) Seed viability test- TTC method.
7) Determination of seed germination by TP/BP/Sand method.
8) Evaluation of seedlings vigour by BP/Sand methods.
9) Seed vigour evaluation by (a) conductivity test (b) Hiltner's test (c) Performance test(d) Accelerated ageing test (e) Cold test.
10) Examination of suspensions obtained from washings of seed.
11) Infection sites studied by planting seed components.
12) Detection of seed-borne fungi and their characters of five seed borne pathogens. Vist: Visit to seed industries/seed companies/ seed research stations.

References:

1) ACAR.2009. Handbook of Agriculture. Indian Council of Agricultural Research, New Delhi.

2) ACAR.2013. Handbook of Horticulture. Indian Council of Agricultural Research, New Delhi.

3) Agarawal, P. K. 2005. Principles of Seed Technology.2nd edn. Oxford and IBH Publishing Co. Pvt. Ltd. New Delhi.

4) Basra, A. S. 2006. Handbook of Seed Science and Technology, The Haworth Press, USA.

5) Copeland, L. O. and McDonald, M. B. 2001. Principles of Seed Science and Technology. 4th edn. Chapman & Hall.

6) Copeland, L.A. 1995. Principles of Seed Science and Technology- Kluwer Academic Publishers, The Netherlands.

7) Michael, B. and Bewley, D. 2000. Seed technology and its biological basis. Wiley- Blackwell.

8) Neergaard, P. 2005. Seed Pathology, Palgrave, Macmillan, Denmark. Science, Technology and Uses. CABI, UK.

9) Vanangamudi, K., Natarajan, K., Saravanan, T., Natarajan, N., Umarani, R., Bharathi, A. and Srimathi, P. 2006. Advances in Seed Science and Technology: Vol: III: Forest Tree Seed Technology and Management, Agrobios, New Delhi.

BOTANY: IV- SEMESTER- SOFT CORE 4.2
SEED PATHOLOGY

Theory - 32 Hrs

Unit-1: Seed Pathology: Introduction, historical development, development of seed health testing; Reduction in crop yields loss in due to seed-borne diseases; Seed-borne pathogens **(**Fungi, Bacteria, Mycoplasma-like Organisms, fastidious Vascular Bacteria, Spiroplasmas, Viruses, Viroids, Nematodes); Location of seed-borne inoculums, histopathology of some seed-borne pathogens; Seed infection, mechanism of seed infection, seed infestation or contamination; Factors affecting seed infection; Longevity of seed-borne pathogens.

Unit-2: Seed transmission and inoculation, factors affecting seed transmission; Cultural practices, epidemiology and inoculum thresholds of seed-borne pathogens; Classification of seed-borne; Role of Seed-borne inoculum in disease development; Economic loss due to seed borne pathogens; Certification program; Seed health tests, Nonparasitic seed disorders; Deterioration of grains; Storage fungi, field and storage fungi; Invasion by storage fungi; effects of seed deterioration.

Unit-3: Detection of Seed-borne Diseases: Examination of dry seeds; Isolation of fungi, Bright-field microscopic examination, observation under UV light, measurement of gases, Determination of FAV, Moldy smell, collection of seed exudates; Immunoassays, ergosterol estimation; Avoiding damage to seeds during harvesting; Processing, threshing, storage conditions, reducing seed moisture to safe limits, seed treatment, resistance.

Unit-4: Mycotoxins - Fungi known to produce mycotoxins, Factors affecting mycotoxin production the effects and control of mycotoxins, storage conditions, sorting of grains, cultural operations, chemical treatment, biological control, detoxification, regulatory measures, use of resistant cultivars; Control of seed-borne pathogens; Selection of seed production areas; Crop management, crop rotation, isolation distances, rouging, biological control, chemical method, mechanical method, physical methods; Certification- certification standards, plant quarantine, national and international regulations.

Practicals-32 Hrs

1-5) Detection of seed-borne fungi and their identification.
6) Detection of Seed-borne bacteria.
6) Detection of seed-borne viruses.
7) Detection of seed-borne insects by egg-plug staining.
8) Detection seed-borne nematodes.
9) Effect of deterioration of grains by Storage Fungi.
10) Detection of seed-borne fungi by PCR.
11) Estimation of ergosterol by UV-visible Spectrophotometer.
12) Detection of mycotoxins by thin Layer chromatography.

References

1) Agarwal, V. K. and Sinclair, J. B. 1996. Principles of Seed Pathology, 2nd edn. CRC Press, Tayler and Francis, USA.
2) Neergaard, P. 1977. Seed Pathology. Vol. I..Macmillan Press, Cornell University, USA.
3) Agrios, G. N. 1994 -Plant Pathology 2nd edn. Academic Press, New York.
4) Mehrotra, R. S. 1983-Plant Pathology Tata Mc. Graw Hill Pub. Co. Ltd., New Delhi.

5) Rangaswamy, G. and Mahadevan, K. 2002. Diseases of Crop plants in India. Prentice Hall of India Private Limited New Delhi.
6) Agarawal, P. K. 2005. Principles of Seed Technology.2 nd edn. Oxford and IBH Publishing Co. Pvt. Ltd. New Delhi.
7) Basra, A. S. 2006. Handbook of Seed Science and Technology, The Haworth Press, USA.
8) Copeland, L.A. 1995. Principles of Seed Science and Technology- Kluwer Academic Publishers, The Netherlands.
9) Vanangamudi, K., Natarajan, K., Saravanan, T., Natarajan, N., Umarani, R., Bharathi, A. and Srimathi, P. 2006. Advances in Seed Science and Technology: Vol: III: Forest Tree Seed Technology and Management, Agrobios, New Delhi.

BOTANY: IV- SEMESTER- SOFT CORE 4.3
BIO- ANALYTICAL TECHNIQUES

Theory-32 Hrs

Unit- 1: Spectroscopy: Principles of UV-Visible spectroscopy, chromophores and their interaction with UV-visible radiation and their utilization in structural, qualitative and quantitative analysis of drug molecules; Infrared Spectroscopy, Infrared radiation and its interaction with organic molecules, vibrational mode of bonds, instrumentation and applications, interpretation of IR spectra; FTIR and ATR, X-ray diffraction methods.

Unit-2: Nuclear Magnetic Resonance Spectroscopy: Magnetic properties of nuclei, field and precession, instrumentation and applications of NMR; Chromatographic techniques- Principles and applications- types- column, paper, thin layer and gas chromatography, HPLC, HPTLC, size exclusion chromatography, Affinity chromatography, Mass spectrometry, MALDI-TOF.

Unit-3: Electrophoresis: Principle and application of PAGE, SDS PAGE, immunostaining, immuno-electrophoresis, Iso-electric focusing, 2D electrophoresis Centrifugation- Principles, techniques of preparative and analytical centrifugation. Ultracentrifuges, molecular weight determination, sedimentation analysis, RCF. Microscopy- principles and applications of electron microscope (SEM and TEM), CryoEM, Preparations of specimen for electron microscopy- freeze drying, freeze etching, fixing, staining; confocal, fluorescent, flow cytometry - principles and applications.

Unit-4: Molecular Biology Techniques: Primer designing; Principles and applications of PCR; Blotting techniques; Hybridization techniques; Micro-array; Next Generation Sequencing- Nucleic acid sequencing.

Practicals-32 Hrs

1) Calibration of bio-analytical instruments.
2) Principles and instrumentation and applications of imaging techniques:
3) Separation of fatty acids/lipids by TLC/HPTLC.
4) Separation of proteins by PAGE, SDS- PAGE.
5) Agarose gel electrophoresis of DNA/RNA.
6) Immunoelectrophoresis
7) Agar gel diffusion, counter immuno electrophoresis.
8) Verification of Beer Lambert law with the U.V. spectrophotometer.
9) Demonstration of blotting techniques.
10) Performing PCR for amplification of ITS regions of fungi/ bacteria.

References

1) Braithwaite, A. and Smith, F.J. 1996. Chromatographic Methods. 5th edn. Blackie Academic & Professional London.
2) Budzikiewicz, H., Djerassi, C. and Williams, D.H. 1968. Mass Spectrometry of Organic Compounds. Holden-Day, San Francisco, CA
3) Harborne, J.B. 1984. Phytochemical Methods. 2nd edn. Chapman and Hall, London.
4) Harborne J.B. (1973) Phytochemical methods a guide to modern techniques of plants analysis. Chapman and Hall, London Ltd.

BOTANY: II SEMESTER - OPEN ELECTIVE 4.1
PLANT DIVERSITY AND HUMAN WELFARE

Theory-32 Hrs

Unit -1: Plant Diversity and Significance: Role of plant diversity in ameliorating energy crisis and global warming; Types of biodiversity-genetic diversity, species diversity, plant diversity at the ecosystem level; Agro-biodiversity and cultivated plant taxa, wild taxa; **Values and uses of Biodiversity-** Ethical and aesthetic values, precautionary principle, methodologies for valuation, uses of plants and microbes.

Unit -2: Loss of Biodiversity: Major causes of for biodiversity loss; Loss of genetic diversity, Loss of species diversity; Loss of ecosystem diversity; Loss of agro-biodiversity; Projected scenario for biodiversity loss; Management of Plant Biodiversity- Organizations associated with biodiversity management; Methodology for execution-IUCN, UNEP, UNESCO, WWF, NBPGR; Biodiversity legislation and conservations; Biodiversity information management and communication.

Unit -3: Conservation of Biodiversity: Conservation of genetic diversity, species diversity and ecosystem diversity, *In situ* and *ex situ* conservation, Social approaches to conservation, Biodiversity awareness programmes, Conservation of Heritage Trees.

Unit-4: Role of plants in relation to Human Welfare: Importance of forestry their utilization and commercial aspects, Avenue trees, Ornamental plants of India, Alcoholic beverages through ages, Fruits and nuts- Fruit crops of Karnataka and their commercial importance; Wood and its uses.

References:

1) Krishnamurthy K. V. 2007. An Advanced Textbook on Biodiversity: Principles and Practice. Oxford & IHB Publishing Co. Pvt. Ltd. New Delhi.
2) Christian Leveque and Jean-Claude Mounolou, 2003. Biodiversity. John Wiley & Sons Ltd, The Atrium, Southern Gate, Chichester, West Sussex PO19 8SQ, England.
3) Jeffries Michael J. 2006. Biodiversity and conservation, 2nd edn. Taylor and Francis Group, New York.

JSS Mahavidyapeetha

JSS COLLEGE OF ARTS, COMMERCE AND SCIENCE

OOTY ROAD, MYSURU – 570 025

POSTGRADUATE DEPARTMENT OF CHEMISTRY

SYLLABUS

PROGRAMME: M.Sc. in CHEMISTRY

PROGRAMME CODE: CHE

Under
Choice Based Credit System (CBCS) and
Continuous Assessment Grading Pattern (CAGP)
Effective from 2021-22

GUIDELINES AND REGULATIONS LEADING TO MASTER OF SCIENCE IN CHEMISTRY (TWO YEARS - SEMESTER SCHEME UNDER CBCS-CAGP)

Programme details

Name of the Department	: PG Department of Chemistry
Subject	: Chemistry
Faculty	: Science
Name of the Programme	: Master of Science (M.Sc.) in Chemistry
Duration of the Programme	: 2 years divided into 4 semesters

Programme Objectives

- To provide the latest subject matter both theory as well as practicals in such a way to foster their core competency and discovery learning. A chemistry postgraduate as envisioned in this framework would be sufficiently competent in the field to understand further discipline specific studies as well as to begin domine related employment.
- To mould a responsible citizen who is aware of most basic domain-independent knowledge including critical thinking and communication.
- Enable the graduate to prepare for national as well as international competitive examinations, especially UGC-CSIR NET and UPSC civil service examinations.

Programme Outcomes

- Students will have a strong foundation in the fundamentals and applications of current theoretical and practical chemistry in Analytical, Inorganic, Organic and Physical Chemistry.
- Students will be able to design and carry out scientific experiments and accurately record and analyze the results of the experiments.
- Students will be skilled in problem solving, critical thinking and analytical reasoning as applied to scientific problems.
- Students will be able to explore new areas of research in both chemistry and allied fields such as Biochemistry, Material Chemistry, Pharmaceutical chemistry and Chemical biology and related technology.
- Students will understand the central role of chemistry to our society which includes understanding of safe handling of chemicals, environmental issues and key issues facing our society in energy, health and medicine.

Programme Specific Outcomes

- Global level research opportunities to pursue Ph.D. programme, targeted approach of CSIR – NET and competitive civil service examinations**.**
- Enormous job opportunities at all levels of teaching, chemical, pharmaceutical, food products, life oriented material industries**.**
- Specific placements in R & D and many pharmaceutical & other industries**.**
- Facile development for the synthesis of biologically significant organic molecules using the green route for chemical reactions for sustainable properties**.**
- To inculcate the scientific temperament in the students and outside the scientific community.
- Learnt to handle sophisticated equipment for the determination and characterization of chemical compounds.
- Use of the latest chemistry software to avoid the laborious work in research**.**

Pedagogies used in the programme

- Conventional method such as black board and chalk, and modern methods like power point presentation and information and communications technology (ICT) are used in class room teaching.
- Molecular models are used to teach molecular symmetry, stereochemistry and solid state chemistry topics.
- Each student performs experiments as per the protocol in practical classes.
- For the preparation of new compounds, each student can adopt new experimental setup, and also exposed to different analytical instruments for qualitative and quantitative analyses. In addition to this, students will acquire skill to handle various instruments independently.
- Students will be presenting seminars in each semester.
- Each student will be subjected to viva-voce examinations in every semester.
- Every student will work for project on a small research problem.
- Rigorous training will be giving for every student to interpret spectral data in the respective course including their dissertation.
- Special lectures are delivered by eminent scholars from different intuitions.
- National/International conferences are organized to upgrade the subject knowledge.

GENERAL REQUIREMENTS

Scheme of instructions

1. A Masters Degree programme is of 4 semesters-two Years duration. A candidate can avail a maximum of 8 semesters – 4 years (in one stretch) to complete Masters Degree (including blank semesters, if any). Whenever a candidate opts for blank semesters, he/she has to study the prevailing courses offered by the department when he/she continues his/her studies.

2. A candidate has to earn a minimum of 76 credits, for successful completion of a Master Degree. The 76 credits shall be earned by the candidate by studying Hardcore, Soft Core and Open Elective. A candidate may earn another 04 credits by studying MOOCs/SWAYAM courses.

3. **Minimum for Pass:** In case a candidate secures less than 30% in C_1 and C_2 put together, the candidate is said to have DROPPED the course, and such a candidate is not allowed to appear for C_3.

4. In case a candidate secures less than 30% in C_3, or secures more than 30% in C_3 but less than 50% in C_1, C_2 and C_3 put together, the candidate is said to have not completed the course and he/she may either opt to DROP the course or to utilize PENDING option.

5. **Credits (Minimum) Matrix:** A candidate has to study 42 credits, but not exceeding 52 credits from hard Core, a minimum of 16 credits in Soft Core (sum total of 4 semesters) and 04 credits in Open Elective (III Semester) for the successful completion of the Masters Degree programme.

6. All other rules and regulations hold good which are governed by the University of Mysore from time to time.

Definitions

1. In the Choice Based Credit System – Continuous Assessment Grading Pattern (CBCS-CAGP), programme means a course and a course means a paper.
2. **HC:** Hard Core; **SC:** Soft Core; **OE:** Open Elective

GENERAL SCHEME WITH RESPECT TO ASSESSMENT OF CREDITS

Semester	Hard Core		Soft Core			Open Elective
	Theory			Theory	Practicals	
I	I	3 + 0 + 0 = 3	A	2 + 0 + 0 = 2	0 + 0 + 4 = 4[a]	-
	O	3 + 0 + 0 = 3	I	2 + 0 + 0 = 2	0 + 0 + 4 = 4[a]	
	P	3 + 0 + 0 = 3	O	2 + 0 + 0 = 2	0 + 0 + 4 = 4[a]	
	A	3 + 0 + 0 = 3	P	2 + 0 + 0 = 2	0 + 0 + 4 = 4[a]	
II	I	3 + 0 + 0 = 3	A	2 + 0 + 0 = 2	0 + 0 + 4 = 4[a]	-
	O	3 + 0 + 0 = 3	I	2 + 0 + 0 = 2	0 + 0 + 4 = 4[a]	
	P	3 + 0 + 0 = 3	O	2 + 0 + 0 = 2	0 + 0 + 4 = 4[a]	
	G	3 + 0 + 0 = 3	P	2 + 0 + 0 = 2	0 + 0 + 4 = 4[a]	
III	I	3 + 0 + 0 = 3	A	2 + 0 + 0 = 2	0 + 0 + 2 = 2[ab]	4 + 0 + 0 = 4
	O	3 + 0 + 0 = 3	I	2 + 0 + 0 = 2	0 + 0 + 2 = 2[ab]	
	P	3 + 0 + 0 = 3	O	2 + 0 + 0 = 2	0 + 0 + 2 = 2[ab]	
	G	3 + 0 + 0 = 3	P	2 + 0 + 0 = 2	0 + 0 + 2 = 2[ab]	
IV	I	3 + 0 + 0 = 3	A	2 + 0 + 0 = 2	0 + 0 + 2 = 2[ab]	-
	O	3 + 0 + 0 = 3	I	2 + 0 + 0 = 2	0 + 0 + 2 = 2[ab]	
	P	3 + 0 + 0 = 3	O	2 + 0 + 0 = 2	0 + 0 + 2 = 2[ab]	
	A	3 + 0 + 0 = 3	P	2 + 0 + 0 = 2	0 + 0 + 2 = 2[ab]	
			D	--	0 + 0 + 4 = 4[c]	
Total Credits	48		24			04

NOTE

A–Analytical; I–Inorganic; O–Organic; P–Physical; G-Spectroscopy; D-Dissertation/Project Work; (L+T+P)-Theory + Tutorial + Practical

[a] Compulsory but 50% of the students will attend Analytical/Inorganic Practicals and remaining 50% students will attend Organic/Physical Practicals in I or III Semesters and vice-versa during II or IV Semesters.

[b] Practicals are only for Chemistry students which are compulsory papers.

[c] Dissertation/Project work, which is offered by the department during IV Semester.

SCHEME OF STUDY AND EXAMINATION

FIRST SEMESTER

HARD CORE COURSES

Course Code	Title	Contact Hours/ week	Credits	Max. Marks	Internal Assessment Marks		Semester End Exams (C_3)	
					C_1	C_2	Duration (hrs)	Marks
21CHA10	Concepts & Models of Inorganic Chemistry	3	3	100	15	15	3	70
21CHA11	Stereochemistry & Reaction Mechanism	3	3	100	15	15	3	70
21CHA12	Basic Physical Chemistry	3	3	100	15	15	3	70
21CHA13	Essentials of Analytical Chemistry	3	3	100	15	15	3	70

SOFT CORE PRACTICALS

Course Code	Title	Contact Hours/ week	Credits	Max. Marks	Internal Assessment Marks		Semester End Exams (C_3)	
					C_1	C_2	Duration (hrs)	Marks
21CHA50	Analytical Chemistry Practicals	8	4	100	15	15	6	70
21CHA51	Inorganic Chemistry Practicals	8	4	100	15	15	6	70
21CHA52	Organic Chemistry Practicals	8	4	100	15	15	6	70
21CHA53	Physical Chemistry Practicals	8	4	100	15	15	6	70

NOTE: 50% of students will attend Analytical and Inorganic Practicals and the remaining 50% of students will attend Organic and Physical Practicals in I Semester and vice-versa in II Semester.

SOFT CORE COURSES

Course Code	Title	Contact Hours/ week	Credits	Max. Marks	Internal Assessment Marks		Semester End Exams (C_3)	
					C_1	C_2	Duration (hrs)	Marks
21CHA54	Titrimetric Analysis	2	2	100	15	15	3	70
21CHA55	Chemistry of Selected Elements	2	2	100	15	15	3	70
21CHA56	Chemistry of Natural Products-I	2	2	100	15	15	3	70
21CHA57	Biophysical Chemistry	2	2	100	15	15	3	70

SECOND SEMESTER

HARD CORE COURSES

Course Code	Title	Contact Hours/ week	Credits	Max. Marks	Internal Assessment Marks		Semester End Exams (C_3)	
					C_1	C_2	Duration (hrs)	Marks
21CHB10	Coordination Chemistry	3	3	100	15	15	3	70
21CHB11	Synthetic Organic Chemistry	3	3	100	15	15	3	70
21CHB12	Principles of Physical Chemistry	3	3	100	15	15	3	70
21CHB13	Molecular Symmetry and Spectroscopy	3	3	100	15	15	3	70

SOFT CORE PRACTICALS

Course Code	Title	Contact Hours/ week	Credits	Max. Marks	Internal Assessment Marks		Semester End Exams (C_3)	
					C_1	C_2	Duration (hrs)	Marks
21CHB50	Analytical Chemistry Practicals	8	4	100	15	15	6	70
21CHB51	Inorganic Chemistry Practicals	8	4	100	15	15	6	70
21CHB52	Organic Chemistry Practicals	8	4	100	15	15	6	70
21CHB53	Physical Chemistry Practicals	8	4	100	15	15	6	70

NOTE: Practicals: Same as that of I Semester. Students who have conducted Analytical and Inorganic or Organic and Physical Practicals in the I Semester will get interchanged during II Semester.

SOFT CORE COURSES

Course Code	Title	Contact Hours/ week	Credits	Max. Marks	Internal Assessment Marks		Semester End Exams (C_3)	
					C_1	C_2	Duration (hrs)	Marks
21CHB54	Titrimetric Analysis	2	2	100	15	15	3	70
21CHB55	Chemistry of Selected Elements	2	2	100	15	15	3	70
21CHB56	Chemistry of Natural Products-I	2	2	100	15	15	3	70
21CHB57	Biophysical Chemistry	2	2	100	15	15	3	70

NOTE: Soft Core Theory: All courses are same as that described in first semester.

THIRD SEMESTER

HARD CORE COURSES

Course Code	Title	Contact Hours/ week	Credits	Max. Marks	Internal Assessment Marks		Semester End Exams (C_3)	
					C_1	C_2	Duration (hrs)	Marks
21CHC10	Advanced Inorganic Chemistry	3	3	100	15	15	3	70
21CHC11	Organometallic and Photochemistry	3	3	100	15	15	3	70
21CHC12	Advanced Physical Chemistry	3	3	100	15	15	3	70
21CHC13	Chemical Spectroscopy	3	3	100	15	15	3	70

SOFT CORE PRACTICALS

Course Code	Title	Contact Hours/ week	Credits	Max. Marks	Internal Assessment Marks		Semester End Exams (C_3)	
					C_1	C_2	Duration (hrs)	Marks
21CHC50	Analytical Chemistry Practicals	4	2	100	15	15	6	70
21CHC51	Inorganic Chemistry Practicals	4	2	100	15	15	6	70
21CHC52	Organic Chemistry Practicals	4	2	100	15	15	6	70
21CHC53	Physical Chemistry Practicals	4	2	100	15	15	6	70

NOTE: 50% of students will attend Analytical and Inorganic Practicals and the remaining 50% of students will attend Organic and Physical Practicals in I Semester and vice-versa in II Semester.

SOFT CORE COURSES

Course Code	Title	Contact Hours/ week	Credits	Max. Marks	Internal Assessment Marks		Semester End Exams (C_3)	
					C_1	C_2	Duration (hrs)	Marks
21CHC54	Kinetic and Radiochemical Methods of Analysis	2	2	100	15	15	3	70
21CHC55	Frontiers in Inorganic Chemistry	2	2	100	15	15	3	70
21CHC56	Chemistry of Natural Products-II	2	2	100	15	15	3	70
21CHC57	Material Chemistry	2	2	100	15	15	3	70

OPEN ELECTIVE FOR NON-CHEMISTRY STUDENTS

Course Code	Title	Contact Hours/ week	Credits	Max. Marks	Internal Assessment Marks		Semester End Exams (C_3)	
					C_1	C_2	Duration (hrs)	Marks
21CHC80	General Chemistry	4	4	100	15	15	3	70

FOURTH SEMESTER

HARD CORE COURSES

Course Code	Title	Contact Hours/ week	Credits	Max. Marks	Internal Assessment Marks		Semester End Exams (C_3)	
					C_1	C_2	Duration (hrs)	Marks
21CHD10	Bioinorganic Chemistry	3	3	100	15	15	3	70
21CHD11	Heterocyclic and Bioorganic Chemistry	3	3	100	15	15	3	70
21CHD12	Nuclear, Radiation and Photochemistry	3	3	100	15	15	3	70
21CHD13	Instrumental Methods of Analysis	3	3	100	15	15	3	70

SOFT CORE COURSES

Course Code	Title	Contact Hours/ week	Credits	Max. Marks	Internal Assessment Marks		Semester End Exams (C_3)	
					C_1	C_2	Duration (hrs)	Marks
21CHD50	Analytical Chemistry Practicals	4	2	100	15	15	6	70
21CHD51	Inorganic Chemistry Practicals	4	2	100	15	15	6	70
21CHD52	Organic Chemistry Practicals	4	2	100	15	15	6	70
21CHD53	Physical Chemistry Practicals	4	2	100	15	15	6	70
21CHD54	Dissertation/Project Work	8	4	100	15	15	-	70

NOTE: Practicals: Same as that of III Semester. Students who have conducted Analytical and Inorganic or Organic and Physical Practicals in the III Semester will get interchanged during IV Semester.

SOFT CORE COURSES

Course Code	Title	Contact Hours/ week	Credits	Max. Marks	Internal Assessment Marks		Semester End Exams (C_3)	
					C_1	C_2	Duration (hrs)	Marks
21CHD55	Automated Methods and Real Sample Analysis	2	2	100	15	15	3	70
21CHD56	Bioinorganic Photochemistry	2	2	100	15	15	3	70
21CHD57	Medicinal Chemistry	2	2	100	15	15	3	70
21CHD58	Quantum Chemistry	2	2	100	15	15	3	70

SCHEME OF EXAMINATION FOR C1, C2 AND C3 COMPONENTS

Preamble

In view of the CBCS syllabus, following is the model distribution of marks for C_1, C_2 and C_3 Components. At a glance, the model includes HC, SC and OE courses for the assessment of marks.

The following is the scheme which will be followed for the assessment of marks for HC, SC and OE courses irrespective of the credits associated with each course. 30% of the marks will be assessed for internals (C_1 and C_2) and remaining 70% will be for the Semester end Examinations (C_3). Each course carries 100 marks and hence 30 marks will be allotted to internals and remaining 70 marks will be for Semester end Examinations. Out of 30 marks for internals, 15 marks will be allotted to each C_1 and C_2 components.

Each course (HC/SC/OE) consists of three components namely C_1, C_2 and C_3. C_1 and C_2 are designated as Internal Assessment (IA) and C_3 as Semester end Examination. Each course (HC/SC/OE) carries **100 Marks** and hence the allotment of marks to C_1, C_2 and C_3 Components will be 15, 15 and 70 marks, respectively. i.e.,

C_1 Component	15 Marks	Assessment Marks
C_2 Component	15 Marks	
C_3 Component	70 Marks	Semester end Examination
Total	**100 Marks**	

The above Scheme will be followed for all the HC, SC and OE courses in all the four semesters.

1. HARD CORE (03 CREDIT COURSES)

Distribution of Marks for C_1 and C_2 Components

Assessment Marks ($C_1 + C_2$) consists of 30 marks. It will be divided into three parts *viz.*, ***Internal Test, Home Assignment and Seminar***. Internal tests will be conducted during the 8th week of the semester for C_1 and 16th week of the semester for C_2. Home Assignment will be considered for C_1 Component and Seminar for C_2 Component only. Hence, a teacher from each unit of a course may be given one assignment (or in their personal interest one more may be given). Since each course has three units, the marks shall be divided equally. Allotment of marks for C_1 and C_2 is as follows: Out of 15 Marks for C_1, Internal test will be conducted for 30 Marks (10 Marks from each unit and reduced to 10 Marks) and Home Assignment will be given for 05 Marks (Each Home Assignment from every unit will be assessed for 05 Marks and finally reduced to 05 Marks). Assessment Marks for C_2 will be distributed as follows: Internal test will be conducted for 30 Marks (10 Marks from each unit and reduced to 10 Marks) and Seminar will be assessed for 20 Marks and finally its Marks will be distributed to each theory HC course. i.e.,

C_1		**C_2**	
Internal Test	30 Marks (10+10+10) **Reduced to 10 Marks**	Internal Test	30 Marks (10+10+10) **Reduced to 10 Marks**
Home Assignment	15 Marks (05+05+05) **Reduced to 5 Marks**	Seminar	20 Marks (05+05+05+05) **5 Marks will be distributed to each HC course**
Total	**15 Marks**	**Total**	**15 Marks**

Distribution of Marks for C_3 Component (Semester end Examination)

The question paper is of 3 hrs duration with the Maximum of 70 Marks. The following question paper pattern will be followed for all the theory courses (HC/SC/OE). Question paper will have FIVE main questions. All the questions will cover all the units of the course with equal marks distribution. Q. No. 1 is of Medium/ Short Answer Type questions which will have nine questions and each question carries two marks. A student has to answer any seven questions. Q. No. 2 to 5 carries 14 marks each and a student has to answer all the four questions (*No Choice*). Each main question will have three sub-sections a, b, c. An examiner may set the questions like (4+4+6) or (4+5+5) or as his/her wish. However, sub-section 'c' will have an internal choice. i.e.,

Model Question Paper Pattern

Max. Duration: 3 Hr **Max. Marks: 70**

Note: *Answer all the questions. Each question carries 14 marks.*
Q. No. 1: Nine Medium/ Short Answer Type Questions and any seven should be answered. Each question carries TWO marks. **(7 × 2 = 14)**

Q. No. 2 to 5: All the four questions have to be answered (*No Choice*). Each question carries **FOURTEEN** marks. An examiner may set the questions like (4+4+6) or (4+5+5) or as his/her wish. However, sub-section c will have an internal choice. (*Two marks questions shall be avoided for 2 to 5*). **(4 × 14 = 56)**

a)
b)
c) **OR** c)

2. SOFT CORE (02 CREDIT COURSES)

Distribution of Marks for C_1 and C_2 Components

Assessment Marks (C_1 + C_2) consists of 30 marks. It will be divided into two parts viz., ***Internal Test and Home Assignment***. Internal tests will be conducted during the 8th week of the semester for C_1 and 16th week of the semester for C_2. As far as Home Assignment is concerned, the concerned teacher will assign one or two Home Assignments to each student. Since each course has two units, the marks will be divided equally. Allotment of marks for C_1 and C_2 is as follows: Out of 15 Marks for IA, Internal tests will be conducted for 20 marks and reduced to 10 marks, whereas Home Assignment is for 05 Marks. i.e.,

C_1		**C_2**	
Internal Test	20 Marks (10+10) **Reduced to 10**	Internal Test	20 Marks (10+10) **Reduced to 10**
Home Assignment	10 Marks (05+05) **Reduced to 05**	Home Assignment	10 Marks (05+05) **Reduced to 05**
Total	**15 Marks**	**Total**	**15 Marks**

Distribution of Marks for C_3 Component (Semester End Examination)

The above described pattern (1.2) holds good in this case also.

3. PRACTICALS

The following Scheme will be applicable for all the four semesters (SC for chemistry students only)

Each practical consists of three components namely C_1, C_2 and C_3. C_1 and C_2 are designated as Internal Assessment (IA) and C_3 as Semester End Examination. Each practical carries **100 Marks** and hence the allotment of marks to C_1, C_2 and C_3 Components will be 15, 15 and 70 marks respectively. i.e.,

C_1 Component	15 Marks	Internal Assessment Marks
C_2 Component	15 Marks	
C_3 Component	70 Marks	Semester End Examination
Total	**100 Marks**	

Distribution of Marks for C_1 and C_2 Components

IA consists of **15 Marks**. It will be divided into three parts *viz*., ***Internal Test, Continuous Assessment and Record***. Continuous assessment refers to the daily assessment of each student based on his/her attendance, skill, results obtained etc. Thus, 05 marks are allotted for Continuous Assessment. Internal tests will be conducted for 05 Marks during the 8th week of the semester for C_1 and 16th week of the semester for C_2. Finally, remaining 05 Marks will be for the record. i.e.,

C_1		**C_2**	
Internal Test	05 Marks	Internal Test	05 Marks
Continuous Assessment	05 Marks	Continuous Assessment	05 Marks
Record	05 Marks	Record	05 Marks
Total	**15 Marks**	**Total**	**15 Marks**

Distribution of Marks for C_3 Component (Semester End Examination)

The end examination will be conducted for **70 Marks/course** with a maximum duration of 6 hours. Two experiments will be given to each student which carries 30 Marks each. Each student will be subjected to Viva-Voce Examination for which 10 Marks is allotted. i.e.,

Two Experiments	30+30 Marks
Viva-Voce	10 Marks
Total	**70 Marks**

Note: Examiners have to set at least one experiment from each part in the semester end Examination (C_3).

4. Evaluation of Dissertation/Project Work:

Each student can take up Project Work/ Dissertation under the guidance of the faculty of the department during the IV Semester as a Soft Core course.

4.1. Distribution of Marks for C_1 and C_2 Components:

IA consists of **fifteen Marks** for each components; it will be divided into three parts viz.,

Attendance, Continuous Assessment and Work Progress. Continuous assessment refers to the daily assessment of each student based on his or her skill, results obtained, literature survey etc. C_1 will be assessed during the 8th Week of the semester and C_2 during the 16th Week of the semester. Hence, the concerned guide will prepare the marks list based on the above said parameters for both C_1 and C_2 Components.

4.2. Distribution of Marks for C_3 Component (Semester End Examination):

The semester end examination will be conducted for **seventy Marks**. Every student is suppose to prepare a hard copy of the findings of the work in the form of report and submitted for evaluation. This part will be assessed for fourth Marks. Each student will be subjected to Viva-Voce Examination for which thirty Marks is allotted. i.e.,

Evaluation of Report	: 40 Marks
Viva-Voce	: 30 Marks
Total	**: 70 Marks**

FIRST SEMESTER
HARD CORE

CONCEPTS AND MODELS OF INORGANIC CHEMISTRY

COURSE CODE: 21CHA10

Objectives

- To study the structures of ionic crystals and simple molecules through VSEPR model.
- To learn acid-base concepts and chemical reactions in non-aqueous, ionic liquids and supercritical fluids as media.
- To study the chemistry of f-block elements.

Course Outcome

- The periodic properties of the elements, structures of ionic solids and their lattice energy calculations. Further, the use of VSEPR concepts in analyzing the structures of simple molecules.
- Various acid-base concepts and their applications in different fields. Also, understand the utility of various non-aqueous solvents in inorganic synthesis.
- Complete understanding of the chemistry of lanthanides, actinides and their applications.

Pedagogy

- Familiarize the students with the periodic properties of the elements using modern periodic table.
- Teaching through conventional method such as black board and chalk, and modern methods like power point presentation.
- For teaching structures of solids, crystal models (MX and MX2 types) are used.

Course content

UNIT-I [16 HOURS]

Chemical Periodicity: Review of periodic properties

Structures and energetics of ionic crystals: Introduction, MX (NaCl, CsCl, ZnS) and MX_2 (fluorite, rutile, β-crystobalite, cadmium chloride and cadmium iodide) types. The perovskite and spinel structures. Thermodynamics of ionic crystal formation. Hydration energy and solubility of ionic compounds, Lattice energy, Born-Haber cycle, Born-Lande equation. The Kapustinskii's equation, Consequences of lattice enthalpies. Applications of lattice energetics. Ionic radii, factors affecting the ionic radii, radius ratio rules.

Structures and energetics of inorganic molecules: Introduction, Bent's rule, Energetics of hybridization. VSEPR model for explaining structure of molecules including fluxional molecule. M.O. treatment of homo-nuclear and heteronuclear diatomic molecules. M.O. treatment involving delocalized π-bonding (CO_3^{2-}, NO_3^-, NO_2^-, CO_2 and N_3^-), M.O. correlation diagrams (Walsh) for triatomic molecules.

UNIT-II [16 HOURS]

Modern concepts of acids and bases: Lux-Flood and Usanovich concepts, solvent system and leveling effect. Hard-Soft Acids and Bases, Classification and Theoretical backgrounds.

Non-aqueous solvents: Classification of solvents, Properties of solvents (dielectric constant, donor and acceptor properties) protic solvents (anhydrous H_2SO_4, HF and glacial acetic acid)

aprotic solvents (liquid SO_2, BrF_3 and N_2O_4). Solutions of metals in liquid ammonia, hydrated electron. Super acids and super bases. Heterogeneous acid-base reactions.

Ionic liquids: Molten salt solvent systems, Ionic liquids at ambient temperature, Reactions in and applications of molten salt/ionic liquid media.

Supercritical fluids: Properties of supercritical fluids and their uses as solvents. Supercritical fluids as media for inorganic chemistry

UNIT-III

[16 HOURS]

Lanthanoid Chemistry: General trends, Electronic, optical and magnetic properties. Abundance and extraction, **General principles**: conventional, solvent extraction and ion-exchange methods. Separation from monazite. Chemistry of principal oxidation states (II, III and IV). Stability of tetrahalides, dihalides and aqua ions of simple lanthanide compounds. Redox potentials. **Uses:** lanthanides as shift reagents, lanthanides as probes in biological systems. High temperature super conductors.

Actinoid Chemistry: General trends and electronic spectra**.** Occurrence and preparation of elements, **Isolation of the elements**: thorium and uranium, enrichment of uranium for nuclear fuel, uranium hydrides, oxides and chlorides. Chemical reactivity and trend. Chemistry of trans-uranium elements.

Supramolecular Chemistry: Introduction, selectivity and Supramolecular Interactions.

References

1. Basic Inorganic Chemistry – 3rd edition. F.A. Cotton, G. Wilkinson and P.L. Gaus, John Wiley and Sons (2002).
2. Inorganic Chemistry, 3rd edition. James E. Huheey, Harper and Row Publishers (1983).
3. Inorganic Chemistry, 5th edition. G.L. Miessler, P. J. Fischer and D.A. Tarr, Pearson (2014).
4. Inorganic Chemistry, 6th edition. D.F. Shriver, M. Weller. T. Overton, J. Rourke and F. Armastrong, Oxford University Press (2014).
5. Inorganic Chemistry, 4th edition. C.E. Housecroft and A.G. Sharpe, Pearson Education Ltd. (2012).
6. Introduction to Modern Inorganic Chemistry, K.M. Mackay and R.A. Mackay, Blackie Publication (1989).
7. Concepts and Models of Inorganic Chemistry 3rd edition. B.E. Douglas, D.H. McDaniel and Alexander, Wiley (2001).
8. Ionic liquids-Classes and Properties (Ed) by Scott T. Handy, Intech Publisher (2011).
9. Lanthanide and Actinide Chemistry, Simon Cotton, John Wiley and Sons Ltd., (2006).
10. Supramolecular Chemistry, Peter J. Cragg, Springer (2010).

STEREOCHEMISTRY AND REACTION MECHANISM
COURSE CODE: 21CHA11

Objectives

- To understand detailed molecular structures of organic compounds.
- To learn bonding and chemical reactions of organic compounds.
- To study different chemical reactions involved in organic synthesis.

Course Outcome

- Optical and geometrical isomerism of Organic compounds. Application of stereochemistry in the study of regioselective and regiospecific reactions.
- The study of HMOT and its applications to simple organic molecules, and also understand the concept of aromaticity and methods of determining reaction mechanism.
- Nucleophilic, electrophilic and elimination reactions.

Pedagogy

- Molecular models are used to teach stereochemistry.
- Teaching through conventional method such as black board and chalk, and modern methods like power point presentation.

Course content

UNIT-I

[16 HOURS]

Stereoisomerism: Projection formulae [flywedge, Fischer, Newman and sawhorse], enantiomers, diastereoisomers, mesomers, configurational notations of simple molecules, DL and RS configurational notations.

Conformational analysis: Conformational analysis of ethane, butane, cyclohexane, decalins, 1,2-, 1,3- and 1,4-disubstituted cyclohexane derivatives, Effect of conformation on the course and rate of reactions.

Optical isomerism: Conditions for optical isomerism; Elements of symmetry-plane of symmetry, centre of symmetry, alternating axis of symmetry (rotation-reflection symmetry). Optical isomerism due to chiral centers and molecular dissymmetry, allenes and biphenyls,

Geometrical isomerism: In C=C, C=N and N=N bonds, *E*, *Z* conventions, determination of configuration by physical and chemical methods. Geometrical isomerism in cyclic systems.

Stereoselectivity: Meaning and examples of stereospecific reactions, stereoselective reactions, diastereoselective reactions, regioselective, regiospecific reactions, enantioselective reactions and enantiospecific reactions.

UNIT-II

[16 HOURS]

Basics of organic reactions: Meaning and importance of reaction mechanism, classification and examples for each class.

Bonding in organic systems: Theories of bonding-molecular orbital approaches. Huckel molecular orbital theory and its application to simple π-systems: ethylene, allyl, cyclopropyl, butadienyl, cyclopentadienyl, pentadienyl, hexatrienyl, cyclohexatrienyl, heptatrienyl, cycloheptatrienyl systems. Calculation of the total π-energy, and M.O. coefficients of the systems.

Aromaticity: Concept of aromaticity, Huckel's rule, Polygon rule, annulenes, heteroannulenes and polycyclic systems.

Structure and reactivity: Brief discussion on effects of hydrogen bonding, resonance, inductive and hyperconjugation on strengths of acids and bases.

Methods of determining organic reaction mechanism: Thermodynamic and kinetic requirements for reactions, kinetic and thermodynamic control; Identification of products; Determination of reaction intermediates, isotope labeling and effects of cross over experiments, kinetic and stereochemical evidence, solvent effect. Formation, structure, stability, detection and reactions of carbocations (classical and non-classical), carbanions, free radicals, carbenes, nitrenes, arynes and ylides (Sulphur, nitrogen and phosphorous).

UNIT-III

[16 HOURS]

Aliphatic Nuleophilic Substitution reactions: Kinetics, mechanism and stereochemical factor affecting the rate of S_N1, S_N2, $S_{RN}i$, S_Ni, S_N1', S_N2', S_{N1i} and $S_{RN}1$ reactions; Neighboring group participation.

Electrophilic substitution reactions: Kinetics, mechanism and stereochemical factor affecting the rate of S_E1 & S_E2

Aromatic electrophilic substitution reactions: Mechanism of nitration, halogenation, sulphonation, Friedel-Crafts alkylation and acylation, Mannich reaction, chloromethylation, Vilsmeier Haack reaction, Diazonium coupling, Gattermann–Koch reaction, Mercuration reaction.

Aromatic nucleophilic substitution reactions: S_N1, S_N2 and benzyne mechanism, Bucherer reaction, von Richter reaction.

Mechanism of Addition reactions: Addition to C=C multiple bonds involving electrophiles, nucleophiles. Markownikoff's rule and anti-Markownikoff's rule.

Additions to carbonyl compounds: Addition of water, alcohol, bisulphate, HCN and amino compounds. Hydrolysis of esters.

Elimination reactions: Mechanism and stereochemistry of eliminations - E_1, E_2, E_{1cB}. *cis* elimination, Hofmann and Saytzeff eliminations, competition between elimination and substitution reactions, decarboxylation reactions. Chugaev reaction.

References

1. Stereochemistry of carbon compounds, Ernest L. Eliel.
2. Stereochemistry: P. S. Kalsi.
3. Organic Chemistry, VI edition, Robert T. Morrison, Robert N. Boyd.
4. Organic Chemistry, Vol-I by I. L. Finar.
5. Advance Organic Chemistry, IV edition, Jerry March.
6. Advance Organic Chemistry, III edition, Part-A and Part-B, Francis A. Carey and Rechard J. Sundberg.
7. Organic Chemistry, III edition, V. K. Ahluwalia and Rakesh Kumar Parashar.
8. Reactive intermediates in Organic Chemistry, N. S. Isaacs.

BASIC PHYSICAL CHEMISTRY
COURSE CODE: 21CHA12

Objectives

- To understand thermal properties of chemical compounds.
- To study the rate of chemical reactions including fast reactions and factors influencing the reaction rate.
- To understand the theory of electrochemistry in solution.

Course Outcome

- The completion of this course will enable the students to gain the knowledge on fundamentals and theoretical background on the concepts of chemical thermodynamics, chemical kinetics and electrochemistry of solutions.
- This helps in understanding the stability and energetics of reaction.

Pedagogy

- Teaching through conventional method such as black board and chalk, and modern methods like power point presentation.
- To teach electrochemical aspects through animations.

Course content

UNIT-I

[16 HOURS]

Chemical Thermodynamics: Entropy: Physical significance, entropy changes in an ideal gas. Variation of entropy with temperature, pressure and volume. Entropy changes in reversible and irreversible processes.

Free energy: Helmholtz and Gibbs free energies, Gibbs-Helmholtz equation and its applications, Maxwell‘s relations and its applications. Nernst heat theorem: its consequences and applications. Third law of thermodynamics: statements, applications and comparison with Nernst heat theorem.

Partial molar properties: Physical significance, determination of partial molar volumes by intercept method and from density measurements. Chemical potential and its significance. Variation of chemical potential with temperature and pressure. Formulation of the Gibbs – Duhem equation. Derivation of Duhem-Margules equation.

Fugacity: Relation between fugacity and pressure, variation of fugacity with temperature and pressure. Determination of fugacity of gases.

Activity and activity coefficient: Variation of activity with temperature and pressure. Determination of activity co-efficient by vapour pressure, depression in freezing point, solubility measurements and by electrical methods.

Thermodynamics of dilute solutions: Raoult‘s law, Henry‘s law. Ideal and non-ideal solutions.

UNIT-II

[16 HOURS]

Chemical Kinetics: Complex reactions: Kinetics of parallel, consecutive and reversible reactions. Chain reactions: Branched chain reactions, general rate expression, Auto catalytic reactions (Hydrogen-Oxygen reaction), oscillatory reactions and explosion limits.

Theories of reaction rates: Collision theory and its limitations, Activated complex theory

(postulates -derivation) and its applications to reactions in solution. Energy of activation, other activation parameters - determinations and their significance. Lindemann theory, Hinshelwood's theory of unimolecular reactions.

Potential energy surfaces: Features and construction, theoretical calculations of E_a.

Reactions in solution: Ionic reactions - salt effects, effect of dielectric constant (single and double sphere models). Effect of pressure, volume and entropy change on the rates of reactions. Cage effect with an example.

Fast reactions- Introduction, study of fast reactions by continuous and stopped flow techniques, relaxation methods (T-jump and P-jump methods), flash photolysis, pulse and shock tube methods.

UNIT-III

[16 HOURS]

Electrochemistry of solutions: Factor effecting electrolytic conductance. Debye-Huckel theory - Concept of ionic atmosphere. Debye-Huckel-Onsager equation of conductivity and its validity. Debye-Huckel limiting law (DHL), its modification for appreciable concentrations. A brief survey of Helmholtz-Perrin, Guoy-Chapman and Stern electrical double layer (no derivation). Transference number: True and apparent transference numbers, Abnormal transference numbers, effect of temperature on transference numbers. Liquid junction potential-determination and minimization.

Energetics of cell reactions: Effect of temperature, pressure and concentration on energetics of cell reactions (calculation of ΔG, ΔH and ΔS).

Irreversible electrode process: Introduction, reversible and irreversible electrodes, reversible and irreversible cells. Polarization, over voltage - concentration over voltage, activation over voltage and ohmic over voltage. Experimental determination of over voltage. Equations for concentration over potential, stationary and non-stationary surface. Butler-Volmer equation, Tafel equation. Hydrogen oxygen over voltage. Effect of temperature, current density and *p*H on over voltage. Polarography- Half wave potential, application in qualitative and quantitative analysis.

References

1. Thermodynamics for Chemists by S. Glasstone, Affiliated East-West Press, New Delhi, (1965).
2. Physical Chemistry by P.W. Atkins, ELBS, 5th edition, Oxford University Press (1995).
3. Text Book of Physical Chemistry by Samuel Glasstone, MacMillan Indian Ltd., 2nd edition (1974).
4. Elements of Physical Chemistry by Lewis and Glasstone, 2nd Edn. Macmillan & Co Ltd., New York.
5. Chemical Kinetics by K.J. Laidler, Tata McGraw-Hill Pub, Co Ltd, New Delhi.
6. Chemical Kinetics by Frost and Pearson.
7. Kinetics and Mechanism of Chemical Transformation by J. Rajaram and J.C. Kuriacose, Macmillan, New Delhi.
8. Chemical Kinetics by L.K. Jain.
9. Introduction to Electrochemistry by S. Glasstone, Affiliated East-West Press, New Delhi,
10. Electrochemistry –Principles and Applications by E.G. Potter, Cleaver-Hume press Ltd, London.
11. Modern Electrochemistry Vol. I and II by J.O.M. Bockris and A.K.N. Reddy, Pentium Press, New York (1970).

ESSENTIALS OF ANALYTICAL CHEMISTRY
COURSE CODE: 21CHA13

Objectives

- To familiarize statistical methods to validate analytical methods.
- To learn sampling techniques and conventional volumetric methods.
- To learn extraction and chromatographic methods for the separation and identification of different compounds.

Course Outcome

- To enhance the knowledge on usage of analytical terminologies
- To build the skills on statistical analysis and comparison of results
- To aquire the skills on sampling, purification, separation and data analysis using instrumental techniques.
- To excel the knowledge on various separation techniques
- Explore topics such as experimental design, sampling, calibration strategies, standardization, optimization, statistics and the validation of experimental results

Pedagogy

- Teaching through conventional method such as black board and chalk, and modern methods like power point presentation.
- To evaluate validation parameters, MS-Office tools *viz.,* MS-Excel sheets can be used.

Course Content

Unit-I

Analytical Chemistry – Objectives. Meaning and role of analytical chemists. Quantitative and qualitative analysis. Analytical process and steps in quantitative analysis. Meanings of the terms: analysis, determination and measurement, techniques, methods, procedures and protocols. Calculating and reporting the data. Measurement of central tendency and variability: Mean median, range, standard deviation and variance.

Meaning of error. Determinate and indeterminate errors and minimization of errors. Accuracy and precision, distribution of random errors, the normal error curve. Propagation of determinate and indeterminate errors

Statistical treatment of finite samples- Student's t-test, confidence interval of mean. Comparison of two means and two standard deviations. Comparison of an experimental mean and a true mean. Criteria for the rejection of an observation- Q-test.

Standardization and calibration: Comparison with standards-direct comparison and titrations. External standard calibration-the least squares methods, regression equation and regression coefficient. Internal standard methods and standard-addition methods.

Validation of analytical method: Linearity, accuracy, precision, sensitivity, selectivity, robustness and ruggedness.

Figures of merit of analytical methods – sensitivity, detection and quantitation limit, linear dynamic range.

Obtaining and preparing samples for analysis: Importance of sampling, designing a sample plan-random, judgement, systematic-judgement, stratified and convenience sampling. Type of sample to collect - grab and composite samples. *Insitu* sampling. Size of sample and number of samples. Implementing the sampling plan - solutions, gases and solids. Bringing solid samples into solution - digestion and decomposing.

[16 HOURS]

UNIT – II

Solvent extraction: Theory-Nernst partition law, efficiency and selectivity of extraction.

Extraction systems: Extraction of covalent neutral molecules, extraction of uncharged metal chelates and synergic extraction, extraction of ion-association complexes-non chelated complexes, chelated complexes and oxonium systems. Use of salting out agents. Methods of extraction-batch and continuous extractions. applications.

Solid Phase Extraction (SPE): Principles, apparatus and instrumentation. Solid phase sorbents, extraction formats - Automated solid phase extraction. Solid phase micro extraction (SPME). Applications of SPE and SPME.

Chromatography: Definition, principles and mechanism of separation, classification of chromatographic techniques. General descriptions of column chromatography-frontal analysis, displacement analysis and elution analysis. General theory of column chromatography: characterizing a chromatogram-retention time, retention volume and baseline width. Chromatographic resolution, capacity factor, column selectivity. Column efficiency-band broadening-rate theory and plate theory. Peak capacity, non ideal behavior. Optimizing chromatographic separations using capacity factor, column selectivity and column efficiency- van Deemter equation, and its modern versions, Golay equation and Huber-Knox equations.

Thin layer chromatography (TLC) - Principles and procedures, stationary and mobile phases, solute- detection, alternative TLC procedures and applications of TLC.

[16 HOURS]

Unit-III

Gas chromatography (GC) - Principles and types. Mobile phases, Sample injections, columns and stationary phases. Temperature control and solute detection; thermal conductivity detector (TCD), flame ionization detector (FID), nitrogen-phosphorus detector (NPD) and electron capture detector (ECD). Instrument control and data processing. GC-procedures- temperature programming and special procedures used in GC. Quantitative and qualitative analyses.

High performance liquid chromatography (HPLC): Principles, mobile phases, solvent delivery systems, sample injection system, column and stationary phases. Solute detection-UV- visible, fluorescence, refractive index and electrochemical detectors. Instrument control and data processing. Modes of HPLC. Optimisation of separations, qualitative and quantitative analyses.

Ion-exchange chromatography (IEC): Principles, apparatus and instrumentation, and applications.

Size-exclusion chromatography (SEC): Principles, apparatus and instrumentation, and applications.

Affinity chromatography (AFC): Principles, methodology and applications.

Supercritical fluid chromatography (SFC): Properties of supercritical fluids, instrumentation and operating variables, comparison of SFC with other chromatographic techniques, applications.

Supercritical fluid extraction (SFE): Advantages, instrumentation, choice of supercritical fluids, off-line and on-line extraction, applications.

Electrophoresis (EP) and electrochromatography (EC): Principles- high performance capillary electrophoresis and capillary electrochromatography, running buffers, supporting medium, sample injection, solutes- detection, instrument control and data processing. Modes of EP and EC- capillary zone electrophoresis (CZE), micellar electrokinetic chromatography (MEKC), capillary gel electrophoresis (CZE), capillary isoelectric focusing (CIEF). Capillary electrochromatography (CEC), features, basis of separations. Qualitative analysis by CE and CEC and applications.

[16 Hours]

References:

1. Fundamental of Analytical Chemistry, D.A. Skoog, D.M. West, Holler and Crouch, 8th edition, 2005, Saunders College Publishing, New York.
2. Analytical Chemistry, G.D. Christian, 5th edition, 2001, John Wiley & Sons, Inc, India.
3. Quantitative Analysis, R.A. Day and A.L. Underwood, 6th edition,1993,Prentice Hall, Inc. New Delhi.
4. Vogel's Textbook of Quantitative Chemical Analysis, J. Mendham, R.C. Denney, J.D. Barnes and M.J.K. Thomas, 6th edition, Third Indian Reprint, 2003, Pearson Education Pvt. Ltd., New Delhi.
5. Analytical Chemistry Principles, John H. Kennedy, 2nd edition, Saunders CollegePublishing, California, 1990.
6. Principles and Practice of Analytical Chemistry, F.W. Fifield and Kealey, 3rd edition, 2000, Blackwell Sci., Ltd. Malden, USA.
7. Modern Analytical Chemistry, David Harvey, McGraw Hill, New Delhi, 2000.

SOFT CORE

ANALYTICAL CHEMISTRY PRACTICALS

COURSE CODE: 21CHA50 **[128 HOURS]**

Safety measures in the laboratory; MSDS; reporting of values.

Course Objective

- To understand basic concepts by carrying out analytical experiments.
- The experimental results are subjected to validation of analytical parameters

Course Outcomes

- After studying this course the student to:
- Analyze various samples with different classical and simple instrumental skills.
- Obtain knowledge for selection of analytical methods with suitable technique being adopted for the analysis different samples like, water, laboratory chemicals and reagents, body fluids such as urine etc.
- Distinguish classical and instrumental methods.
- Propose and conduct experiment for quantification of individual analytes

Pedagogy

- Computer aided applications for the evaluation of experimental results.
- Each student performs experiments as per the protocol in practical classes.

PART – I

1. Determination of total acidity of vinegar and wines by acid-base titration.
2. Determination of purity of a commercial boric acid sample, and Na_2CO_3 content of washing soda.
3. Determination of relative equivalent weight of a weak organic acid by titration with NaOH.
4. Determination of ephedrine and aspirin in their tablet preparations by residual acid-base titrimetry.
5. Determination of carbonate and bicarbonate in a mixture by *p*H-metric titration and comparison with visual acid-base titration.
6. Determination of carbonate and hydroxide-analysis of a commercial washing soda by visual and *p*H-titrimetry.
7. Determination of purity of a commercial sample of mercuric oxide by acid-base titration.
8. Determination of benzoic acid in food products by titration with methanolic KOH in chloroform medium using thymol blue as indicator.
9. Determination of the *p*H of hair shampoos and *p*H determination of an unknown soda ash.
10. Analysis of water/ waste water for acidity by visual, *p*H metric and conductometric titrations.
11. Analysis of water/ waste water for alkalinity by visual, *p*H metric and conductometric titrations.
12. Determination of ammonia in house-hold cleaners by visual and conductometric titration.
13. Determination of chromate and dichromate in mixture by acid-base titration: visual and pH metric methods.

14. Potentiometric determination of the equivalent weight and Ka for a pure unknown weak acid.
15. Determination of purity of aniline by non-aqueous acid-base titration by visual and potentiometric methods.
16. Determination of purity of ethylene glycol and glycerol by oxidimetric method using periodate (Malprade reaction).
17. Spectrophotometric determination of creatinine and phosphorus in urine.
18. Flame emission spectrometric determination of sodium, potassium and calcium in river/ lake water.

PART – II

1. Determination of percentage of chloride in a sample by precipitation titration- Mohr, Volhard and Fajan's methods.
2. Determination of silver in an alloy and Na_2CO_3 in soda ash by Volhard method.
3. Mercurimetric determination of chloride in blood or urine.
4. Determination of total hardness, calcium and magnesium hardness and carbonate and bicarbonate hardness of water by complexation titration using EDTA.
5. Determination of calcium in calcium gluconate/ calcium carbonate tablets/ injections and of calcium in milk powder by EDTA titration.
6. Determination of zinc in a sample of foot powder and thallium in a sample of rodenticide by EDTA titration.
7. Analysis of commercial hypochlorite and peroxide solution by iodometric titration.
8. Determination of copper in an ore/ an alloy by iodometry and tin in stibnite by iodimetry.
9. Determination of ascorbic acid in vitamin C tablets by titrations with $KBrO_3$ and of vitamin C in citrus fruit juice by iodimetric titration.
10. Determination of iron in razor blade by visual and potentiometric titration using sodium metavanadate.
11. Determination of iron in pharmaceuticals by visual and potentiometric titration using cerium(IV) sulphate.
12. Determination of nickel in steel by synergic extraction and boron in river water/ sewage using ferroin.
13. Determination of total cation concentration of tap water by ion-exchange chromatography.
14. Determination of magnesium in milk of magnesium tablets by ion-exchange chromatography.
15. Cation exchange chromatographic separation of cadmium and zinc and their estimation by EDTA titration.
16. Gas chromatographic determination of ethanol in beverages.
17. Solvent extraction of zinc and its spectrophotometric determination.
18. Anion exchange chromatographic separation of zinc and magnesium followed by EDTA titration of the metals.
19. Separation and determination of chloride and bromide on an anion exchanger.
20. Separation of *o*- and *p*-nitroaniline and analysis by thin layer chromatography.

References

1. Fundamental of Analytical Chemistry, D.A. Skoog, D.M. West, Holler and Crouch 8th edition, 2005, Saunders College Publishing, New York.
2. Analytical Chemistry, G.D. Christian, 5th edition, 2001 John Wiley & Sons, Inc, India.
3. Quantitative Analysis, R.A. Day and A.L. Underwood, 6th edition, 1993, Prentice Hall, Inc. New Delhi.
4. Vogel's Textbook of Quantitative Chemical Analysis, J. Mendham, R.C. Denney, J.D. Barnes and M.J.K. Thomas, 6th edition, Third Indian Reprint, 2003, Pearson Education Pvt. Ltd., New Delhi.
5. Analytical Chemistry Principles, John H. Kennedy, 2nd edition, Saunders College Publishing, California, 1990.
6. Practical Clinical biochemistry methods and interpretations, R. Chawla, J.P. Bothers Medical Publishers (P) Ltd., 1995.
7. Laboratory manual in biochemistry, J. Jayaraman, New Age International Publishers, New Delhi, 1981.
8. Practical Clinical Biochemistry by Harold Varley and Arnold.Heinmann, 4th edition.

INORGANIC CHEMISTRY PRACTICALS

COURSE CODE: 21CHA51 [128 HOURS]

Objectives

- To understand basic concepts by carrying out different experiments.
- To develop the skill for the qualitative and quantitative analysis of various samples.

Course Outcome

- Determination of various analytes presents in different ore samples by volumetric, gravimetric and spectrophotometric methods.
- The chemistry of redox, complexometric and indirect methods
- The principle in the semi-micro analysis of an inorganic salt mixture

Pedagogy

- Each student performs experiments as per the protocol in practical classes.
- Handling the instrument and pyrolysis for quantitative determination of analyte.

Course experiments

PART – A

1. Determination of iron in haematite using cerium (IV) solution (0.02M) as the titrant, and gravimetric estimation of insoluble residue.
2. Estimation of calcium and magnesium carbonates in dolomite using EDTA titration, and gravimetric analysis of insoluble residue.
3. Determination of manganese dioxide in pyrolusite using permanganate titration.
4. Quantitative analysis of copper-nickel in alloy/mixture:
    i. Copper volumetrically using KIO_3.
    ii. Nickel gravimetrically using DMG

5. Determination of lead and tin in a mixture: Analysis of solder using EDTA titration.
6. Quantitative analysis of chloride and iodide in a mixture:
    i. Iodide volumetrically using KIO_3
    ii. Total halide gravimetrically
7. Gravimetric analysis of molybdenum with 8-hydroxyquinoline.
8. Quantitative analysis of copper(II) and iron(II) in a mixture:
    i. Copper gravimetrically as CuSCN and
    ii. Iron volumetrically using cerium(IV) solution
9. Spectrophotometric determinations of:
    a. Titanium using hydrogen peroxide
    b. Chromium using diphenyl carbazide in industrial effluents
    c. Iron using thiocyanate/1,10-phenanthroline method in commercial samples
    d. Nickel using dimethylglyoxime in steel solution
10. Micro-titrimetric estimation of :
    a) Iron using cerium(IV)
    b) Calcium and magnesium using EDTA
11. Quantitative estimation of copper (II), calcium (II) and chloride in a mixture.
12. Circular paper chromatographic separation of: (Demonstration)
    a. Iron and nickel
    b. Copper and nickel

PART – B

Semimicro qualitative analysis of inorganic mixtures containing **TWO** anions and **TWO** cations (excluding sodium, potassium and ammonium cations) and **ONE** of the following less common cations: W, Mo, Ce, Ti, Zr, V and Li.

References

1. Vogel's Text Book of Quantitative Chemical Analysis – 5th edition, J. Basset, R.C. Denney, G.H. Jeffery and J. Mendhom.
2. A Text Book of Quantitative Inorganic Analysis by A.I. Vogel, 3rd edition.
3. Spectrophotometric Determination of Elements by Z. Marczenko.
4. Vogel's Qualitative Inorganic Analysis – Svelha.
5. Macro and SemimicroInorganicQualitative Analysis by A.I. Vogel.
6. Semimicro Qualitative Analysis by F.J. Welcher and R.B. Halin.
7. Quantitative Chemical Analysis by Daniel C. Harris, 7th edition, (2006).

ORGANIC CHEMISTRY PRACTICALS

COURSE CODE: 21CHA52 [128 HOURS]

Objectives

- To understand synthetic methods by carrying out different experiments.
- To develop the skill for the separation and qualitative analysis of binary mixtures of organic compounds.

Course Outcome

- Students are involved in the multi-step synthesis of different organic compounds.
- Understand the qualitative analysis of binary mixture of organic compounds through separation, identification of functional groups and preparation of solid derivatives.

Pedagogy

- Each student performs experiments as per the protocol in practical classes.
- Experimental setup for the synthesis of organic compounds by every individual.

Course experiments

PART-A

Safety measures in the laboratory; MSDS; reporting of values and demonstration of KingDraw/ ChemDraw

Multistep synthesis

1. Preparation *p*-bromoaniline from acetanilide**.**
2. Preparation of *n*-butyl bromide from *n*-butyl alcohol.
3. Oxidation of cyclohexanol to adipic acid.
4. Esterification: Preparation of benzoccaine from *p*-nitrotoluene.
5. Diazotization (Sandmeyer‘s reaction): Preparation of *p*-chlorobenzoic acid from *p*-toluidine.
6. Preparation benzilic acid from benzoin**.**
7. Preparation of *o*-hydroxy benzophenone from phenyl benzoate *via* Fries rearrangement.
8. Preparation of benzanilide from benzophenone oxime *via* Beckmann rearrangement.
9. Preparation of benzoic acid from benzaldehyde (Cannizzaro Reaction).
10. Preparation of 2,4-dinitrophenylhydrazine from 2,4-dinitrochlorobenzene.
11. Preparation of *m*-nitrobenzoic acid from methylbenzoate.
12. Preparation of chalcone.

PART-B

Qualitative analysis: Separation of binary mixtures, identification of functional groups and preparation of suitable solid derivatives.

References

1. Vogel' text book of practical organic chemistry, V edition, B. S. Furniss, A. J. Hannaford, P. W. G. Smith, A. R. Tatehell.
2. Elementary practical organic chemistry, Part-I: Small scale preparations, Part-II: Qualitative organic analysis, By Arthur I, Vogel.
3. Hand book of organic analysis, H. T. Clarke and Norman Collie.
4. Experiments in Organic Chemistry, Louis F. Fieser.
5. Laboratory manual of Organic Chemistry by B. B. Dey and M. V. Sitaraman.
6. Practical Organic Chemistry by Mann F. G. and Saunders.

PHYSICAL CHEMISTRY PRACTICALS
COURSE CODE: 21CHA53 [128 HOURS]

Objectives

- To understand the rate of chemical reactions and factors influencing the reaction rate by carrying out kinetic experiments.
- To understand basic concepts of electrochemistry by carrying out experiments.

Course Outcome

- After the completion of this course, the students can able to develop the experimental skill and theoretical interpretation of experimental results of many physical chemistry experiments of chemical kinetics in solution phase, thermodynamics, electrochemistry and spectrophotometry.
- This helps in academics, research and industries.

Pedagogy

- Each student performs experiments as per the protocol in practical classes.
- To optimize the reaction conditions for understanding the rate of chemical reactions.

Course experiments

PART - A

1. Study of kinetics of hydrolysis of methyl acetate in presence of two different concentrations of HCl/H_2SO_4 and report the relative catalytic strength.
2. Study of kinetics of reaction between $K_2S_2O_8$ and KI, first order, determination of rate constants at two different temperatures and E_a.
3. To study the kinetics of saponification of ethyl acetate by conductivity method at two different concentrations of NaOH and report the relative catalytic strength.
4. Determination of partial molar volume of salt-water system ($NaCl-H_2O/KCl-H_2O/KNO_3-H_2O$) systems.
5. To study the kinetics of reaction between acetone and iodine - determination of order of reaction with respect to iodine and acetone.
6. Study the kinetics of decomposition of diacetone alcohol by NaOH, determine the catalytic coefficient of the reaction and comparison of strength of alkali.
7. Determination of energy of activation for the bromide-bromate reaction.
8. Kinetics of reaction between sodium formate and iodine and determination of energy of activation.
9. Determination of heat of solution of organic acid (benzoic acid/salicylic acid) by variable temperature method (graphical method).
10. Determination of degree of association of benzoic acid in benzene by distribution method.
11. To determine the eutectic point of a two component system (Naphthalene-*m*-dinitrobenzene system).
12. Analysis of a binary mixture (Gylcerol & Water) by measurement of refractive index.
13. Determination of the molecular weight of a polymer material by viscosity measurements (cellulose acetate/methyl acrylate).

PART – B

1. Conductometric titration of a mixture of HCl and CH_3COOH against NaOH.
2. Conductometric titration of sodium sulphate against barium chloride.
3. pH titration of (a) HCl against NaOH (b) Copper sulphate against NaOH and (c) CH_3COOH/HCOOH against NaOH - determination of K_a.
4. Determination of equivalent conductance of weak electrolyte (CH_3COOH) at infinite

dilution following Kohlrausch law.

5. Determination of dissociation constant and mean ionic activity coefficient of weak acids ($CH_3COOH/HCOOH/ClCH_2COOH$) by conductivity method.
6. Potentiometric titration of KI *vs* $KMnO_4$ solution.
7. Determination of dissociation constant of a weak acid ($CH_3COOH/HCOOH/ClCH_2COOH$) by potentiometric method.
8. Potentiometric titration of a mixture of halides (KCl+KI/KCl+KBr/KBr+KI) against $AgNO_3$.
9. To obtain the absorption spectra of coloured complexes, verification of Beer's law and estimation of metal ions in solution using a spectrophotometer.
10. Potentiometric titration of $K_2Cr_2O_7$ against FAS determination of redox potential and concentration of Fe^{2+} ions.
11. Conductometric titration of oxalic acid against NaOH and NH_4OH.
12. Coulometric titration I_2 vs $Na_2S_2O_3$.
13. Determination of acidic and basic dissociation constant and isoelectric point of an amino acid by pH metric method.
14. Kinetics of photodegradation of indigocarmine (IC) using ZnO/TiO_2 as photocatalyst and study the effect of [ZnO/TiO_2] and [IC] on the rate of photodegradation.

References

1. Practical Physical Chemistry – A.J. Findlay.
2. Experimental Physical Chemistry – F. Daniels *et al*.
3. Selected Experiments in Physical Chemistry – Latham.
4. Experiments in Physical Chemistry – James and Prichard.
5. Experiments in Physical Chemistry – Shoemaker.
6. Advanced Physico-Chemical Experiments – J. Rose.
7. Practical Physical Chemistry – S.R. Palit.
8. Experiments in Physical Chemistry – Yadav, Geol Publishing House.
9. Experiments in Physical Chemistry – Palmer.
10. Experiments in Chemistry – D.V. Jahagirdar, Himalaya Publishing House, Bombay, (1994).
11. Experimental Physical Chemistry – R.C. Das and B. Behera, Tata Mc Graw Hill.

SOFT CORE PAPERS

TITRIMETRIC ANALYSIS

COURSE CODE: 21CHA54

Objective

- To familiarize statistical methods to validate analytical methods.
- To learn sampling techniques and conventional volumetric methods.

Course Outcome

After studying this course the student able to:

- Understand on quantitative and qualitative methods of analysis with relevant equilibrium chemistry.
- Develop the ideas with the fundamental aspects in analytical chemistry.
- Build the interest in students in developing good experimental protocols, and in interpreting

experimental results.

- Gain analytical knowledge for the quantitative analysis of various samples of different origin under titrimetric aspects.
- Learn statistical aspects from which the spirit of assessing the results will be enhanced.
- Learn method development and validation features so that they will become outstanding basement for their career in various industries.

Pedagogy

- Conventional method such as black board and chalk is used.
- Modern methods like power point presentation and animations are used in class room teaching.

Unit-I

Titrimetric analysis: An overview of titrimetry. Principles of titrimetric analysis. Titration curves. Titrations based on acid-base reactions-titration curves for strong acid and strong base, weak acid and strong base and weak base and strong acid titrations. Selecting and evaluating the end point. Finding the end point by visual indicators, monitoring *p*H and temperature. Quantitative applications – selecting and standardizing a titrant, inorganic analysis-alkalinity, acidity and free CO_2 in water and waste waters, nitrogen, sulphur ammonium salts, nitrates and nitrites, carbonates and bicarbonates. Organic analysis-functional groups like carboxylic acid, sulphonic acid, amine, ester, hydroxyl, carbonyl. Air pollutants like SO_2. Quantitative calculations. Characterization applications-equivalent weights and equilibrium constants.

Acid-base titrations in non-aqueous media: Role of solvent in acid-base titrations, solvent systems, differentiating ability of a solvent, some selected solvents, titrants and standards, titration curves, effect of water, determining the equivalence point, typical applications-determination of carboxylic acids, phenols and amines.

Precipitation titrations: Titration curves, feasibility of precipitation titrations, factors affecting shape - titrant and analyte concentration, completeness of the reaction, titrants and standards, indicators for precipitation titrations involving silver nitrate, the Volhard, the Mohr and the Fajan's methods, typical applications.

[16 HOURS]

UNIT – II

Complexometric titrations: Complex formation reactions, stability of complexes, stepwise formation constants, chelating agents, EDTA - acidic properties, complexes with metal ions, equilibrium calculations involving EDTA, conditional formation constants, derivation of EDTA titration curves, effect of other complexing agents, factors affecting the shape of titration curves - completeness of reaction, indicators for EDTA titrations - theory of common indicators, titration methods employing EDTA - direct, back and displacement titrations, indirect determinations, titration of mixtures.

Redox titrations: Balancing redox equations, calculation of the equilibrium constant of redox reactions, calculating titration curves, detection of end point, visual indicators and potentiometric end point detection. Quantitative applications - adjusting the analyte's oxidation state, selecting and

standardizing a titrant. Inorganic analysis - chlorine residuals, dissolved oxygen in water, water in non-aqueous solvents. Organic analysis - chemical oxygen demand (COD) in natural and waste waters, titrations of mercaptans and ascorbic acid with I_3^- and titration of organic compounds using periodate.

Automatic titrators: Principles and theory of CO_2, sulphate, chloride and Karl Fisher titrators.

[16 HOURS]

References

1. Fundamental of Analytical Chemistry, D.A. Skoog, D.M. West, Holler and Crouch, 8th edition, 2005, Saunders College Publishing, New York.
2. Analytical Chemistry, G.D. Christian, 5th edition, 2001, John Wiley & Sons, Inc, India.
3. Quantitative Analysis, R.A. Day and A.L. Underwood, 6th edition,1993,Prentice Hall, Inc. New Delhi.
4. Vogel's Textbook of Quantitative Chemical Analysis, J. Mendham, R.C. Denney, J.D. Barnes and M.J.K. Thomas, 6th edition, Third Indian Reprint, 2003, Pearson Education Pvt. Ltd., New Delhi.
5. Analytical Chemistry Principles, John H. Kennedy, 2nd edition, Saunders CollegePublishing, California, 1990.
6. Principles and Practice of Analytical Chemistry, F.W. Fifield and Kealey, 3rd edition, 2000, Blackwell Sci., Ltd. Malden, USA.
7. Modern Analytical Chemistry, David Harvey, McGraw Hill, New Delhi, 2000.

CHEMISTRY OF SELECTED ELEMENTS
COURSE CODE: 21CHA55

Objectives

- To learn basic chemistry of some selected group elements from periodic table.
- To understand properties of metal-metal bonding and cluster compounds.

Course Outcome

- Understand the chemistry of hydrogen and group 2 elements.
- The chemistry of pseudohalogens, interhalogens and their halogen compounds.
- The chemistry of xenon and other noble gas compounds.

Pedagogy

- Conventional method such as black board and chalk is used.
- Modern methods like power point presentation and animations are used in class room teaching.Course content

UNIT-I

Compounds of hydrogen: The hydrogen and hydride ions, Dihydrogen and hydrogen bonding. Classes of binary hydrides: Molecular hydrides, saline hydrides and metallic hydrides.

The Group 1 elements: Occurrence, extraction and uses. Simple compounds: Hydrides, halides, oxides, hydroxides, oxoacids, nitrides, solubility and hydration and solutions in liquid ammonia. Coordination and organometallic compounds. Applications.

The Group 2 elements: Occurrence, extraction and uses. General properties. Halides, hydrides

and salts of oxo acids. Complex ion in aqueous solution and complexes with amido and alkoxy ligands.

The Group 15 elements: Introduction, oxides and oxoacids of nitrogen and phosphorus.

[16 HOURS]

UNIT-II

The Group 17 elements: Occurrence, recovery and uses. Trends in properties and pseudohalogens. **Interhalogens**: Physical properties and structures, chemical properties, cationic interhalogens. **Compounds with oxygen**: Halogen oxides, oxoacids and oxoanions**.** Trends in rates of redox reactions and redox properties of individual oxidation states**.**

Chemistry of astatine.

The Group 18 elements: Occurrence, recovery and uses. Synthesis and structure of xenon fluorides, Reaction of xenon fluorides, xenon-oxygen compounds, Organoxenon compounds, other compounds of noble gases.

M-M bonds: Multiple metal-metal bonds.

Cluster compounds: carbonyl and carbide clusters.

References

1. Basic Inorganic Chemistry – 3rd edition. F.A. Cotton, G. Wilkinson and P.L. Gaus, John
2. Wiley and Sons (2002).
3. Inorganic Chemistry, 3rd edition. James E. Huheey, Harper and Row Publishers (1983).
4. Inorganic Chemistry, 3rd edition. G.L. Miessler and D.A. Tarr, Pearson Education (2004).
5. Inorganic Chemistry, 4th edition. C.E. Housecroft and A.G. Sharpe, Pearson Education Ltd. (2012).
6. Chemistry of the Elements – N.N. Greenwood and A. Earnshaw, Pergamon Press (1985).
7. Inorganic Chemistry, 6th edition. D.F. Shriver, M. Weller. T. Overton, J. Rourke and F.

CHEMISTRY OF NATURAL PRODUCTS-I
COURSE CODE: 21CHA56

Objectives

- To learn the nomenclature, classification, purification, structure and synthesis of some natural products.
- To understand the biological functions of biomolecules.

Course Outcome

- Acquire the knowledge of chemistry of lipids, prostaglandins and terpenoids.
- Understand the biological importance of chlorophyll and porphyrins.
- Chemistry of flavonoids and isoflavonoids.

Pedagogy

- Conventional method such as black board and chalk is used.
- Modern method like power point presentation is used in class room teaching.

Course content

UNIT-I

[16 HOURS]

Lipids: Nomenclature, classification, purification, structure and synthesis of fatty acids, phospholipids, sphingolipids. Biological importance of lipids (Lecithin, sphingolipids, oils and fats).

Prostaglandins: Introduction, classification and biological importance of PG's. Constitution of PGE1. Synthesis of PGE & F series.

Terpenoids: Introduction, classification and general methods of structural elucidation. Chemistry of pinene, camphor, caryophyllene, santonin. Biosynthesis of terpenoids.

UNIT-II

[16 HOURS]

Porphyrins: Introduction, structure and biological functions of haemin. Vitamin B12: structure and as coenzyme in molecular rearrangement reactions; Chlorophyll: structure and biological importance.

Flavonoids and Isoflavonoids: Occurrence, nomenclature and general methods of structure determination. Isolation and synthesis of Apigenin, Luteolin, Kaempferol, Quercetin, wedelolactone, Butein, Daidzein. Biosynthesis of flavonoids and isoflavonoids: Acetate Pathway and Shikimic acid Pathway. Biological importance of flavonoids and isoflavonoids

References

1. Organic Chemistry, VI edition, Robert T. Morrison, Robert N. Boyd.
2. Organic Chemistry, Vol-II by I. L. Finar.
3. Schaum's outline of theory and problems of Organic Chemistry, Harbert Meislich, Howard Nechamkin and Jocob Sharefkin.
4. Natural products: Their chemistry and biological significance, J. Mann, R. S. Davidson, J. B. Banthorpe and J. B. Harborne.
5. Synthetic drugs, Gurdeep R. Chatwal.
6. Heterocyclic chemistry by Achison.
7. Heterocyclic chemistry by Smith and Joule.
8. Heterocyclic chemistry by Pacquete.

BIOPHYSICAL CHEMISTRY

COURSE CODE: 21CHA57

Objectives

- To understand the physico-chemical principles of biological fluids.
- To learn the pharmacokinetics, pharmacodynamics, toxicokinetics of biological systems.

Course Outcome

- After the completion of this course, the students gain the knowledge on theory and principles of biophysical chemistry and pharmacokinetics.
- This course helps to understanding the bio-availability and different pharmacokinetic parameters of drugs in the living system.

Pedagogy

- Conventional method such as black board and chalk is used.
- Modern methods like power point presentation and animations are used in class room teaching.

Course content

UNIT-I

[16 HOURS]

Biophysical Chemistry: Electrophoresis - Principles of free electrophoresis, zone electrophoresis, gel electrophoresis and its applications in qualitative and quantitative study of proteins. Determination of isoelectric point of a protein. Electro-osmosis and streaming potential and its biological significance. Biological significance of Donnan membrane phenomenon. Micelles and its involvement during digestion and absorption of dietary lipids. Diffusion of solutes across bio-membranes and its application in the mechanism of respiratory exchange. –Salting In‖ and –Salting Out‖ of proteins. Osmotic behaviour of cells and osmo-regulation and its application in the evolution of excretory systems of organisms. Effect of temperature and *p*H on the viscosity of bio-molecules (albumin solution). Significance of viscosity in biological systems - mechanism of muscle contraction, polymerization of DNA and nature of blood flow through different vessels. Effect of temperature, solute concentration (amino acids) on surface tension. Biological significance of surface tension - stability of Alveoli in lungs, interfacial tension in living cells (Danielli and Davson model). Application of sedimentation velocity and sedimentation equilibrium method for molecular weight determination of proteins.

UNIT-II

[16 HOURS]

Pharmacokinetics: Introduction, biopharmaceutics, pharmacokinetics, clinical pharmacokinetics, pharmacodynamics, toxicokinetics and clinical toxicology. Measurement of drug concentration in blood, plasma or serum. Plasma level-time curve, significance of measuring plasma drug concentrations.

One compartment open model: Intravenous route of administration of drug, elimination rate constant, apparent volume of distribution and significance. Calculation of elimination rate constant from urinary excretion data, clinical application.

Two compartment model: Plasma level-time curve, relationship between tissue and plasma drug concentrations, Apparent volumes of distribution. Drug clearance, clinical example. Plasma level-time curve for a three compartment open model.

Drug absorption: Factors affecting the rate of drug absorption - nature of the cell membrane, Route of drug administration - Oral drug absorption, Intravenous infusion and intravenous solutions, Effect of food on gastrointestinal drug absorption rate.

References

1. Introduction to Physical Organic Chemistry, R.D. Gilliom, Madison – Wesley, USA (1970).
2. Physical Organic Chemistry- Reaction Rate and Equilibrium Mechanism – L.P. Hammett, McGraw HillBook, Co., (1970).
3. Biophysical Chemistry- Principle and Technique – A. Upadhyay, K. Upadhyay and N. Nath, Himalaya Publishing House, Bombay, (1998).
4. Essentials of Physical Chemistry and Pharmacy – H. J. Arnikar, S. S. Kadam, K.N. Gujan, Orient Longman, Bombay, (1992).
5. Applied Biopharmacokinetics and Pharmacokinetics - Leon Shargel, Andrew YuPrentice-Hall International, Inc (4^{th} edition).
6. Essentials of Physical Chemistry and Pharmacy – H.J. Arnikar, S.S. Kadam, K.N. Gujan, Orient Longman, Bombay, (1992).

SECOND SEMESTER

COORDINATION CHEMISTRY

COURSE CODE: 21CHB10

Objectives

- To understand the preparation, properties, electronic configuration and structural elucidation of coordination compounds.
- To learn the reaction mechanism, stereochemistry and photochemistry of coordination compounds.

Course Outcome

- Gain the knowledge of preparative methods of coordination compounds and geometries of different coordination numbers.
- Understand the CFT and MOT bonding theories of metal complexes.
- Electronic spectra, magnetic properties and infrared spectroscopy of coordination compounds. In addition, understand the reaction mechanism and photochemistry of coordination compounds.

Pedagogy

- Conventional method such as black board and chalk is used.
- Modern methods like power point presentation and animations are used in class room teaching.

Course content

UNIT-I

[16 HOURS]

Preparation of coordination compounds: Introduction, Preparative methods- simple addition reactions, substitution reactions, oxidation-reduction reactions, thermal dissociation reactions. Geometries of metal complexes of higher coordination numbers (2-12).

Stability of coordination compounds: Introduction, trends in stepwise stability constants, factors influencing the stability of metal complexes with reference to the nature of metal ion and ligands, the Irving-William series, chelate effect.

Determination of stability constants: Theoretical aspects of determination of stability constants of metal complexes by spectrophotometric and polarographic methods.

Crystal field theory: Salient features of CFT, d-orbital splitting in octahedral, tetrahedral, square planar and tetragonal complexes, Jahn-Teller distortions, measurement of 10 Dq and factors affecting it. Evidences for metal-ligand covalency.

Molecular Orbital Theory: MOT to octahedral, tetrahedral and square planar complexes without and with pi-bonding.

UNIT-II

[16 HOURS]

Electronic spectra: Introduction, selection rules and intensities, electronic spectra of octahedral and tetrahedral complexes, Term symbols for d^n ions, Orgel and Tanabe-Sugano diagrams, charge-transfer spectra. Ligand-field transition. Charge transfer and energy applications. Optical rotatory dispersion and Circular dichroism. Magnetic circular dichroism.

Magnetic properties: Introduction, magnetic susceptibility and its measurements, spin and orbital contributions to the magnetic moment, the effects of temperature on μeff, spin-cross over, ferromagnetism, anti-ferromagnetism and ferrimagnetism.

Applications of infrared spectroscopy of coordination compounds: Metal complexes of

ammine, nitro, nitrito, hydroxo, carbonato, sulphato, cyano, cyanato and thiocyanato complexes.

UNIT-III

[16 HOURS]

Reactions and Mechanisms: Introduction. Substitution reactions- Inert and labile compounds, mechanisms of substitution. Kinetic consequences of Reaction pathways- Dissociation, interchange and association. Experimental evidence in octahedral substitution- Dissociation, associative mechanisms, the conjugate base mechanism, the kinetic chelate effect.

Stereochemistry of reactions- Substitution in *trans* and its complexes, isomerization of chelate rings. Substitution reactions of square-planar complexes-kinetics and stereochemistry of square-planar substitutions, evidence for associative reactions, explanations of the *trans* effect.

Electron-transfer processes: Inner-sphere mechanism and outer-sphere mechanism, conditions for high and low oxidation numbers.

Photochemistry of coordination compounds: Photochemistry of chromium(III) ammine compounds, Light-induced excited state spin trapping in iron(II) compounds and MLCT photochemistry in pentammineruthenium(II) compounds.

References

1. Physical Inorganic Chemistry- A Coordination Chemistry Approach- S.F.A. Kettle, Spektrum, Oxford, (1996).
2. Inorganic Chemistry-4th edition. C.E. Housecroft and A.G. Sharpe, Pearson Education Ltd. (2012).
3. Inorganic Chemistry-5th edition. G.L. Miessler, P. J. Fischer and D.A. Tarr, Pearson (2014).
4. Inorganic Chemistry-6th edition. D.F. Shriver, M. Weller. T. Overton, J. Rourke and F. Armastrong, Oxford University Press (2014).
5. Inorganic Chemistry- 3rd edition, James E. Huheey, Harper and Row Publishers, (1983).
6. Basic Inorganic Chemistry- 3rd edition, F.A. Cotton, G. Wilkinson and P.L. Gaus, John Wiley and Sons, (2002).
7. Infrared and Raman Spectra of Coordination Compounds, Part-B- 6th edition, K. Nakamoto, John Wiley and Sons (2009).

SYNTHETIC ORGANIC CHEMISTRY
COURSE CODE: 21CHB11

Objectives

- To understand the reactions of organic compounds involving various reagents.
- To learn the synthesis and retro-synthesis of different organic compounds.

Course outcome

- Students are familiar about chemistry of oxidants, reductants and their applications in the organic synthesis.
- Understand the various catalysts in organic synthesis by known naming reactions.
- Retro-synthesis and molecular rearrangement.

Pedagogy

- Conventional method such as black board and chalk is used.
- Modern method like power point presentation is used in class room teaching.

Course content

UNIT-I

[16 HOURS]

Oxidation: Oxidation with chromium and manganese reagents (CrO_3, $K_2Cr_2O_7$, PCC, PDC, Sarret reagent, MnO_2, $KMnO_4$), peroxides and peracids, periodic acid, OsO_4, SeO_2, NBS, Oppenauer oxidation, Sharpless epoxidation.

Reduction: Catalytic hydrogenation (homogeneous and heterogeneous) – catalysts (Pt, Pd, Ra-C, Ni, Ru, Rh), solvents and reduction of functional groups, catalytic hydrogen transfer reactions. Wilkinson catalyst, $LiAlH_4$, $NaBH_4$, DIBAL-H, Sodium cyanoborohydride, Birch reduction, Leukart reaction (reductive amination), diborane as reducing agent, Meerwein-Ponndorf-Verley reduction, Wolff-Kishner reduction, Clemensen reduction, stannous chloride, Organoboron compounds: Introduction and preparations; Hydroboration and its applications; Reactions of organoboranes: isomerization reactions, oxidation, protonolysis, carbonylation, cyanidation. Reactions with aldehydes or ketones (*E* and *Z*-alkenes).

UNIT-II

[16 HOURS]

Reagents and reactions in organic synthesis: Use of following reagents in organic synthesis and functional group transformations: Lithium diisopropylamide (LDA), Gilmann reagent, dicyclohexyl carbodimide (DCC), dichlorodicyanoquinone (DDQ), Silane reagents-trialkylsilyl halides, trimethylsilyl cyanide, trimethyl silane; phase transfer catalyst, crown ethers, cyclodextrins, Ziegler-Natta catalyst, diazomethane, Woodward and Prevost hydroxylation, Stark enamine reaction, phosphorous ylides - Wittig and related reactions, Sulphur ylides – reactions with aldehydes and ketones, 1,3-dithiane anions - Umpolung reaction, Peterson reaction. Palladium reagents: Suzuki coupling, Heck reaction, Negishi reaction. Green Chemistry: Definition and principles, planning green synthesis in the laboratory, green preparations- aqueous reactions, solid state (solvent free) reactions, photochemical reactions, enzymatic transformations and reactions in ionic liquids.

UNIT-III

[16 HOURS]

Molecular rearrangements: Introduction Carbon to carbon migration: Pinacol-pinacolone, Wagner-Meerwein, Benzidine, benzylic acid, Favorskii, Fries rearrangement, dienophile rearrangement. Carbon to nitrogen migration: Hofmann, Curtius, Lossen, Schmidt and Beckmann rearrangements. Miscellaneous rearrangements: Wittig, Smiles, Bayer-Villeger rearrangement and Barton reaction.

Retrosynthesis: Introduction to disconnection approach: Basic principles and terminologies used in disconnection approach. One group C-X and two group C-X disconnections. Synthons and synthetic equivalents. Retrosynthesis and synthesis of benzofurans, *p*-methoxy acetophenone, saccharine, α-bisabolene, nuciferal, tetralone, ibuprofen; Functional group transformations in organic synthesis: nitro to keto, nitro to amine, acid to alcohol etc.

References

1. Organic Chemistry, VI edition, Robert T. Morrison, Robert N. Boyd.
2. Organic Chemistry, Vol-I & II by I. L. Finar.
3. Advance Organic Chemistry, IV edition, Jerry March.
4. Advance Organic Chemistry, III edition, Part-A and Part-B, Francis A. Carey and Rechard J. Sundberg.
5. Organic Chemistry, III edition, V. K. Ahluwalia and Rakesh Kumar Parashar.
6. Organic named reactions and molecular rearrangements, Gudeep Raj.
7. Modern synthetic reactions, II edition, H. O. House.
8. Organic synthesis, Jagadamba Singh and L. D. S. Yadav.
9. Green Chemistry, K. R. Desai.
10. Principles of Organic synthesis, R. O. C. Norman and J. M. Coxon.
11. Organic synthesis II edition, V. K. Aluwalia and Renu Agarwal.
12. Organic synthesis, Robert E. Ireland.
13. Schaum's outline of theory and problems of Organic Chemistry, Harbert Meislich, Howard Nechamkin and Jocob Sharefkin.
14. Organic chemistry by Clayden, Greeves, Warren and Wothers.

PRINCIPLES OF PHYSICAL CHEMISTRY
COURSE CODE: 21CHB12

Objectives

- To understand the theoretical calculations of energies of simple molecules.
- To learn the calculation of different energies by statistical thermodynamics.
- To understand the basics of polymers, their kinetics and applications.

Course Outcome

- Principles of Quantum chemistry and theoretical calculations of energies of molecules and chemical reactions.
- Apply solutions of the Schrödinger equation for simple systems (particle in a box, rigid rotor, harmonic oscillator) to real systems (vibrational, rotational, and electronic energy states) in determining the energy of stationary states.
- Explain angular momentum as possessed by atomic or molecular systems, various descriptions of how angular momentum can be coupled, and how conservation of angular momentum is important to spectroscopy.
- Concepts and applicability of statistical thermodynamics in the calculations of different energies in the reacting system. Applications of phase rule for separation of the metals from ore.
- Fundamentals of polymers and their applications in controlling the quality and waste management of polymer product.

Pedagogy

- Conventional method such as black board and chalk is used.
- Modern method like power point presentation is used in class room teaching.
- Assigning the students to solve the problems to understand the concepts.

Course content

UNIT-I

[16 HOURS]

Quantum Chemistry: Introduction to quantum mechanics: Schrödinger wave equation, time-independent and time dependent Schrödinger wave equation and the relation between their solutions. Eigen functions and Eigen values. Physical interpretation of wave function. Concept of operators – Laplacian, Hamiltonian, Linear and Hermitian operators. Angular momentum operators and their properties. Commutative and non-commutative operators. Normalization, orthogonality and orthonormality of wave functions. Postulates of quantum mechanics. Solutions of Schrödinger wave equation for free particles, particle in a ring, particle in three dimensional box. Quantum mechanical degeneracy, tunnelling (no derivation). Wave equation for H-atom, separation and solution of R, ϕ and θ equations. Application of Schrodinger equation to rigid rotator and harmonic oscillator. Eigen functions and Eigen values of angular momentum. Ladder operator method for angular momentum.

UNIT-II

[16 HOURS]

Statistical thermodynamics: Objectives of statistical thermodynamics, concept of distribution, types of ensembles. Thermodynamic probability and most probable distribution law. Partition functions – definition, evaluation of translational, rotational and vibrational and electronic partition functions for monoatomic, diatomic and polyatomic gaseous molecules. Sackur-Tetrode equation for entropy of translation function. Calculation of thermodynamic functions and equilibrium constants in terms of partition functions. Different distribution laws (Types of statistics): Maxwell-Boltzmann, Bose-Einstein and Fermi-Dirac Statistics (derivation of the three distribution laws). Comparison of Bose-Einstein and Fermi-Dirac Statistics with Maxwell-Boltzmann statistics. Problems and their solutions.

Phase rule studies: Thermodynamic derivation of phase rule. Application of phase rule to the two component systems - compound formation with congruent melting point and incongruent melting points, Roozeboom‘s classification. Application of phase rule to three component systems- systems of three liquids and systems of two salts and water.

UNIT-III

[16 HOURS]

Polymers: Fundamentals of polymers - monomers, repeat units, degree of polymerization. Linear, branched and network polymers. Classification of polymers, Polymerization - condensation, addition, free radical, ionic, co-ordination polymerization and ring opening polymerization. Molecular weight and size, polydispersion. Average molecular weight concepts – number, weight and viscosity average molecular weight. Determination of molecular weights - viscosity method, osmotic pressure method, sedimentation and light scattering methods.

Kinetics of Polymerization - Condensation, addition, free radical, ionic, co-ordination polymerization.

Phase transitions in polymers and thermal characterization: Glass transition, crystallinity and melting- correlation with the polymer structure.

Polymers in solution: Criteria of polymer solubility, thermodynamics of polymer solutions.

Colloids: Types and classification, Micelles: Surface active agents, micellization, hydrophobic interaction, critical micellar concentration (CMC), factors affecting the CMC of surfactants, micellar catalysis.

References

1. Text Book of Physical Chemistry by Samuel Glasstone, MacMillan Indian Ltd., 2nd edition (1974).
2. Quantum Chemistry – A.K. Chandra. 2nd edition, Tata McGraw Hill Publishing Co. Ltd., (1983).
3. Quantum Chemistry – Eyring, Walter and Kimball. John Wiley and Sons, Inc., New York.
4. Quantum Chemistry – I.N. Levine. Pearson Education, New Delhi, (2000).
5. Theoretical Chemistry – S. Glasstone. East West Press, New Delhi, (1973).
6. Quantum Chemistry – R.K. Prasad, New Age International Publishers, (1996).
7. Text Book of Polymer Science, F.W. Billmeyer, Jr., John Wiley, London (1994).
8. Polymer Science. V. R. Gowrikar, N.V. Vishwanathan and J. Sreedhar, Wiley Eastern, New Delhi (1990).
9. Fundamentals of Polymer Science and Engineering. A. Kumar and S.K. Gupta, Tata – McGraw Hill New Delhi (1978).
10. Polymer Characterization, D. Campbell and J.R. White, Chapman and Hall, New York.
11. Fundamental Principles of Polymer Materials, R.L. Rosen, John Wiley and Sons, New York.

MOLECULAR SYMMETRY AND SPECTROSCOPY
COURSE CODE: 21CHB13

Objectives

- To understand the concepts of symmetry and symmetry operations and their application to CFT, hybridization, MOT and vibrational spectroscopy.
- To learn the theory and applications of microwave, vibration and Raman spectroscopy.
- To understand the principles and applications of UV-Visible and resonance Raman spectroscopy.

Course outcome

- Molecular symmetry and applications of group theory to CFT, hybridization, MOT and vibrational spectroscopy.
- Theory and principles of Rotation, Vibration and Raman Spectroscopy.
- Theory and principles Electronic and Resonance Raman spectroscopy.

Pedagogy

- Conventional method such as black board and chalk is used.
- Molecular models are used to teach symmetry aspects of molecules
- Modern methods like power point presentation and animations are used in class room teaching.
- Students will be assigned to solve the numerical problems.

Course content

UNIT-I

[16 HOURS]

Molecular symmetry and group theory: Symmetry elements and symmetry operations.

The Point Groups Used with Molecules: Concept of a group, definition of a point group. Classification of molecules into point groups. Subgroups.

Hermann-Maugin symbols for point groups. Multiplication tables (C_{2V}, C_{2h} and C_{3V}). Matrix notation for the symmetry elements. Classess and similarity transformation.

Representation of groups: The Great Orthogonality theorem and its consequences.

Character tables (C_s, C_i, C_2, C_{2v}, C_{2h} and C_{3v}). Symmetry and dipole moment.

Applications of group theory: Group theory and hybrid orbitals.

Symmetry in Chemical bonding: Group theory to Crystal field theory and Molecular orbital theory (octahedral and tetrahedral complexes).

Symmetry in Vibrational Spectroscopy: Determining the symmetry groups of normal modes for non-linear molecules (H_2O, NH_3, CH_4, trans-N_2F_2) and linear molecules (CO, HCl, HCN and CO_2) (Integration method).

UNIT-II

[16 HOURS]

Microwave spectroscopy: Rotation spectra of diatomic Molecules - rigid and non rigid rotator model. Rotational quantum number and the selection rule. Effect of isotopic substitution on rotation spectra. Classification of polyatomic molecules based on moment of inertia. Rotation spectra of polyatomic molecules (OCS CH_3F and BCl_3). Moment of inertia expression for linear tri-atomic molecules. Applications - Principles of determination of Bond length and moment of inertia from rotational spectra. Stark effect in rotation spectra and determination of dipole

moments.

Vibration spectroscopy*:* Vibration of diatomic molecules, vibrational energy curves for simple harmonic oscillator. Effects of anharmonic oscillation, expressions for fundamental and overtone frequencies. Vibration - rotation spectra of carbon monoxide. Vibration of polyatomic molecules – The number of degrees of freedom of vibration. Parallel and perpendicular vibrations (CO_2 and H_2O). Combination, difference and hot bands. Fermi resonance. Force constant and its significance. Theory of infrared absorption and theoretical group frequency. Intensity of absorption band and types of absorptions. Applications: Structures of small molecules: XY_2 – linear or bent, XY_3 – planar or pyramidal.

Raman spectroscopy: Introduction, Raman and Rayleigh scattering, Stokes and anti-Stokes lines, polarization of Raman lines, depolarization factor, polarizability ellipsoid. Theories of Raman spectra - classical and quantum theory. Rotation-Raman and vibration-Raman spectra. Raman activity of vibrations, rule of mutual exclusion principle. Vibration modes of some simple molecules and their activity.

UNIT-III

[16 HOURS]

UV Visible spectroscopy: Quantitative aspects of absorption – Beer's law, Technology associated with absorption measurements. Limitations – real, chemical, instrumental and personal. Theory of molecular absorption. Vibration-rotation fine structure of electronic spectra. Types of absorption bands: n to π^*, π to π^*, n to σ^* and σ to σ^*, C-T and ligand field. Instrumentation.

Applications: Qualitative and quantitative analysis of binary mixtures, measurements of dissociation constants of acids and bases, determination of molecular weight. Woodwards empirical rules for predicting the wavelength of maximum absorption for olefins, conjugated dienes, cyclic trienes and polyenes, α,ß-unsaturated aldehydes and ketones, benzene and substituted benzene rings.

Resonance Raman Spectroscopy: Resonance Raman Effect and its applications. Non-linear Raman effects: Hyper, stimulated and inverse Raman effects. Coherent Anti-Stokes Raman Scattering and its applications.

References

1. Chemical Applications of Group Theory, 3rd edition, F.A. Cotton, John Wiley and
2. Sons (2006).
3. Molecular Symmetry and Group Theory – Robert L Carter, John Wiley and Sons (2005).
4. Symmetry in Chemistry - H. Jaffe and M. Orchin, John Wiley, New York (1965).
5. Molecular Symmetry – David J. Willock, John Wiley and Sons Ltd., (2009).
6. Group Theoryand its Chemical Applications - P.K. Bhattacharya, Himalaya Publications, New Delhi (1998).
7. Fundamentals of Molecular Spectroscopy, C.N. Banwell and E.M. McCash. 4th edition, Tata McGraw Hill, New Delhi.
8. Fundamentals of molecular spectroscopy, G. M. Barrow, MgGraw Hill, New York (International students Edition), 1974.
9. Theoretical chemistry, S. Glasstone, affiliated East-West Press Pvt. Ltd, New Delhi,

1973.
10. Spectroscopy, B.P. Straughan and S. Walker, John Wiley & Sons Inc., New York, Vol. 1 and 2, 1976.
11. Vibration Spectroscopy Theory and Applications, D.N. Satyanarayana, New Age International, New Delhi (2004).
12. Spectroscopy, B.P. Straughan and S. Salker, John Wiley and Sons Inc., New York, Vol.2, 1976.
13. Organic Spectroscopy, William Kemp, English Language Book society, Macmillan, 1987.
14. Instrumental methods of analysis, H. H. Willard, L. L. Merritt and J. A. Dean, 7th Edition, 1988.
15. Physical methods in inorganic chemistry, R. S. Drago, affiliated East-West press Pvt. Ltd., (Student Edition) 1978.

SOFT CORE
ANALYTICAL CHEMISTRY PRACTICALS

COURSE CODE: 21CHB50 [128 HOURS]

Safety measures in the laboratory; MSDS; reporting of values.

Course Objective

- To understand basic concepts by carrying out analytical experiments.
- The experimental results are subjected to validation of analytical parameters

Course Outcomes

- After studying this course the student to:
- Analyze various samples with different classical and simple instrumental skills.
- Obtain knowledge for selection of analytical methods with suitable technique being adopted for the analysis different samples like, water, laboratory chemicals and reagents, body fluids such as urine etc.
- Distinguish classical and instrumental methods.
- Propose and conduct experiment for quantification of individual analytes

Pedagogy

- Computer aided applications for the evaluation of experimental results.
- Each student performs experiments as per the protocol in practical classes.

PART – I

1. Determination of total acidity of vinegar and wines by acid-base titration.
2. Determination of purity of a commercial boric acid sample, and Na_2CO_3 content of washing soda.
3. Determination of relative equivalent weight of a weak organic acid by titration with NaOH.
4. Determination of ephedrine and aspirin in their tablet preparations by residual acid-base titrimetry.
5. Determination of carbonate and bicarbonate in a mixture by *p*H-metric titration and comparison with visual acid-base titration.

6. Determination of carbonate and hydroxide-analysis of a commercial washing soda by visual and *p*H-titrimetry.
7. Determination of purity of a commercial sample of mercuric oxide by acid-base titration.
8. Determination of benzoic acid in food products by titration with methanolic KOH in chloroform medium using thymol blue as indicator.
9. Determination of the *p*H of hair shampoos and *p*H determination of an unknown soda ash.
10. Analysis of water/ waste water for acidity by visual, *p*H metric and conductometric titrations.
11. Analysis of water/ waste water for alkalinity by visual, *p*H metric and conductometric titrations.
12. Determination of ammonia in house-hold cleaners by visual and conductometric titration.
13. Determination of chromate and dichromate in mixture by acid-base titration: visual and pH metric methods.
14. Potentiometric determination of the equivalent weight and Ka for a pure unknown weak acid.
15. Determination of purity of aniline by non-aqueous acid-base titration by visual and potentiometric methods.
16. Determination of purity of ethylene glycol and glycerol by oxidimetric method using periodate (Malprade reaction).
17. Spectrophotometric determination of creatinine and phosphorus in urine.
18. Flame emission spectrometric determination of sodium, potassium and calcium in river/ lake water.

PART – II

1. Determination of percentage of chloride in a sample by precipitation titration- Mohr, Volhard and Fajan's methods.
2. Determination of silver in an alloy and Na_2CO_3 in soda ash by Volhard method.
3. Mercurimetric determination of chloride in blood or urine.
4. Determination of total hardness, calcium and magnesium hardness and carbonate and bicarbonate hardness of water by complexation titration using EDTA.
5. Determination of calcium in calcium gluconate/ calcium carbonate tablets/ injections and of calcium in milk powder by EDTA titration.
6. Determination of zinc in a sample of foot powder and thallium in a sample of rodenticide by EDTA titration.
7. Analysis of commercial hypochlorite and peroxide solution by iodometric titration.
8. Determination of copper in an ore/ an alloy by iodometry and tin in stibnite by iodimetry.
9. Determination of ascorbic acid in vitamin C tablets by titrations with $KBrO_3$ and of vitamin C in citrus fruit juice by iodimetric titration.
10. Determination of iron in razor blade by visual and potentiometric titration using sodium metavanadate.
11. Determination of iron in pharmaceuticals by visual and potentiometric titration using cerium(IV) sulphate.

12. Determination of nickel in steel by synergic extraction and boron in river water/ sewage using ferroin.
13. Determination of total cation concentration of tap water by ion-exchange chromatography.
14. Determination of magnesium in milk of magnesium tablets by ion-exchange chromatography.
15. Cation exchange chromatographic separation of cadmium and zinc and their estimation by EDTA titration.
16. Gas chromatographic determination of ethanol in beverages.
17. Solvent extraction of zinc and its spectrophotometric determination.
18. Anion exchange chromatographic separation of zinc and magnesium followed by EDTA titration of the metals.
19. Separation and determination of chloride and bromide on an anion exchanger.
20. Separation of *o*- and *p*-nitroaniline and analysis by thin layer chromatography.

References

1. Fundamental of Analytical Chemistry, D.A. Skoog, D.M. West, Holler and Crouch 8th edition, 2005, Saunders College Publishing, New York.
2. Analytical Chemistry, G.D. Christian, 5th edition, 2001 John Wiley & Sons, Inc, India.
3. Quantitative Analysis, R.A. Day and A.L. Underwood, 6th edition, 1993, Prentice Hall, Inc. New Delhi.
4. Vogel's Textbook of Quantitative Chemical Analysis, J. Mendham, R.C. Denney, J.D. Barnes and M.J.K. Thomas, 6th edition, Third Indian Reprint, 2003, Pearson Education Pvt. Ltd., New Delhi.
5. Analytical Chemistry Principles, John H. Kennedy, 2nd edition, Saunders College Publishing, California, 1990.
6. Practical Clinical biochemistry methods and interpretations, R. Chawla, J.P. Bothers Medical Publishers (P) Ltd., 1995.
7. Laboratory manual in biochemistry, J. Jayaraman, New Age International Publishers, New Delhi, 1981.
8. Practical Clinical Biochemistry by Harold Varley and Arnold.Heinmann, 4th edition.

INORGANIC CHEMISTRY PRACTICALS

COURSE CODE: 21CHB51 [128 HOURS]

Objectives

- To understand basic concepts by carrying out different experiments.
- To develop the skill for the qualitative and quantitative analysis of various samples.

Course Outcome

- Determination of various analytes presents in different ore samples by volumetric, gravimetric and spectrophotometric methods.
- The chemistry of redox, complexometric and indirect methods
- The principle in the semi-micro analysis of an inorganic salt mixture

Pedagogy

- Each student performs experiments as per the protocol in practical classes.
- Handling the instrument and pyrolysis for quantitative determination of analyte.

Course experiments

PART – A

1. Determination of iron in haematite using cerium (IV) solution (0.02M) as the titrant, and gravimetric estimation of insoluble residue.
2. Estimation of calcium and magnesium carbonates in dolomite using EDTA titration, and gravimetric analysis of insoluble residue.
3. Determination of manganese dioxide in pyrolusite using permanganate titration.
4. Quantitative analysis of copper-nickel in alloy/mixture:
    a. Copper volumetrically using KIO_3.
    b. Nickel gravimetrically using DMG
5. Determination of lead and tin in a mixture: Analysis of solder using EDTA titration.
6. Quantitative analysis of chloride and iodide in a mixture:
    a. Iodide volumetrically using KIO_3
    b. Total halide gravimetrically
7. Gravimetric analysis of molybdenum with 8-hydroxyquinoline.
8. Quantitative analysis of copper(II) and iron(II) in a mixture:
    a. Copper gravimetrically as CuSCN and
    b. Iron volumetrically using cerium(IV) solution
9. Spectrophotometric determinations of:
    e. Titanium using hydrogen peroxide
    f. Chromium using diphenyl carbazide in industrial effluents
    g. Iron using thiocyanate/1,10-phenanthroline method in commercial samples
    h. Nickel using dimethylglyoxime in steel solution
10. Micro-titrimetric estimation of :
    c) Iron using cerium(IV)
    d) Calcium and magnesium using EDTA
11. Quantitative estimation of copper (II), calcium (II) and chloride in a mixture.
12. Circular paper chromatographic separation of: (Demonstration)
    c. Iron and nickel
    d. Copper and nickel

PART – B

Semimicro qualitative analysis of inorganic mixtures containing **TWO** anions and **TWO** cations (excluding sodium, potassium and ammonium cations) and **ONE** of the following less common cations: W, Mo, Ce, Ti, Zr, V and Li.

References

1. Vogel's Text Book of Quantitative Chemical Analysis – 5th edition, J. Basset, R.C. Denney, G.H. Jeffery and J. Mendhom.
2. A Text Book of Quantitative Inorganic Analysis by A.I. Vogel, 3rd edition.
3. Spectrophotometric Determination of Elements by Z. Marczenko.
4. Vogel's Qualitative Inorganic Analysis – Svelha.
5. Macro and SemimicroInorganicQualitative Analysis by A.I. Vogel.
6. Semimicro Qualitative Analysis by F.J. Welcher and R.B. Halin.
7. Quantitative Chemical Analysis by Daniel C. Harris, 7th edition, (2006).

ORGANIC CHEMISTRY PRACTICALS

COURSE CODE: 21CHB52 [128 HOURS]

Objectives

- To understand synthetic methods by carrying out different experiments.
- To develop the skill for the separation and qualitative analysis of binary mixtures of organic compounds.

Course Outcome

- Students are involved in the multi-step synthesis of different organic compounds.
- Understand the qualitative analysis of binary mixture of organic compounds through separation, identification of functional groups and preparation of solid derivatives.

Pedagogy

- Each student performs experiments as per the protocol in practical classes.
- Experimental setup for the synthesis of organic compounds by every individual.

Course experiments

PART-A

Safety measures in the laboratory; MSDS; reporting of values and demonstration of KingDraw/ ChemDraw

Multistep synthesis

1. Preparation *p*-bromoaniline from acetanilide**.**
2. Preparation of *n*-butyl bromide from *n*-butyl alcohol.
3. Oxidation of cyclohexanol to adipic acid.
4. Esterification: Preparation of benzoccaine from *p*-nitrotoluene.
5. Diazotization (Sandmeyer‘s reaction): Preparation of *p*-chlorobenzoic acid from *p*-toluidine.
6. Preparation benzilic acid from benzoin**.**
7. Preparation of *o*-hydroxy benzophenone from phenyl benzoate *via* Fries rearrangement.
8. Preparation of benzanilide from benzophenone oxime *via* Beckmann rearrangement.
9. Preparation of benzoic acid from benzaldehyde (Cannizzaro Reaction).
10. Preparation of 2,4-dinitrophenylhydrazine from 2,4-dinitrochlorobenzene.
11. Preparation of *m*-nitrobenzoic acid from methylbenzoate.
12. Preparation of chalcone.

PART-B

Qualitative analysis: Separation of binary mixtures, identification of functional groups and preparation of suitable solid derivatives.

References

1. Vogel' text book of practical organic chemistry, V edition, B. S. Furniss, A. J. Hannaford, P. W. G. Smith, A. R. Tatehell.
2. Elementary practical organic chemistry, Part-I: Small scale preparations, Part-II: Qualitative organic analysis, By Arthur I, Vogel.
3. Hand book of organic analysis, H. T. Clarke and Norman Collie.
4. Experiments in Organic Chemistry, Louis F. Fieser.
5. Laboratory manual of Organic Chemistry by B. B. Dey and M. V. Sitaraman.
6. Practical Organic Chemistry by Mann F. G. and Saunders.

PHYSICAL CHEMISTRY PRACTICALS
COURSE CODE: 21CHB53 [128 HOURS]

Objectives

- To understand the rate of chemical reactions and factors influencing the reaction rate by carrying out kinetic experiments.
- To understand basic concepts of electrochemistry by carrying out experiments.

Course Outcome

- After the completion of this course, the students can able to develop the experimental skill and theoretical interpretation of experimental results of many physical chemistry experiments of chemical kinetics in solution phase, thermodynamics, electrochemistry and spectrophotometry.
- This helps in academics, research and industries.

Pedagogy

- Each student performs experiments as per the protocol in practical classes.
- To optimize the reaction conditions for understanding the rate of chemical reactions.

Course experiments

PART - A

1. Study of kinetics of hydrolysis of methyl acetate in presence of two different concentrations of HCl/H_2SO_4 and report the relative catalytic strength.
2. Study of kinetics of reaction between $K_2S_2O_8$ and KI, first order, determination of rate constants at two different temperatures and E_a.
3. To study the kinetics of saponification of ethyl acetate by conductivity method at two different concentrations of NaOH and report the relative catalytic strength.
4. Determination of partial molar volume of salt-water system ($NaCl-H_2O/KCl-H_2O/KNO_3-H_2O$) systems.
5. To study the kinetics of reaction between acetone and iodine - determination of order of reaction with respect to iodine and acetone.
6. Study the kinetics of decomposition of diacetone alcohol by NaOH, determine the catalytic coefficient of the reaction and comparison of strength of alkali.
7. Determination of energy of activation for the bromide-bromate reaction.
8. Kinetics of reaction between sodium formate and iodine and determination of energy of activation.
9. Determination of heat of solution of organic acid (benzoic acid/salicylic acid) by variable temperature method (graphical method).
10. Determination of degree of association of benzoic acid in benzene by distribution method.
11. To determine the eutectic point of a two component system (Naphthalene-*m*-dinitrobenzene system).
12. Analysis of a binary mixture (Gylcerol & Water) by measurement of refractive index.
13. Determination of the molecular weight of a polymer material by viscosity measurements (cellulose acetate/methyl acrylate).

PART – B

1. Conductometric titration of a mixture of HCl and CH_3COOH against NaOH.
2. Conductometric titration of sodium sulphate against barium chloride.
3. pH titration of (a) HCl against NaOH (b) Copper sulphate against NaOH and (c) $CH_3COOH/HCOOH$ against NaOH - determination of K_a.
4. Determination of equivalent conductance of weak electrolyte (CH_3COOH) at infinite

dilution following Kohlrausch law.

5. Determination of dissociation constant and mean ionic activity coefficient of weak acids (CH_3COOH/HCOOH/$ClCH_2COOH$) by conductivity method.
6. Potentiometric titration of KI *vs* $KMnO_4$ solution.
7. Determination of dissociation constant of a weak acid (CH_3COOH/HCOOH/$ClCH_2COOH$) by potentiometric method.
8. Potentiometric titration of a mixture of halides (KCl+KI/KCl+KBr/KBr+KI) against $AgNO_3$.
9. To obtain the absorption spectra of coloured complexes, verification of Beer's law and estimation of metal ions in solution using a spectrophotometer.
10. Potentiometric titration of $K_2Cr_2O_7$ against FAS determination of redox potential and concentration of Fe^{2+} ions.
11. Conductometric titration of oxalic acid against NaOH and NH_4OH.
12. Coulometric titration I_2 vs $Na_2S_2O_3$.
13. Determination of acidic and basic dissociation constant and isoelectric point of an amino acid by pH metric method.
14. Kinetics of photodegradation of indigocarmine (IC) using ZnO/TiO_2 as photocatalyst and study the effect of [ZnO/TiO_2] and [IC] on the rate of photodegradation.

References

1. Practical Physical Chemistry – A.J. Findlay.
2. Experimental Physical Chemistry – F. Daniels *et al*.
3. Selected Experiments in Physical Chemistry – Latham.
4. Experiments in Physical Chemistry – James and Prichard.
5. Experiments in Physical Chemistry – Shoemaker.
6. Advanced Physico-Chemical Experiments – J. Rose.
7. Practical Physical Chemistry – S.R. Palit.
8. Experiments in Physical Chemistry – Yadav, Geol Publishing House.
9. Experiments in Physical Chemistry – Palmer.
10. Experiments in Chemistry – D.V. Jahagirdar, Himalaya Publishing House, Bombay, (1994).
11. Experimental Physical Chemistry – R.C. Das and B. Behera, Tata Mc Graw Hill.

SOFT CORE PAPERS

TITRIMETRIC ANALYSIS

COURSE CODE: 21CHB54

Objective

- To familiarize statistical methods to validate analytical methods.
- To learn sampling techniques and conventional volumetric methods.

Course Outcome

After studying this course the student able to:

- Understand on quantitative and qualitative methods of analysis with relevant equilibrium chemistry.
- Develop the ideas with the fundamental aspects in analytical chemistry.
- Build the interest in students in developing good experimental protocols, and in interpreting

experimental results.

- Gain analytical knowledge for the quantitative analysis of various samples of different origin under titrimetric aspects.
- Learn statistical aspects from which the spirit of assessing the results will be enhanced.
- Learn method development and validation features so that they will become outstanding basement for their career in various industries.

Pedagogy

- Conventional method such as black board and chalk is used.
- Modern methods like power point presentation and animations are used in class room teaching.

Unit-I

Titrimetric analysis: An overview of titrimetry. Principles of titrimetric analysis. Titration curves. Titrations based on acid-base reactions-titration curves for strong acid and strong base, weak acid and strong base and weak base and strong acid titrations. Selecting and evaluating the end point. Finding the end point by visual indicators, monitoring *p*H and temperature. Quantitative applications – selecting and standardizing a titrant, inorganic analysis-alkalinity, acidity and free CO_2 in water and waste waters, nitrogen, sulphur ammonium salts, nitrates and nitrites, carbonates and bicarbonates. Organic analysis-functional groups like carboxylic acid, sulphonic acid, amine, ester, hydroxyl, carbonyl. Air pollutants like SO_2. Quantitative calculations. Characterization applications-equivalent weights and equilibrium constants.

Acid-base titrations in non-aqueous media: Role of solvent in acid-base titrations, solvent systems, differentiating ability of a solvent, some selected solvents, titrants and standards, titration curves, effect of water, determining the equivalence point, typical applications-determination of carboxylic acids, phenols and amines.

Precipitation titrations: Titration curves, feasibility of precipitation titrations, factors affecting shape - titrant and analyte concentration, completeness of the reaction, titrants and standards, indicators for precipitation titrations involving silver nitrate, the Volhard, the Mohr and the Fajan's methods, typical applications.

[16 HOURS]

UNIT – II

Complexometric titrations: Complex formation reactions, stability of complexes, stepwise formation constants, chelating agents, EDTA - acidic properties, complexes with metal ions, equilibrium calculations involving EDTA, conditional formation constants, derivation of EDTA titration curves, effect of other complexing agents, factors affecting the shape of titration curves - completeness of reaction, indicators for EDTA titrations - theory of common indicators, titration methods employing EDTA - direct, back and displacement titrations, indirect determinations, titration of mixtures.

Redox titrations: Balancing redox equations, calculation of the equilibrium constant of redox reactions, calculating titration curves, detection of end point, visual indicators and potentiometric end point detection. Quantitative applications - adjusting the analyte's oxidation state, selecting and

standardizing a titrant. Inorganic analysis - chlorine residuals, dissolved oxygen in water, water in non-aqueous solvents. Organic analysis - chemical oxygen demand (COD) in natural and waste waters, titrations of mercaptans and ascorbic acid with I_3^- and titration of organic compounds using periodate.

Automatic titrators: Principles and theory of CO_2, sulphate, chloride and Karl Fisher titrators.

[16 HOURS]

References

1. Fundamental of Analytical Chemistry, D.A. Skoog, D.M. West, Holler and Crouch, 8th edition, 2005, Saunders College Publishing, New York.
2. Analytical Chemistry, G.D. Christian, 5th edition, 2001, John Wiley & Sons, Inc, India.
3. Quantitative Analysis, R.A. Day and A.L. Underwood, 6th edition,1993,Prentice Hall, Inc. New Delhi.
4. Vogel's Textbook of Quantitative Chemical Analysis, J. Mendham, R.C. Denney, J.D. Barnes and M.J.K. Thomas, 6th edition, Third Indian Reprint, 2003, Pearson Education Pvt. Ltd., New Delhi.
5. Analytical Chemistry Principles, John H. Kennedy, 2nd edition, Saunders CollegePublishing, California, 1990.
6. Principles and Practice of Analytical Chemistry, F.W. Fifield and Kealey, 3rd edition, 2000, Blackwell Sci., Ltd. Malden, USA.
7. Modern Analytical Chemistry, David Harvey, McGraw Hill, New Delhi, 2000.

CHEMISTRY OF SELECTED ELEMENTS
COURSE CODE: 21CHB55

Objectives

- To learn basic chemistry of some selected group elements from periodic table.
- To understand properties of metal-metal bonding and cluster compounds.

Course outcome

- Understand the chemistry of hydrogen and group 2 elements.
- The chemistry of pseudohalogens, interhalogens and their halogen compounds.
- The chemistry of xenon and other noble gas compounds.

Pedagogy

- Conventional method such as black board and chalk is used.
- Modern methods like power point presentation and animations are used in class room teaching.Course content

UNIT-I

Compounds of hydrogen: The hydrogen and hydride ions, Dihydrogen and hydrogen bonding. Classes of binary hydrides: Molecular hydrides, saline hydrides and metallic hydrides.

The Group 1 elements: Occurrence, extraction and uses. Simple compounds: Hydrides, halides, oxides, hydroxides, oxoacids, nitrides, solubility and hydration and solutions in liquid ammonia. Coordination and organometallic compounds. Applications.

The Group 2 elements: Occurrence, extraction and uses. General properties. Halides, hydrides

and salts of oxo acids. Complex ion in aqueous solution and complexes with amido and alkoxy ligands.

The Group 15 elements: Introduction, oxides and oxoacids of nitrogen and phosphorus.

[16 HOURS]

UNIT-II

The Group 17 elements: Occurrence, recovery and uses. Trends in properties and pseudohalogens. **Interhalogens**: Physical properties and structures, chemical properties, cationic interhalogens. **Compounds with oxygen**: Halogen oxides, oxoacids and oxoanions**.** Trends in rates of redox reactions and redox properties of individual oxidation states**.**

Chemistry of astatine.

The Group 18 elements: Occurrence, recovery and uses. Synthesis and structure of xenon fluorides, Reaction of xenon fluorides, xenon-oxygen compounds, Organoxenon compounds, other compounds of noble gases.

M-M bonds: Multiple metal-metal bonds.

Cluster compounds: carbonyl and carbide clusters.

References

1. Basic Inorganic Chemistry – 3rd edition. F.A. Cotton, G. Wilkinson and P.L. Gaus, John
2. Wiley and Sons (2002).
3. Inorganic Chemistry, 3rd edition. James E. Huheey, Harper and Row Publishers (1983).
4. Inorganic Chemistry, 3rd edition. G.L. Miessler and D.A. Tarr, Pearson Education (2004).
5. Inorganic Chemistry, 4th edition. C.E. Housecroft and A.G. Sharpe, Pearson Education Ltd. (2012).
6. Chemistry of the Elements – N.N. Greenwood and A. Earnshaw, Pergamon Press (1985).
7. Inorganic Chemistry, 6th edition. D.F. Shriver, M. Weller. T. Overton, J. Rourke and F.

CHEMISTRY OF NATURAL PRODUCTS-I
COURSE CODE: 21CHB56

Objectives

- To learn the nomenclature, classification, purification, structure and synthesis of some natural products.
- To understand the biological functions of biomolecules.

Course Outcome

- Acquire the knowledge of chemistry of lipids, prostaglandins and terpenoids.
- Understand the biological importance of chlorophyll and porphyrins.
- Chemistry of flavonoids and isoflavonoids.

Pedagogy

- Conventional method such as black board and chalk is used.
- Modern method like power point presentation is used in class room teaching.

Course content

UNIT-I

[16 HOURS]

Lipids: Nomenclature, classification, purification, structure and synthesis of fatty acids, phospholipids, sphingolipids. Biological importance of lipids (Lecithin, sphingolipids, oils and fats).

Prostaglandins: Introduction, classification and biological importance of PG's. Constitution of PGE1. Synthesis of PGE & F series.

Terpenoids: Introduction, classification and general methods of structural elucidation. Chemistry of pinene, camphor, caryophyllene, santonin. Biosynthesis of terpenoids.

UNIT-II

[16 HOURS]

Porphyrins: Introduction, structure and biological functions of haemin. Vitamin B12: structure and as coenzyme in molecular rearrangement reactions; Chlorophyll: structure and biological importance.

Flavonoids and Isoflavonoids: Occurrence, nomenclature and general methods of structure determination. Isolation and synthesis of Apigenin, Luteolin, Kaempferol, Quercetin, wedelolactone, Butein, Daidzein. Biosynthesis of flavonoids and isoflavonoids: Acetate Pathway and Shikimic acid Pathway. Biological importance of flavonoids and isoflavonoids

References

1. Organic Chemistry, VI edition, Robert T. Morrison, Robert N. Boyd.
2. Organic Chemistry, Vol-II by I. L. Finar.
3. Schaum's outline of theory and problems of Organic Chemistry, Harbert Meislich, Howard Nechamkin and Jocob Sharefkin.
4. Natural products: Their chemistry and biological significance, J. Mann, R. S. Davidson, J. B. Banthorpe and J. B. Harborne.
5. Synthetic drugs, Gurdeep R. Chatwal.
6. Heterocyclic chemistry by Achison.
7. Heterocyclic chemistry by Smith and Joule.
8. Heterocyclic chemistry by Pacquete.

BIOPHYSICAL CHEMISTRY

COURSE CODE: 21CHB57

Objectives

- To understand the physico-chemical principles of biological fluids.
- To learn the pharmacokinetics, pharmacodynamics, toxicokinetics of biological systems.

Course Outcome

- After the completion of this course, the students gain the knowledge on theory and principles of biophysical chemistry and pharmacokinetics.
- This course helps to understanding the bio-availability and different pharmacokinetic parameters of drugs in the living system.

Pedagogy

- Conventional method such as black board and chalk is used.
- Modern methods like power point presentation and animations are used in class room teaching.

Course content

UNIT-I

[16 HOURS]

Biophysical Chemistry: Electrophoresis - Principles of free electrophoresis, zone electrophoresis, gel electrophoresis and its applications in qualitative and quantitative study of proteins. Determination of isoelectric point of a protein. Electro-osmosis and streaming potential and its biological significance. Biological significance of Donnan membrane phenomenon. Micelles and its involvement during digestion and absorption of dietary lipids. Diffusion of solutes across bio-membranes and its application in the mechanism of respiratory exchange. –Salting In‖ and –Salting Out‖ of proteins. Osmotic behaviour of cells and osmo-regulation and its application in the evolution of excretory systems of organisms. Effect of temperature and *p*H on the viscosity of bio-molecules (albumin solution). Significance of viscosity in biological systems - mechanism of muscle contraction, polymerization of DNA and nature of blood flow through different vessels. Effect of temperature, solute concentration (amino acids) on surface tension. Biological significance of surface tension - stability of Alveoli in lungs, interfacial tension in living cells (Danielli and Davson model). Application of sedimentation velocity and sedimentation equilibrium method for molecular weight determination of proteins.

UNIT-II

[16 HOURS]

Pharmacokinetics: Introduction, biopharmaceutics, pharmacokinetics, clinical pharmacokinetics, pharmacodynamics, toxicokinetics and clinical toxicology. Measurement of drug concentration in blood, plasma or serum. Plasma level-time curve, significance of measuring plasma drug concentrations.

One compartment open model: Intravenous route of administration of drug, elimination rate constant, apparent volume of distribution and significance. Calculation of elimination rate constant from urinary excretion data, clinical application.

Two compartment model: Plasma level-time curve, relationship between tissue and plasma drug concentrations, Apparent volumes of distribution. Drug clearance, clinical example. Plasma level-time curve for a three compartment open model.

Drug absorption: Factors affecting the rate of drug absorption - nature of the cell membrane, Route of drug administration - Oral drug absorption, Intravenous infusion and intravenous solutions, Effect of food on gastrointestinal drug absorption rate.

References

1. Introduction to Physical Organic Chemistry, R.D. Gilliom, Madison – Wesley, USA (1970).
2. Physical Organic Chemistry- Reaction Rate and Equilibrium Mechanism – L.P. Hammett, McGraw HillBook, Co., (1970).
3. Biophysical Chemistry- Principle and Technique – A. Upadhyay, K. Upadhyay and N. Nath, Himalaya Publishing House, Bombay, (1998).
4. Essentials of Physical Chemistry and Pharmacy – H. J. Arnikar, S. S. Kadam, K.N. Gujan, Orient Longman, Bombay, (1992).
5. Applied Biopharmacokinetics and Pharmacokinetics - Leon Shargel, Andrew YuPrentice-Hall International, Inc (4^{th} edition).
6. Essentials of Physical Chemistry and Pharmacy – H.J. Arnikar, S.S. Kadam, K.N. Gujan, Orient Longman, Bombay, (1992).

THIRD SEMESTER

ADVANCED INORGANIC CHEMISTRY
COURSE CODE: 21CHC10

Objectives

- To understand the fundamental concepts of organometallic chemistry and general principles of homogeneous and heterogeneous catalysis.
- To learn the concepts of metal clusters, silicates and silicones.

Course Outcome

- Fundamental concepts of organometallic chemistry and synthesis, structure and bonding in different organometallics and their applications.
- Homogeneous and heterogeneous catalysts and their applications in the synthesis of organic compounds in industries.
- Chemistry of main group elements, metal clusters, silicates and silicones and their applications in day to day life.

Pedagogy

- Conventional method such as black board and chalk is used.
- Modern methods like power point presentation and animations are used in class room teaching.

Course content

UNIT-I

[16 HOURS]

Fundamental concepts: Introduction, Classification of organometallic compounds by bond type, nomenclature, the effective atomic number rule, complexes that disobey the EAN rule, common reactions used in complex formation.

Organometallics of transition metals: Preparation, bonding and structures of nickel, cobalt, iron and manganese carbonyls. Preparation and structures of metal nitrosyls.

Ferrocene: Preparation, structure and bonding**. Metal-carbene and metal-carbyne complexes**. **Complexes containing alkene, alkyne, arene and allyl ligands**: Preparation, structure and bonding.

UNIT-II

[16 HOURS]

General principles of Catalysis: Language of catalysis. Homogeneous and heterogeneous catalysts.

Homogeneous catalysis - Industrial Applications: Alkene hydrogenation and hydroformylation, The Wacker‘s process, Monsanto acetic acid process and L-DOPA synthesis, alkene oligomerizations, water-gas shift reactions. The Reppe reaction.

Heterogeneous catalysis –The nature of heterogeneous catalysts. Alkene polymerization: Ziegler-Natta catalysis, Fischer-Tropsch carbon chain growth. New directions in heterogeneous catalysis.

Zeolites as catalysts for organic transformation: Uses of ZSM – 5.

Alkene metathesis, hydroboration, arylation or vinylation of olefins (Heck reaction).

Biological and Medicinal Applications: Organomercury, organoboron, organosilicon and organoarsenic compounds.

UNIT-III

[16 HOURS]

Chemistry of main group elements: Diborane and its reactions, polyhedral boranes(preparation, properties, structure and bonding). Wade‘s rules, carboranes andmetallocarboranes. Borazines. Phosphazenes, S-N compounds.

Metal clusters: Evidences and factors favoring of M-M bonding, Wade‘s-Mingo‘s-Lauherrules, bi, tri, tetra, penta and hexa nuclear metal carbonyl clusters.

Low and high nuclearity carbonyl clusters. Electron counting schemes in carbonyl clusters. The isolobal analogy.

Silicates: Structure, classification - silicates with discrete anions, silicates containing chain anion, silicates with layer structure, silicones with three dimensional net-work and applications.

Silicones: General methods of preparation, properties. Silicone polymers - silicone fluids, silicone greases, silicone resins, silicone rubbers and their applications.

References

1. Organometallic Chemistry, 2nd edition, R.C. Mehrothra and A. Singh, New Age International Publications (2006).
2. Fundamental Transition Metal Organometallic Chemistry - Charles M. Lukehart, Brooks, Cole Publishing Company (1985).
3. The Organometallic Chemistry of the Transition Metals, 4th edition, Robert H. Crabtree, Wiley Interscience, (2005).
4. Organometallics - A Concise Introdution, 2nd edition, ChistophElschenbroich and Albert Salzer VCH, (1992).
5. Inorganic Chemistry, 2nd edition, C.E. Housecroft and A.G. Sharpe, Pearson Education Ltd., (2005).
6. Inorganic Chemistry- 3rd edition, G.L. Miessler and D.A. Tarr, Pearson Education,(2004).
7. Basic Organometallic Chemistry - B.D. Gupta and A.J. Elias, Universities Press (2010).
8. Inorganic Chemistry Principles of Structure and Reactivity: James E. Huheey, Ellen A.
9. Keiter, Richard L. Keiter, Okhil K. Medhi, Delhi University, New Delhi (2006)
10. Chemistry of the Elements – N.N. Greenwood and A. Earnshaw, Pergamon Press (1985).
11. Inorganic Chemistry, 6th edition. D.F. Shriver, M. Weller. T. Overton, J. Rourke and F. Armastrong, Oxford University Press (2014).
12. Organometallic Chemistry and Catalysis, Didier Astruc, Springer (2007).
13. Transition Metal Organometallic Chemistry, Francois Mathey, Springer (2013).

ORGANOMETALLIC AND PHOTOCHEMISTRY
COURSE CODE: 21CHC11

Objectives

- To understand the fundamental concepts of photochemistry and pericyclic reactions.
- To learn the synthesis and reactions of organometallic compounds.
- To learn the asymmetric synthesis of organic compounds.

Course Outcome

- Basic concepts of photochemistry and pericyclic reactions and their usefulness in the synthesis of many organic compounds.
- Synthesis of organic compounds using different organometallic compounds as catalysts.
- Asymmetric synthesis of organic compounds using chiral compounds.

Pedagogy

- Conventional method such as black board and chalk is used.
- Modern methods like power point presentation is used in class room teaching.

Course content

UNIT-I

[16 HOURS]

Photochemistry: Light absorption and electronic transitions, Jablonski diagram, intersystem crossing, energy transfer, sensitizers, quenchers. Photochemistry of olefins, conjugated dienes, aromatic compounds, ketones-Norrish type-I and Norrish type-II reactions, enones, Paterno-Buchi reaction, di-pi methane rearrangement, photooxidation, photoreduction.

Pericyclic reactions: Electrocyclic reactions: Stereochemistry, symmetry and Woodward-Hofmann rules for electrocyclic reactions, FMO theory of electrocyclic reactions, correlation diagram for butadiene to cyclobutene and hexatriene to cyclohexadiene systems. Cycloaddition reactions: Classification, analysis by FMO and correlation diagram method. Cycloaddition reactions: [2+2] and [4+2] cycloadditions-FMO and correlation diagram method, Deil's-Alder reaction, hetero Diels-Alder reaction and their applications. Intra and intermolecular 1,3-dipolar cycloadditions: involving nitrile oxide, nitrile imine, nitrile ylide and their application in organic synthesis. Sigmatropic reactions: Classification, stereochemistry and mechanisms. suprafacial and antarafacial shifts of H and carbon moieties. [3,3] and [5,5]-sigmatropic rearrangement, Claisen, Cope and aza-Cope rearrangement.

UNIT-II

[16 HOURS]

Chemistry of organometallic compounds: Synthesis and reactions of organolithium (n-BuLi, PhLi), organocadmium, organomagnesium (Grignard reagent), organoselenium and organotellurium. Organoaluminium reagents: Preparation, site selective and stereoselective additions of nucleophiles mediated by organoaluminum reagents, reaction with acid chlorides, allyl vinyl ethers, 1,2-addition to imines and application in the synthesis of natural products. Organocopper reagents: Gilmann reagent, preparation, reactions with aldehydes, ketones and imines. Application in the synthesis of brevicomin, Organozinc reagents: Preparation - oxidative addition and transmetallation, addition reactions of alkyl, aryl, allylic and propargylic zinc reagents, diastereoselective and enantioselective addition reaction with aldehydes, Reformatsky reaction. Organotin reagents: tributyltin hydride, Barton decarboxylation reaction, Barton deoxygenation reaction, Stille coupling, Stille-Kelley coupling reactions, Barton McCombie reaction, Keck stereoselective allylation and other applications.

UNIT-III

[16 HOURS]

Asymmetric synthesis: Definition, importance, mechanism, energy consideration, advantages and limitations, methods of determination of enantiomeric excess. Methods of asymmetric induction:

Topocity-Prochirality: Substrate selectivity - Diastereoselectivity and enantioselectivity-Substrate controlled methods-use of chiral substrates - examples

Auxiliary controlled methods: Use of chiral auxiliaries - Chiral enolates-alkylation of chiral imines - Asymmetric Diels - Alder reaction

Reagent controlled methods: Use of chiral reagents - Asymmetric oxidation – Sharpless epoxidation - Asymmetric reduction - Use of lithium aluminium hydride and borate reagents. Synthesis and applications of oxazaborolidines, IPC-BBN, IPC2BH, (*S*)-BINAP-DIAMINE and (*R*)-BINAL-H. Use of (*R,R*)-DIPAMP, (*S,S*)-CHIRAPHOS, (*R,R*)-DIOP, SAMP, RAMP, *S*-Proline, *S*-PBMgCl, (-)-BOAlCl2, (+) and (-)-DET.

References

1. Organic Chemistry, VI edition, Robert T. Morrison, Robert N. Boyd.
2. Advance Organic Chemistry, IV edition, Jerry March.
3. Advance Organic Chemistry, III edition, Part-A and Part-B, Francis A. Carey and Rechard J. Sundberg.
4. Organic Chemistry, III edition, V. K. Ahluwalia and Rakesh Kumar Parashar.
5. Schaum's outline of theory and problems of Organic Chemistry, Harbert Meislich, Howard Nechamkin and Jocob Sharefkin.
6. Asymmetric synthesis, Garry Procter.
7. Mechanism in Organic Chemistry, VI edition, Peter Sykes.
8. Molecular reactions and photochemistry, Charles H. Depuy, Orville L. Chopman.
9. Modern methods of Organic synthesis, III edition, W. Carruthers.
10. Organometallics in Organic synthesis, J. M. Swan and D. Stc Black.
11. Organic chemistry by Clayden, Greeves, Warren and Wothers.

ADVANCED PHYSICAL CHEMISTRY
COURSE CODE: 21CHC12

Objectives

- To understand the concepts of enzyme kinetics, industrial catalysis and linear free energy relationship.
- To learn the electrochemical aspects of batteries and electroplating.
- To understand the mechanism of corrosion prevention of metals by different methods.
- To understand the fundamentals of X-ray crystallography.

Course Outcome

- Applications of reaction kinetics help in correlating the rates of biological and chemical reactions.
- Theory and applications of electrochemical systems helps in the field of e-waste management and protection of metals.
- Fundamentals of X-ray crystallography and structural interpretation by various X-ray diffraction techniques.

Pedagogy

- Conventional method such as black board and chalk is used.
- Modern methods like power point presentation and animation are used in class room teaching.
- Students will be assigned to solve the numerical problems to understand the concepts.

Course content

UNIT-I

[16 HOURS]

Homogeneous Catalysis: Electronic and structural effects on acidity and basicity. Hard and soft acids and bases. Acidity functions: Hammet acidity function, Zucker-Hammet hypothesis, Bonnett hypothesis. Industrial catalysis: Catalyst carrier, promoter, inhibitor and catalyst poison.
Enzyme kinetics: Effect of substrate concentration (Michaelis - Menton equation), Effect of pH, effect of catalysts and inhibitors (substrate, zeolite, Cr^{3+}, Fe^{2+} ZnO, U.V light), effect of temperature. A brief kinetic and mechanistic applications of glucose oxidase in the oxidation of glucose.
Linear Free Energy Relationship: Hammett equation, Taft equation, Okemoto Brown equation and its application to oxidation of amino acids and aromatic amines. Swain-Scott and Edward equation. Winstein - Grunwald relationship. Isokinetic relationship and significance of isokinetic temperature, Exner criterion.
Kinetic Isotope Effect: Theory of kinetic isotope effect - normal and inverse isotope effect, primary isotope effect, secondary isotope effect, solvent isotope effect.

UNIT-II

[16 HOURS]

Electrochemical cells and batteries: Introduction, galvanic and electrolytic cells, schematic representation of cells. Faradays's law, mass transfer in cells. Batteries: Classification, characteristics, primary, secondary and lithium batteries, fuel cells.
Electroplating: Definition, theory and mechanism of electroplating, effect of plating variables on the properties of electro deposits, comparative account of complexing and non-complexing baths (general treatment), additives on plating baths and their significance.
Metallic coating: Preparation of substrate surface, electroplating of Cu and Cr. Application of

Au and Ag plating.

Corrosion: Types of corrosion, basis of electrochemical corrosion, theories and mechanism of wet corrosion. Thermodynamic aspects of corrosion. Current – potential relations (Evan diagram) in corrosion cells. Factors influencing the rate of corrosion: Metal and environmental factors. Kinetic aspects corrosion: Corrosion rate measurement by different methods – chemical and electrochemical methods. General aspects of corrosion prevention and control – designing aspects, effect of allying and surface modification. Corrosion prevention by painting, phosphating and anodic (passivation) and cathodic protection. Corrosion inhibitors: Introduction, classification, Characteristics and requirements of efficient corrosion inhibitors, Green inhibitors and their significance, Corrosion inhibition mechanism.

UNIT-III

[16 HOURS]

Fundamentals of X-ray crystallography: Law of interfacial angles, laws of symmetry, Miller indices, Bragg equation (No derivation), Experimental methods – powder and rotating crystal methods, indexing of powder and rotating crystal photographs. Atomic scattering factor, structure factor, Fourier synthesis and electron density diagrams. Electron diffraction of gases, experimental technique, Scattering-Intensity curves, Wierl equation (no derivation), Radial distribution method determination of bond lengths and bond angles.

Imperfections in atomic packing: Types of imperfections, classification of imperfections, point defects, Schottky defects, Frenkel defects, disordered crystals, line defects, dislocation types, plane defects, small-angle and large-angle boundaries, stacking faults, crystal growth and twinning, non-stoichiometry.

Imperfections and physical properties: electrical, optical, magnetic, thermal and mechanical properties.

References

1. Chemical Kinetics by K.J. Laidler, Tata McGraw-Hill Pub, Co Ltd, New Delhi.
2. Fundamentals of Chemical Kinetics, M. R. Wright, Harwood publishing, Chichesrer, 1999.
3. Kinetics and Mechanism of Chemical Transformation by J. Rajaram and J.C. Kuriacose, Macmillan, New Delhi.
4. Electrochemistry –Principles and Applications by E.G. Potter, Cleaver-Hume press Ltd, London.
5. Chemical and Electrochemical energy systems, R. Narayan and B. Viswanathan (University Press), 1998.
6. Industrial Electrochemistry, D. Pletcher and F. C. Walsh, Chapman and Hall, 2nd Edn, 1984.
7. An Introduction to Metallic Corrosion and its Prevention, Raj Narayan (Oxford –IBH, New Delhi), 1983.
8. Fundamentals of metallic corrosion, Philips A. Schweitzer, CRC press Taylor and Francis group, New York.
9. Corrosion prevention and control, Baldev Raj, U Kamachi Mudali & S. Rangarajan, Narora Publishing House, India.
10. Solid State Chemistry and its applications – A.R. West, John Wiley & Sons.
11. New Directions in Solid State Chemistry – CNR Rao and J. Gopalakrishna, Cambridge University Press.
12. Solid state chemistry, N. B. Hannay, PHI, New Delhi.
13. Principles of the Solid State – H.V. Keer, Wiley Eastern.

CHEMICAL SPECTROSCOPY
COURSE CODE: 21CHC13

Objectives

- To understand the basic concepts of spectroscopic techniques such as NMR, ESR, NQR, Mossbauer and photoelectron spectroscopy.
- To familiarize with the IR and mass spectroscopy.

Course Outcome

- Understand the spectroscopic techniques such as NMR, IR, UV, and MS for recording and interpretation of spectra.
- Understand the characterization of chemical compounds.
- To learn electric and magnetic properties of radiation, molecules and bulk matter and solve the problems related to these properties.
- Understanding various fragmentation reactions of organic molecules.
- Predict the NMR, IR, UV, and MS spectra from a given molecular structure, including fragment-ions in MS.

Pedagogy

- Conventional method such as black board and chalk is used.
- Modern methods like power point presentation and animation are used in class room teaching.
- Students will be assigned to solve the spectroscopic problems to understand the interpretation of spectra.

Course content

UNIT-I

[16 HOURS]

NMR Spectroscopy: Magnetic properties of nuclei (magnetic moment, g factor, nuclear spin), effect of external magnetic field on spinning nuclei, Larmor precession frequency, resonance conditions, population of nuclear magnetic energy levels, relaxation processes, relaxation time, line width and other factors affecting line width. Chemical Shift: Standards employed in NMR, factors influencing chemical shift: electronegativity, shielding and deshielding, van der Walls deshielding magnetic anisotropy, H-bonding, diamagnetic and paramagnetic anisotropies, spin-spin coupling, chemical shift values and correlation for protons bonded to carbon and other nuclei, Instrumentation. Chemical shift equivalence and magnetic equivalence, effects of chiral centre, Karplus curve-variation of coupling constants with dihedral angle. Complex NMR Spectra: Simplification of complex spectra-isotopic substitution, increased magnetic field strength, double resonance and lanthanide shift reagents, Nuclear Overhauser Effect (NOE), FT-NMR Spectroscopy and advantages. ^{13}C-NMR Spectroscopy: multiplicity-Proton decoupling-Off resonance decoupling; Chemical shift, application of ^{13}C, ^{19}F, ^{31}P, ^{11}B and ^{15}N. Applications of NMR: Structural diagnosis, conformational analysis, keto-enol tautomerism, H-bonding. Solid state NMR and its applications.

Multiple resonance spectroscopy: Introduction to 2D-techniques: DEPT, COSY and NOESY.

UNIT-II

[16 HOURS]

Electron Spin Resonance Spectroscopy: Basic principles, hyperfine couplings, the g values, factors affecting g values, isotropic and anisotropic hyperfine coupling constants, Zero

Field splitting and Kramer's degeneracy. Measurement techniques and applications to simple inorganic and organic free radicals and to inorganic complexes.

NQR Spectroscopy: Introduction, Principles, Quadrupolar nuclei, electric field gradient, nuclear quadrupole coupling constants, energies of quadrupolar transitions, effect of magnetic field. Applications.

Mössbauer spectroscopy: The Mössbauer effect, chemical isomer shifts, quadrupole interactions, magnetic splitting, measurement techniques and spectrum display, application to the study of $Fe^{2+}$and Fe $^{3+}$compounds; iron in very high oxidation states-Fe(V) and Fe(VI) nitride complexes; $Sn^{2+}$and Sn^{4+}compounds, nature of M-L bond, coordination number and structure, detection of oxidation states and an inter halogen compound $I_2Br_2Cl_4$.

Photoelectron Spectroscopy: Introduction, principles, chemical shifts, photoelectron spectra of simple molecules. X-ray photoelectron and Auger electron spectroscopy- Principles and applications.

UNIT-III

[16 HOURS]

IR spectroscopy: Introduction, instrumentation, sample handling, Characteristic group frequencies and skeletal frequencies. Finger print region, Correlation chart. Identification of functional groups-alkanes, alkenes, alkynes, aromatics, carbonyl compounds (aldehydes, ketones, esters and lactones), halogen compounds, sulphur and phosphorous compounds, alcohols, amides, lactums, amino acids and amines, Factors affecting group frequencies and band shapes: conjugation, resonance and inductance, hydrogen bonding and ring strain. tautomerism, *Cis-trans* isomerism. Applications of IR spectroscopy.

Mass Spectrometry: Basic principles, Instrumentation-Mass spectrometer, interpretation of mass spectra, resolution, molecular ions, meta-stable ions, Nitrogen rule and isotope ions. Different methods of ionization (chemical ionization, electron impact, field ionization-FAB and MALDI). Fragmentation processes-representation of fragmentation, basic fragmentation types and rules. Factors influencing fragmentations and reaction pathways. McLafferty rearrangement. Fragmentations (fragmentation of organic compounds with respect to their structure determination) associated with functional groups-alkanes, alkenes, cycloalkanes, aromatic hydrocarbons, halides, alcohols, phenols, ethers, acetals, ketals, aldehydes, ketones, quinines, carboxylic acids, esters, amides, acid chlorides, nitro compounds, amines & nitrogen heterocycles. Fragmentation patterns of glucose, myrcene, nicotine, retro Diels-Alder fragmentation. Composite problems involving the applications of UV, IR, ^{1}H and ^{13}C-NMR and mass spectroscopic techniques for the structural elucidation of organic compounds.

References

1. Organic Spectroscopy-3rd Ed.-W. Kemp (Pagrave Publishers, New York), 1991.
2. Spectrometric Identification of Organic Compounds - Silverstein, Bassler & Monnill (Wiley) 1981.
3. Spectroscopy of Organic Compounds-3rd Ed.-P.S. Kalsi (New Age, New Delhi) 2000.
4. E.A.V. Ebsworth, D.W.H. Ranklin and S. Cradock: Structural Methods in Inorganic Chemistry, Blackwell Scientific, 1991.
5. J. A. Iggo: NMR Spectroscopy in Inorganic Chemistry, Oxford University Press, 1999.
6. C. N. R. Rao and J. R. Ferraro: Spectroscopy in Inorganic Chemistry, Vol I & II (Academic) 1970.
7. Spectroscopy, B. P. Straughan and S. Salker, John Wiley and Sons Inc., New York, Vol.2, 1976.
8. Application of Absorption Spectroscopy of Organic Compounds, John R. Dyer, Prentice/Hall of India Private Limited, New Delhi, 1974.
9. Organic Spectroscopy, V. R. Dani, Tata McGraw-Hall Publishing Company Limited, New Delhi. 1995.

10. Interpretation of Carbon-13 NMR Spectra, F.W. Wehrli and T. Wirthin, Heyden, London, 1976.
11. NMR spectroscopy-Powai

SOFT CORE

ANALYTICAL CHEMISTRY PRACTICALS

COURSE CODE: 21CHC50 [64 HOURS]

Objectives

- To familiarize with the handling of instruments in the quantitative analysis of various samples.
- To understand the analysis of real samples like waste water, soil samples and biological samples and mixtures

Course Outcomes

After studying this course, the student to:

- Get experience on analysis of various complex mixtures by following multistep reactions.
- Acquire the knowledge on handling instruments and to overcome the general problems arises during the analysis.
- Acquire industrial skills required for sampling, analytical and interpretation and presentation of results.
- Possess adequate knowledge on literature search for developed analytical methods.

Pedagogy

- Each student performs experiments as per the protocol in practical classes.
- Computer aided applications are used for the evaluation of experimental results.

[128 HOURS]

PART – III

1. Determination of calcium in limestone by redox, acid-base and complexation titrations.
2. Determination of vitamin C in orange juice by titration with cerium(IV) and with 2,6-dichlorophenol indophenol.
3. Determination of mercury in an algaecide by EDTA titration; and arsenic in ant control preparation by redox titration.
4. Determination of aluminium and magnesium in antacids by EDTA titration.
5. Analysis of a copper-nickel alloy sample for copper and nickel by EDTA titration using masking and selective demasking reactions.
6. Determination of saccharin in tablets by precipitation titration.
7. Determination of iodine value and saponification value of edible oils.
8. Determination of ascorbic acid in goose berry/bitter gourd by titrimetry and spectrophotometry using *N*-bromosuccinimide (NBS).
9. Analysis of a mixture of iron(II) and iron(III) by EDTA titration using *p*H control.

10. Determination of sulpha drugs by potentiometry using $NaNO_2$ and iodometric assay of penicillin.
11. Solvent extraction method for determination of silver as ion-associate with 1,10-phenanthroline and bromopyragallol red.
12. Electrolytic determination of copper and lead in brass.
13. Polarographic determination of copper and zinc in brass.
14. Determination of sodium, potassium and calcium in mineral waters by atomic emission spectrometry.
15. Determination of iron in mustard seeds and phosphorus in peas by spectrophotometry.
16. Analysis of waste water for anionic detergents and phenol by spectrophotometry.
17. Fluorimetric determination of riboflavin (vit.B_2) in tablets.
18. Colorimetric analysis of procaine by diazotization and coupling reaction.
19. Determination of manganese in steel by extraction-free spectrophotometry and molybdenum in steel by extractive spectrophotometry.
20. Determination of ethanol in wine by titrimetric and spectrophotometric dichromate methods

PART – IV

1. Analysis of waste waters for DO and COD by titrimetry.
2. Analysis of a ground water sample for sulphate by titrimetry (EDTA) and turbidimetry.
3. Potentiometric determination of formula and stability constant of a silver-ammonia complex ion.
4. Determination of aspirin, phenacetin and caffeine in mixture and APC tablets by solvent extraction and UV spectrophotometry.
5. Kinetic determination of urinary creatinine and purity of a commercial H_2O_2 sample.
6. Determination of chromium(III) and iron(III) in a mixture by kinetic masking methods.
7. Catalytic determination of traces of selenium in biological materials and iodide in blood serum.
8. Photometric and potentiometric titration of iron(III) with EDTA.
9. Photometric and potentiometric titration of copper with EDTA.
10. Determination of copper(II) and iron(III) in mixture by photometric titration with EDTA.
11. Analysis of brackish water for chloride content by a) spectrophotometry (mercuric thiocyanate method), b) conductometry (silver nitrate) and c) potentiometry (silver nitrate).
12. Conductometric titration of sodium acetate with HCl and NH_4Cl with NaOH.
13. Ascorbic acid determination in natural orange juice by coulometry.
14. Spectrophotometric determination of iron in natural waters using thiocyanate and 1,10-phenanthroline as reagents.
15. Determination of fluoride in drinking water/ground water by spectrophotometry(alizarin red lake method).
16. Analysis of waste water for
    a) Phosphate by molybdenum blue method

b) ammonia-nitrogen by Nessler's method
c) nitrite-nitrogen by NEDA method

15. Analysis of a soil sample for
    a) Calcium carbonate and organic carbon by titrimetry.
    b) Calcium and magnesium by EDTA titration.
16. Analysis of a soil sample for
    a) Nitrogen content by Kjeldahl method
    b) Available phosphorus by spectrophotometry.
    c) Nitrate-nitrogen/nitrite nitrogen/ammonia nitrogen by spectrophotometry.
    d) Sodium and potassium by flame photometry.
17. Analysis of urine for
    a) Urea and uric acid by titrimetrysnd spectrophotometry.
    b) Sulphate by precipitation titration after ion-exchange separation.
    c) Sugar by Benedict's reagent.
18. Analysis of blood for
    a) cholesterol by spectrophotometry
    b) Bicarbonate by acid-base titration.
19. Fluorimetric determination of quinine in an antimalarial tablet.

References

1. Fundamental of Analytical Chemistry, D.A. Skoog, D.M. West, Holler and Crouch 8thedition, 2005, Saunders College Publishing, New York.
2. Analytical Chemistry, G.D. Christian, 5th edition, 2001 John Wiley & Sons, Inc. India.
3. Quantitative Analysis, R.A. Day and A.L. Underwood, 6th edition, 1993, prentice Hall, Inc. New Delhi.
4. Vogel's Textbook of Quantitative Chemical Analysis, J. Mendham, R.C. Denney, J.D.Barnes and M.J.K. Thomas, 6th edition, Third Indian Reprint, 2003 Pearson EducationPvt. Ltd., New Delhi.
5. Analytical Chemistry Principles, John H. Kennedy, 2nd edition, Saunders CollegePublishing, California, 1990.
6. Quantitative Analysis of Drugs in Pharmaceutical Formulations, P. D. Sethi, 3rdedition, CBS Publishers & Distributors, New Delhi, 1997.
7. Practical Clinical biochemistry methods and interpretations, R. Chawla, J.P. BothersMedical Publishers (P) Ltd., 1995.
8. Laboratory Manual in Biochemistry, J. Jayaraman, New Age International Publishers,New Delhi, 1981.
9. Experiments on Water Pollution, D.I.Williams and D. Anglesia, Wayland Publishers Ltd., England, 1978.
10. Experiments on Land Pollution, D.I. Williams and D. Anglesia, Wayland PublishersLtd., England, 1978.

15. Experiments in Environmental Chemistry, P.D. Vowler and D.W. Counel, PergamonPress,Oxford 1980.
16. Manual Soil Laboratory Testing, vol.I, K.H. Head, Pentech Press, London 1980.

INORGANIC CHEMISTRY PRACTICALS
COURSE CODE: 21CHC51 [64 HOURS]

Objectives

- To familiarize with the instrumental methods of analysis for determining metals present in the different samples.
- To familiarize with the preparation and characterization of different inorganic complexes.

Course Outcome

- Determination of alloy samples and understanding the electrochemical deposition of metals.
- Preparation and characterization of coordination compounds.
- Determination of composition, stability constant and magnetic susceptibility of metal complexes.

Pedagogy

- Each student performs experiments as per the protocol in practical classes.
- Spectroscopic tools are applied for the characterization of the synthesized complexes.

Course experiments

PART-A

1. Determination of bismuth, cadmium and lead in a mixture: Analysis of a low melting alloy (Wood‘s alloy).
2. Simultaneous spectrophotometric determination of chromium and manganese in a steel solution.
3. Determination of chromium(III) and iron(III) in a mixture: Kinetic masking method.
4. Electrogravimetric determination of:
   a) Copper in copper sulphate
   b) Nickel in nickel suphate
   c) Copper and nickel in alloy solution
   d) Lead in lead nitrate.
5. Flame photometric determination of the following metal ions from different samples: a) sodium b) potassium and c) sodium and potassium in a mixture.
6. Polarographic estimation of cadmium and zinc.
7. Determination of iron as the 8-hydroxyquinolate by solvent extraction method.
8. Quantitative determination of nickel using dithizone and 1,10-phenanthroline by synergistic extraction.
9. Spectrophotometric determination of the *p*Ka value of methyl red.
10. Semimicro gravimetric determination of aluminium.

PART-B

1. Preparation and characterization of:
   a) Chloropentammine cobalt(III) chloride
   b) Estimation of chloride in a complex by potentiometric or ion-exchange method

c) Record the electronic absorption spectrum of a complex and verify TanabeSugano diagram.

2. Preparation of *cis*- and *trans*- dichlorobis(ethylenediammine) cobalt(III)chloride. Record the UV-Vis spectra and compare it with *cis*-form. Measure the molar conductance.
3. Preparation of hexammine cobalt(III) chloride and estimate cobalt ion.
4. Determination of magnetic susceptibility of any two compounds/complexes by Gouy method.
5. Determination of the composition of iron-phenanthroline complex by:
   (a) Job's method
   (b) mole-ratio method and
   (c) Slope-ratio method.
6. Determine the stability constant of iron-tiron/iron-phenanthroline by Turner-Anderson method.
7. Preparation of potassium tris(oxalato)ferrate(III) and estimate the metal ion.
8. Preparation of acetyl acetonatomanganese(III) complex.
9. Preparation of tris(en)nickel(II) chloride and hexamine nickel(II) chloride complexes. Record electronic spectra and evaluate spectrochemical series.
10. Using chloropentammine cobalt(III) chloride, prepare nitro and nitritopentammine cobalt(III) chloride. Record the IR spectra of the isomers and interpret.
11. Estimate the chloride ion in a given complex by silver nitrate titration after ion-exchange separation.
12. Demonstration Experiments:
    (a) Recording and interpretation of IR and NMR spectra of complexes.
    (b) Spectrochemical series- Evaluation of Dq value.
    (c) DNA interaction with metal complexes by UV-visible absorption and viscosity methods.

References

1. Advanced Physico-Chemical Experiments – J. Rose.
2. Instrumental Analysis Manual - Modern Experiments for Laboratory – G.G. Guilbault and L.G. Hargis.
3. A Text Book of Quantitative Inorganic Analysis – A.I. Vogel, 5th edition.
4. Experimental Inorganic Chemistry – G. Palmer.
5. Inorganic Synthesis – O. Glemser.
6. Experimental Inorganic/Physical Chemistry- Mounir A. Malati.
7. Quantitative Chemical Analysis – Daniel C. Harris, (2006) 7th edition.
8. Spectrophotometric Determination of Elements – Z. Marczenko

ORGANIC CHEMISTRY PRACTICALS
COURSE CODE: 21CHC52 [64 HOURS]

Objectives

- To understand the concepts of isolation and purification of natural products.
- To familiarize with the estimation of different functional groups in organic compounds.

Course Outcome

- The isolation of caffeine, carotene, lycopene, cincole, azelaic acid and piperine from respective natural sources.
- Estimation of ketones, sugars, nitro and amino groups in natural products.
- Interpret UV, IR, NMR and MS data of different organic compounds.

Pedagogy

- Each student performs experiments as per the protocol in practical classes.
- Spectroscopic tools are applied for the characterization of isolated natural products.

Course experiments

PART-A

1. Fractional crystallization: separation of mixture of naphthalene and biphenyl.
2. Thin layer chromatography: Separation of plant pigments.
3. Column chromatography: Separation of *o*- and *p*-nitro aniline
4. Isolation of piperine from pepper.
5. Isolation of caffeine from tea.
6. Isolation of azelaic acid from castor oil.
7. Isolation of carotene from carrot.
8. Isolation of lycopene from tomato.
9. Isolation of cincole from eucalyptus leaves.

PART-B

Isolation of natural products & estimations:

1. Estimation of ketones by haloform reaction.
2. Estimation of sugars by Bertrand's method.
3. Estimation of nitro groups.
4. Estimation of amino group.
5. Determination of enol content by Meyer's method.
6. Determination of iodine value of an oil or fat.
7. Determination of saponification value of oil.
8. Determination of equivalent weight of carboxylic acid by silver salt method

Interpretation of Spectra: Structural elucidation of some simple organic compounds by UV, IR, NMR and mass. Spectra have to be provided by the Teachers/ Examiners.

References

1. Vogel' text book of practical organic chemistry, V edition, B. S. Furniss, A. J. Hannaford, P. W. G. Smith, A. R. Tatehell.
2. Elementary practical organic chemistry, Part-III: Quantitative organic analysis, By Arthur I, Vogel.
3. Laboratory manual of Organic Chemistry by B. B. Dey and M. V. Sitaraman.
4. Practical Organic Chemistry by Mann F. G. and Saunders.
5. Natural products: A laboratory guide by Raphael Ikhan.

PHYSICAL CHEMISTRY PRACTICALS

Objectives **COURSE CODE: 21CHC53** **[64 HOURS]**

- To understand the significance of various factors influencing the reaction rate in proposing the reaction mechanism.
- To understand electrochemical and spectrophotometric methods of quantification of samples, and also determination of physico-chemical parameters of some important samples.

Course Outcome

- Students can able to develop experimental skill and interpretation of plausible mechanisms of reactions.
- Gain practical knowledge on the theoretical basis of electrochemistry, thermodynamics, and spectrophotometry experiments.
- This helps in academics, research and industries.

Pedagogy

- Each student performs experiments as per the protocol in practical classes.
- Electrochemical and spectrophotometric tools are used to conduct the experiments.

Course experiments

PART-A

1. Determination of order of reaction for the acid hydrolysis of methyl acetate and evaluation of activation parameters.
2. Evaluation of Arrhenius parameters for the reaction between $K_2S_2O_8$ and KI (First order reaction).
3. Study of kinetics of autocatalytic reaction between oxalic acid and $KMnO_4$ and determine the order of reaction with respect to $KMnO_4$.
4. Kinetics of saponification of ethyl acetate by conductivity method and study the effect of dielectric constant of the medium (using CH_3OH).
5. Study of effect of salt (ionic strength) on the kinetics of reaction between potassium persulphate and potassium iodide (second order reaction).
6. Spectrophotometric kinetics of oxidation of indigocarmine (IC) by chloramine-T (CAT) – Determination of order of reaction with respect to [CAT] and [IC].
7. To study the acid catalysed kinetics of oxidation of glycine by chloramine-T (CAT) - determination of order of reaction with respect to [CAT] and [glycine].
8. Study the phase diagram of three component system (Glacial acetic acid-Chloroform-water system / Glacial acetic acid-Acetone-Water system).
9. Study the rate of corrosion and inhibition efficiency of an inhibitor (thiourea) on mild steel/Al/Cu by weight loss method.

PART-B

1. Conductometric titration of orthophosphoric acid against NaOH.
2. Conductometric titration of a mixture of HCl, CH_3COOH and $CuSO_4$ against NaOH.
3. Conductometric titration of thorium nitrate with potassium tartarate.
4. Potentiometric titration of mixture of weak acids (acetic acid and monochloroacetic acid) against NaOH.
5. Dwtermination of pK_a values of phosphoric acid by potentiometric / pH metric method.

6. Potentiometric titration of mixture of KCl+KBr+KI against $AgNO_3$.
7. Potentiometric titration of FAS against ceric sulphate and sodium metavenadate, determine the concentration of FAS and redox potential.
8. Potentiometric titration of lead nitrate against EDTA and determine the concentration of lead nitrate solution.
9. Determination of *p*K value of an indicator (methyl orange/methyl red).
10. Spectrophotometric analysis of a mixture of (a) $KMnO_4$ and $K_2Cr_2O_7$.
11. Study of complex formation between ferric salt and salicylic acid.

References

1. Practical Physical Chemistry – A.J. Findlay.
2. Experimental Physical Chemistry – F. Daniels *et al*.
3. Selected Experiments in Physical Chemistry – Latham.
4. Experiments in Physical Chemistry – James and Prichard.
5. Experiments in Physical Chemistry – Shoemaker.
6. Advanced Physico-Chemical Experiments – J. Rose.
7. Practical Physical Chemistry – S.R. Palit.
8. Experiments in Physical Chemistry – Yadav, Geol Publishing House.
9. Experiments in Physical Chemistry – Palmer.
10. Experiments in Chemistry – D.V. Jahagirdar, Himalaya Publishing House, Bombay, (1994).
11. Experimental Physical Chemistry – R.C. Das and B. Behera, Tata Mc Graw Hill.

SOFT CORE
KINETIC AND RADIOCHEMICAL METHODS OF ANALYSIS

COURSE CODE: 21CHC54

Objectives

- To learn aspects of kinetic and radiochemical methods for analysis
- To understand the knowledge of applied aspects of recent needs by simple techniques

Course Outcome

- To understand the reaction kinetics
- To gain the principles of radiochemical methods
- To understand the applicability of radiometric assays

Pedagogy

- Conventional method such as black board and chalk is used.
- Modern methods like power point presentation and information and communications technology are used in class room teaching.
- Students will be assigned to solve the numerical problems to understand electrochemical concepts.

Course Content

Unit-I **[16 HOURS]**

Kinetic methods of analysis: Analytical uses of reaction rates relative, basis of reaction rate

methods, rate laws-first and second order reactions relative rates of reactions, analytical utilityof first or pseudo first order reactions, determination of reaction rates, types of kinetic methods– differential methods, integral methods, multicomponent analysis-neglect of reaction of slow- reacting component, logarithmic extrapolation method, reaction rate method, applications- catalyzed reactions, measurement methods for catalyzed reactions, micro determination of inorganic species like iodide, selenium, cobalt & mercury in complex materials, determination of organic species, non-catalytic reactions. Applications of enzyme-catalysed reactions for the analysis of substratesstoichiometric and rate methods, determination of urea, uric acid, blood glucose, galactose and blood alcohol, determination of enzymes-LDH, GOT and GPT. A brief outline of IR, UV, NMR, Mass spectroscopy as tools for kineticstudy.

UNIT – II [16 HOURS]

Radiometric methods: Radioactive isotopes. Nuclear emissions-αandβ-particles, neutrons, gamma rays and miscellaneous nuclear particles. Nuclear reactions, radiochemical decay and activity. Instrumentation and measurement of radioactivity. Radiation detectors-gas ionization, scintillation and semiconductor detectors. Pulse height analysis. Autoradiography. Statistics of radioactive measurements.

Radiochemical analysis: **Neutron activation methods**-neutrons and their sources. Interaction of neutrons with matter. Theory, experimental considerations and applications.

Isotope dilution methods-direct isotope dilution and inverse isotope dilution methods and their applications. Radiometric titrations. Radiorelease methods. Radioactive tracers.

Radio immunoassay: Principles of immunoassay. Specificity of immuno assays. Preparation of the antibody, incubation period for the assay, separation of the bound and free antigen. Fluorescence immunoassay. Enzyme immunoassay.

References:

1. Fundamental of Analytical Chemistry, D.A. Skoog, D.M. West, Holler and Crouch 8th edition, 2005, Saunders College Publishing, New York.
2. Analytical Chemistry, G.D. Christian, 5th edition, 2001 John Wiley & Sons, Inc. India.
3. Quantitative Analysis, R.A. Day and A.L. Underwood, 6th edition,1993 Prentice Hall, Inc. New Delhi.
4. Vogel's Textbook of Quantitative Chemical Analysis, J. Mendham, R.C. Denney, J.D. Barnes and M.J.K. Thomas, 6th edition, Third Indian Reprint, 2003 Pearson Education Pvt. Ltd., New Delhi.
5. Analytical Chemistry Principles, John H. Kennedy, 2nd edition, Saunders CollegePublishing, California, 1990.
6. Instrumental Methods of Analysis by H.H. Willard, L.L. Merritt and J.A. Dean,7th edition, (1988).
7. Principles and Practice of Analytical Chemistry, F.W. Fifield and Kealey, 3rd edition, 2000, Blackwell Sci., Ltd. Malden, USA.
8. Modern Analytical Chemistry, David Harvey, McGraw Hill, New Delhi, 2000.

9. Introduction to Instrumental Analysis, Braun, Pharm. Med. Press. India.
10. Instrumental Method of Analysis, W. M. Dean and Settle, 7th edition, 1986, CBS Publishers, New Delhi.
11. Instant Notes of Analytical Chemistry, Kealey and Haines, Viva books Pvt. Ltd., 2002.
12. Soil Chemical Analysis, M.L. Jackson, Prentice Hall of India Pvt. Ltd., New Delhi, 1973.
13. Clinical Chemistry, Principles and Procedures, J.S. Annino, 2nd edition, Boston: Little, Brown, 1960.
14. Methods of Geochemical Analysis, D. Click, Ed., A Multivolume series, NewYork, Interscience.
15. Clinical Chemistry, Principles and Techniques, R.J. Henry, D.C. Cannon and J.W. Winkleman, Eds., 2nd edition,Hagerstorm, M.D: Harper and Row, 1974.
16. Fundamentals of Clinical Chemistry, N.W. Tietz, Ed., 2nd edition, Philaddphia: W.B. Saunders, 1976.

FRONTIERS IN INORGANIC CHEMISTRY

COURSE CODE: 21CHC55

Objectives

- To understand the basic concepts, synthesis and applications of materials.
- To learn the properties, fabrication and characterization of nanomaterials.

Course Outcome

- Gain knowledge on design and synthesis of new inorganic materials.
- Fabrication and characterization of nanomaterials.
- Applications of ceramics, pigments, silicates and biomaterials.

Pedagogy

- Conventional method such as black board and chalk is used.
- Modern methods like power point presentation and animations are used in class room teaching.

Course content

UNIT-I

[16 HOURS]

Materials chemistry: Historical Perspectives. Design of new materials through a Critical Thinking Approach. Materials sustainability.
Synthesis of materials: The formation of bulk material by different methods.
Defects and ion transport: Extended defects. Atom and ion diffusion. Solid electrolytes.
Metal oxides, nitrides and fluorides: Monoxides of the 3d metals, higher oxides and complex oxides, oxide glasses, nitrides and fluorides.
Sulfides, intercalation compounds and metal rich phases: Layered MS2 compounds and intercalation, Chevrel phases.
Ceramic materials: Sol-gel process and applications of biomaterials of ceramics.
Inorganic pigments: Coloured pigments, white and black inorganic materials.
Molecular materials and fullerides: Fullerides, Molecular material chemistry.
Silicates: Structure, classification - silicates with discrete anions, silicates containing chain anion, silicates with layer structure, silicones with three dimensional net work and applications.

UNIT-II

Nanomaterials-Introduction. **[16 HOURS]**

Fundamentals-Terminology and history.

Characterization and fabrication: Top-down and bottom-up fabrication. Solution based synthesis of nanoparticles. Vapour-phase synthesis of nanoparticles. Templated synthesis of nanomaterials using frameworks, supports and substrates. Sonochemical microwave methods for the synthesis of nanoparticles.

Structural study of nanocomposites by different methods.

Nanostructures and properties

One-dimensional control: carbon nanotubes and inorganic nanowires.

Two-dimensional control: grapheme, quantum wells and solid-state super lattices.

Three-dimensional control: mesoporous materials and composites.

Some applications of inorganic/organic/polymeric materials: Optical, electrical, magnetic, and chemical and biosensors.

References

1. Inorganic Chemistry, 4th edition. P. Atkins, T. Overton, J. Rourke, M. Weller and F. Armstrong, Oxford University Press (2006).
2. Inorganic Chemistry Principles of Structure and Reactivity: James E. Huheey, Ellen A. Keiter, Richard L. Keiter, Okhil K. Medhi, Delhi University, New Delhi (2006).
3. Chemistry of the Elements – N.N. Greenwood and A. Earnshaw, Pergamon Press (1985).
4. Industrial Inorganic Chemistry – 2nd edition. K.H. Buchel, H.H. Moretto and P. Woditsh, Wiley - VCH (2000).
5. Basic Inorganic Chemistry – 3rd edition. F.A. Cotton, G. Wilkinson and P.L. Gaus, John Wiley and Sons (2002).
6. Inorganic Chemistry, 3rd edition. James E. Huheey, Harper and Row Publishers (1983).
7. Inorganic Chemistry, 3rd edition. G.L. Miessler and D.A. Tarr, Pearson Education (2004).
8. Inorganic Chemistry, 2nd edition. C.E. Housecroft and A.G. Sharpe, Pearson Education.

CHEMISTRY OF NATURAL PRODUCTS-II
COURSE CODE: 21CHC56

Objectives

- To familiarize with the chemical concepts of alkaloids and steroids.
- To learn the structural elucidation and biological importance of alkaloids and steroids.

Course Outcome

- Chemistry of alkaloids and their biological significances.
- Synthesis and characterization of several alkaloids and steroids.

Pedagogy

- Conventional method such as black board and chalk is used.
- Modern methods like power point presentation and animations are used in class room teaching.

Course content

UNIT-I

[16 HOURS]

Alkaloids: Introduction, classification, isolation and general methods of structural elucidation of alkaloids. Classification of alkaloids. Biological importance of alkaloids. Structural elucidation of nicotin, papavarine, quinine, reserpine and morphine. Biosynthesis of alkaloids (nicotin, conine and cocaine).

UNIT-II

[16 HOURS]

Steroids: Introduction, Structural elucidation of cholesterol, bile acids, Ergosterol and its irradiation products. Sex hormones and corticosteroids: Synthesis of estrone, progesterone, androsterone, testosterone. Barton reaction for the synthesis of aldosterone. Brief discussion of homosteroids, norsteroids and oral contraceptives. Biological significance of anabolic steroids.

References

1. Organic Chemistry, VI edition, Robert T. Morrison, Robert N. Boyd.
2. Organic Chemistry, Vol-II by I. L. Finar.
3. Schaum's outline of theory and problems of Organic Chemistry, Harbert Meislich, Howard Nechamkin and Jocob Sharefkin.
4. Natural products: Their chemistry and biological significance, J. Mann, R. S. Davidson, J. B. Banthorpe and J. B. Harborne.

MATERIALS CHEMISTRY
COURSE CODE: 21CHC57

Objectives

- To familiarize with the preparation and characterization of different types of nanomaterials.
- To learn the properties and applications of semiconductors and superconductors.

Course Outcome

- Understand the fundamentals and importance of different types of nanomaterials, their methods of preparation and characterization by different techniques.
- Basic aspects of semiconductors and superconductors, their properties and applications.

Pedagogy

- Conventional method such as black board and chalk is used.
- Modern methods like power point presentation and animations are used in class room teaching.

Course content

UNIT-I

[16 HOURS]

Chemistry of nanomaterials: Fundamentals and importance, metal nanoclusters, magic numbers, theoretical modelling of nanoparticles, geometric structure, electronic structure, reactivity, fluctuations, magnetic clusters, bulk to nano transitions. Semiconducting nanoparticles: optical properties, photo fragmentation, Coulombic explosion.

Carbon nanoparticles: Introduction, carbon molecules, nature of carbon bond, new carbon structure. Carbon clusters: Small carbon clusters, C_{60}: Discovery, structure, alkali doping, super conductivity. Fullerenes and other bulky balls. Carbon nano-tubes: Fabrication structure, electrical properties, vibrational properties, mechanical properties. Quantum dots, Graphene, and applications of nanomaterials.

Methods of preparation: Plasma arc, Chemical vapour deposition (CVD), sol-gel, silica-gel, hydrolysis, condensation, polymerization of monomers to form nanoparticles, solvothermal, and hydrothermal methods, electrochemical, ball milling and pulsed laser methods. Characterization of nanomaterials (X- ray, IR, UV and SEM).

UNIT-II

[16 HOURS]

Semiconductors: Metals, insulators and semiconductors. Band theory, energy bands, intrinsic and extrinsic semiconductors. Conductivity: electrons and holes, temperature dependence on conductivity, Optical properties: absorption spectrum, photoconductivity, photovoltaic effect and luminescence. Junction properties: metal-metal junctions, metal-semiconductor junctions, p-n junctions, transistors, industrial applications of semiconductors: Mixed oxides, spinels and other magnetic materials.

Superconductors: Introduction, critical temperature and zero resistivity, Meissner effect, critical magnetic field and its variation with temperature. Type - I and II super conductors, specific heat, isotope effect, basic concepts of BCS theory. High temperature (Tc) superconductors and its applications.

References

1. Introduction to Nanotechnology, Charles P. Poole. Jr. and Frank J. Owens, Wiley-Interscience, Joh Wiley and Sons Inc, 2006.
2. Nanotechnology, Richard Booker and Earl Boysen, Wiley.
3. Nanometerials, A.K. Bandopadhyay, New Age International, 2nd edition.
4. Nanotechnology - Importance and Applications, M. H. Fulekar, Ink International publishing.
5. Solid State Chemistry – N.B. Hannay.
6. Introduction to Solids – Azaroff.
7. Solid State Chemistry and its applications – A.R. West.
8. Principles of the Solid State – H.V. Keer.
9. Basic Solid State Chemistry, 2nd edition, Anthony R. West.
10. Solid State Chemistry: An Introduction, 3rd edition, Lesley E. Smart and Elaine A. Moore.
11. Introduction to Solid state Physics-C. Kittel, 5th edition, Wiley Eastern, Limited.
12. C.N.R. Rao and J. Gopalakrishna –New Directions in solid state chemistry| Cambridge University Press, Cambridge (1999).

OPEN ELECTIVE (FOR NON-CHEMISTRY STUDENTS ONLY)
GENERAL CHEMISTRY
COURSE CODE: 21CHC80

Objectives

- To understand the basic concepts of chemistry including periodic properties of elements, structure and bonding.
- To learn the applications of synthetic products and biological importance of natural products. .
- To understand the basic concepts of thermodynamics, chemical kinetics, ionic equilibria and electrochemistry.
- To learn the statistical evaluation of experimental data. Applications of titrimetric methods and separation techniques.

Course Outcome

- Periodic properties of elements, structure and bonding of ionic compounds as well as various concepts of acids and bases.
- Hybridization, bonding and molecular structure of simple organic molecules. And also, biological importance of natural products.
- Basic concepts of thermodynamics, chemical kinetics, electrochemistry and ionic equilibria and their applications.
- Statistical evaluation of experimental data, concept of titrimetric and chromatographic methods.

Pedagogy

- Conventional method such as black board and chalk is used.
- Modern methods like power point presentation and animations are used in class room teaching.
- Students will be assigned to solve the numerical problems to understand the concepts.

Course content

UNIT-I

[16 HOURS]

Periodic table and chemical periodicity: Periodic properties of elements, State of Matter, their resources. Important periodic properties of the elements, covalent radii, ionic radii, ionization potential, electron affinity and electronegativity.

Structure and Bonding: Properties of ionic compounds, structure of crystal lattices (NaCl, CsCl, ZnS, Wurtzite and rutile), Lattice energy, Born-Haber Cycle, radius ratio rules and their limitations.MO treatment for homo- and heteronuclear diatomic molecules. VSEPR model to simple molecules. Factors affecting the radii of ions, covalent character in ionic bonds, hydration energy and solubility of ionic compounds.

Concepts of Acids and Bases: Review of acid base concepts**.** Lux-Flood and solvent system concepts. Hard-soft acids and bases. Applications.

UNIT-II

[16 HOURS]

Bonding and molecular structure: Introduction to organic chemistry, atomic orbitals, sigma and pi bond formation-molecular orbital (MO) method, sp, sp^2 and sp^3 hybridization, bond length, bond dissociation energies and bond angles (open chain and cyclic compounds). Electronegativity and polarity of the bonds. Classifications and reactions of organic compounds (with examples).

Acids and bases: Hydrogen bonding, resonance and inductive effective on strengths of acids and bases.

Biological importance of natural products: Amino acids, proteins, carbohydrates (cellulose, starch, glycogen), lipids (fats and oils, phospholipids), prostaglandins, nucleic acids, steroids, alkaloids, vitamins, flavonoids.

Applications of synthetic products: Dyes, drugs, polymers (plastics), soaps and detergents, pesticides and pheromones.

UNIT-III

[16 HOURS]

Thermodynamics: First and second laws of thermodynamics. Concept of entropy and free energy, entropy as a measure of unavailable energy. Entropy and free energy changes and spontaneity of process.

Chemical kinetics: Rate and order of reaction. Factor affecting the rate of reaction. and determination Order of reaction. Energy of activation and its determination. Brief account of collision and activated complex theories.

Ionic equilibria: pH scale, buffer solutions, calculation of pH of buffer solutions, buffer capacity and buffer index, buffer mixtures.

Solutions: Concentration units, solutions of liquids in liquids, Raoult‘s law, ideal and non-ideal solutions.

Electrochemistry: Electrolytic conductance, specific, equivalent and molar conductance, ionic mobility and transference number, factors affecting the electrolytic conductance, Arrhenius theory of strong and weak electrolytes, assumptions of Debye-Huckel theory of strong electrolytes. Single electrode potential, reference electrodes, galvanic cells, emf of galvanic cells and construction of electrochemical cells.

UNIT-IV

[16 HOURS]

Basic Statistics and Data Handling: Significant figures, accuracy and precision. Types of errors: Determinate error and indeterminate error. Definitions for statistics. Quantifying random error: Confidence limits, variance. Rejection of results.

Applications of titrimetric methods: Introduction, theory and applications of acid base titrimetry, complexometric titrations and redox titrimetry

Separation techniques: Purification-Crystallization, sublimation, fractional crystallization, distillation techniques (simple distillation, steam distillation, distillation under reduced pressure, and fractional distillation), solvent extraction.

Chromatography: Thin layer chromatography and ion-exchange chromatography and their applications in the separation of the components from the mixture.

References

1. Text Book of Physical Chem., by Samuel Glasstone, MacMillan Indian Ltd., 2nd Ed., (1974).
2. Elements of Physical Chem., by Lewis and Glasstone, 2nd Edn. Macmillan & Co Ltd.
3. Organic Chemistry, VI edition, Robert T. Morrison, Robert N. Boyd.
4. Organic Chemistry, Vol-I by I. L. Finar.
5. Vogel' text book of practical organic chemistry, V edition, B. S. Furniss, A. J. Hannaford, P. W. G. Smith, A. R. Tatehell.
6. Laboratory manual of Organic Chemistry by B. B. Dey and M. V. Sitaraman.
7. Practical Organic Chemistry by Mann F. G. and Saunders.
8. Fundamentals of analytical Chem., 8th Edition, D. A. Skoog, West, Holler and Crouch.
9. Principles and Practice of Analytical Chemistry, F.W. Fifield and Kealey, 3rd edition, 2000, Blackwell Sci., Ltd. Malden, USA.
10. Modern Analytical Chemistry, David Harvey, McGraw Hill, New Delhi, 2000.

FOURTH SEMESTER
HARD CORE
BIOINORGANIC CHEMISTRY
COURSE CODE: 21CHD10

Objectives

- To understand the structural parameters of metallo-proteins and their biological role.
- To learn the biological properties of metal complexes in chemo and radio therapeutics.

Course Outcome

- Structural building blocks of proteins, nucleic acids and their metal ion interactions. Biological role of Na/K channel, Ca, Vit B12, and coenzymes.
- Biochemical reactions of several metallo-enzymes and oxygen transport proteins.
- Medicinal applications of metals and metal complexes, and also treatment of toxicity due to heavy metal ions.

Pedagogy

- Conventional method such as black board and chalk is used.
- Modern methods like power point presentation and animations are used in class room teaching.

Course content

UNIT-I

[16 HOURS]

Structural and molecular biology: Introduction, The structural building blocks of proteins, the structural building block of nucleic acids. Metal ion interactions with nucleosides and nucleotides. General features of DNA - metal complex interaction.

Bioenergetics: Introduction, Redox reactions in metabolism, the central role of ATP in metabolism. Kinetic stability of ATP, Mitochondrial flow of electrons from NADH to O_2. Phosphorylation and respiratory chain. Oxidative phosphorylation.

Sodium and potassium-channels and pumps: Introduction, transport across membranes. Potassium and sodium channels, The sodium-potassium ATPase, Macrocyclic crown ether compounds, cryptands and ionophores.

Biochemistry of calcium: Introduction - comparison of Ca^{2+} and Mg^{2+}. Biological roles of calcium, binding sites of calcium and proteins, storage of calcium, calcium in muscle contraction, calcium in blood clotting process.

Vitamin B12 and Coenzymes: Structural feature, names of different forms, chemistry of cobalamin, biochemical functions of cobalamins, model compounds. Special characteristics of B12 co-enzyme. Photosystems.

UNIT-II

[16 HOURS]

Metal ion transport and storage: Iron storage and transport: Transferrin, ferritin, phosvitin and gastroferrin. Iron transport in microbes: siderophores, *in vivo* microbial transport of iron.

Oxygen transport and oxygen uptake proteins: Properties of dioxygen (O2): thermodynamic and kinetic aspects of dioxygen as an oxidant, activation of dioxygen through complexation with metal ions. Haemoglobin (Hb) and Myoglobin (Mb) in oxygen transport mechanism: Introduction to porphyrin system, substituent effects on porphyrin rings, functions of Hb and Mb. Characteristics of O_2^--binding interaction with Hb and Mb. Model compounds for oxygen

carriers (Vaska's complex and cobalt(III) – Schiff base complexes). Hemerythrin and hemocyanin.

Electron transport proteins and redox enzymes: Iron – sulfur proteins (rubredoxins and ferredoxins) and cytochromes including cytochrome P450. Catalase and peroxidase: Structure and reactivity. **Superoxide dismutase**: Structure and reactivity.

Molybdenum containing enzymes: Aspects of molybdenum chemistry, Xanthine oxidase, aldehyde oxidase, sulfite oxidase, nitrogenase and nitrite reductase.

Non-redox metalloenzymes - Structure and reactivity: Carboxypeptidase-A, alcohol dehydrogenase, leucineaminopeptidase and carbonic anhydrase.

UNIT-III

[16 HOURS]

Medicinal Inorganic Chemistry: State of the Art, New Trends, and a Vision of the Future: Introduction, metals and human biochemistry, general requirements.

Disease due to metal deficiency and treatment: Iron, zinc, copper, sodium, potassium, magnesium, calcium and selenium.

Metal complexes as drugs and therapeutic agents: Introduction, Antibacterial agents, Antiviral agents, **Cancer Therapy**: Current Status and Mechanism of Action of Platinum-Based Anticancer Drugs. Non-platinum anticancer agents.

Gold-Based Therapeutic Agents: **A New Perspective**: Uses for the treatment of rheumatoid arthritis, **Diabetes**: Vanadium and diabetes,

Metal-Based Radiopharmaceuticals: Metal complexes as radio diagnostic agents.

Treatment of toxicity due to inorganics: General aspects of mechanism of metal ion toxicity,

(i) Mechanism of antidote complex with poison, rendering it inert: arsenic, lead, mercury, iron and copper.

(ii) Antidote accelerated metabolic conversion of poison to non-toxic product: cyanide and carbon monoxide.

References

1. The Inorganic Chemistry of Biological Process- 2nd edition, M. N. Hughes, John Wiley and Sons, (1988).
2. Bioinorganic Chemistry - R.W. Hay, Ellis Horwood Ltd., (1984).
3. Biological Inorganic Chemistry – An Introduction, R.R. Crichton, Elsevier, (2008).
4. Bioinorganic Chemistry - A.K. Das, Books and Allied (P) Ltd, (2007).
5. Bioinorganic Chemistry - K. Hussain Reddy, New Age International Ltd. (2003).
6. Bioinorganic Chemistry: A Survey - EiichiroOchiai, Academic Press, (2008).
7. Bioinorganic Chemistry: A Short Course - 2nd edition, R.M. Roat-Malone, Wiley Interscience, (2007).
8. Medicinal Applications of Coodination Chemistry - Chris Jones and John Thornback, RSC Publishing, (2007).
9. Transition Metal Complexes as Drugs and Chemotherapeutic Agents - N. Farrell, Kluwer Academic Publishers (1989).
10. The Biological Chemistry of the Elements: The Inorganic Chemistry of Life - 2nd edition, J.J.R. Frausto da Silva and R.J.P. Williams, Oxford University Press, (2001).
11. Essentials of Inorganic Chemistry, K. A. Strohfeldt, John Wiley and Sons Ltd.,(2015).
12. Bioinorganic Medicinal Chemistry (Ed) EnzoAlessio, Wiley-VCH Verlag and Co., (2011).

HETEROCYCLIC AND BIOORGANIC CHEMISTRY

COURSE CODE: 21CHD11

Objectives

- To familiarize with the chemistry of heterocyclic compounds.
- To learn the synthesis and biological importance of carbohydrates, proteins and nucleic acid.

Course Outcome

- Structure, reactivity and synthesis of several heterocyclic compounds.
- Synthesis, industrial and biological importance of carbohydrates.
- General synthesis of amino acids, peptides, nucleic acids and their biological significance.

Pedagogy

- Conventional method such as black board and chalk is used.
- Modern methods like power point presentation and animations are used in class room teaching.

Course content

UNIT-I

[16 HOURS]

Heterocyclic compounds: Nomenclature; Structure, reactivity, synthesis and reactions of furan, pyrrole, thiophene, indole, pyridine, quinoline, isoquinoline, pyrazole, imidazole, pyrone, coumarin, chromones, pyrimidines, purines. Synthesis and synthetic applications of azirines & aziridines, azetidines, oxazolines, isoxazolines, isoxazole, triazole and azepines and benzodiazepines.

UNIT-II

[16 HOURS]

Protecting groups: Protection of hydroxyl, carboxyl, carbonyl, thiol and amino groups. Illustration of protection and deprotection in synthesis.

Carbohydrates: Introduction, Ring size determination of monosaccharides, configuration and conformations of monosaccharides, anomeric effect, Hudson‘s rules, epimerization and mutarotation. Synthesis, industrial and biological importance of glycosides, amino sugars, sucrose, maltose and lactose. Polysaccharides: General methods of structure elucidation. Industrial importance and biological importance of cellulose, starch, glycogen, dextran, hemicellulose, pectin, agar- agar. Photosynthesis and biosynthesis of carbohydrates.

UNIT-III

[16 HOURS]

Amino Acids: General structure, physiological properties, protection of functional groups. **Peptides**: Structure and conformation of peptide bond, peptide synthesis: Solution phase and Merrifield’s solid phase synthesis, Racemization and use of HOBt, Synthesis of oxytocin and vasopressin, biological importance of insulin, selective cleavage of polypeptide bonds (chemical and enzymatic). Proteins: Structure determination: *C* and *N* terminal residue determination, primary, secondary, tertiary and quaternary structure determination, denaturing and renaturing of proteins.

Nucleic acids: Introduction, structure and synthesis of nucleosides and nucleotides, protecting groups for hydroxy group in sugar, amino group in the base and phosphate functions. Methods of formation of internucleotide bonds: DCC, phosphodiester approach and phosphoramide methods. Solid phase synthesis of oligonucleotides. Structure of RNA and DNA, Crick-Watson model, role of nucleic acids in the biosynthesis of proteins.

References

1. Organic Chemistry, VI edition, Robert T. Morrison, Robert N. Boyd.
2. Organic Chemistry, Vol-II by I. L. Finar.
3. Schaum's outline of theory and problems of Organic Chemistry, Harbert Meislich, Howard Nechamkin and Jocob Sharefkin.
4. Natural products: Their chemistry and biological significance, J. Mann, R. S. Davidson, J. B. Banthorpe and J. B. Harborne.
5. A text book of synthetic drugs, O. D. Tyagi and M. Yadav.
6. Synthetic drugs, Gurdeep R. Chatwal.
7. Carbohydrate Chemistry and applications of carbohydrates, K. M. Lokanatha Rai.
8. Heterocyclic chemistry by Achison.
9. Heterocyclic chemistry by Smith and Joule.
10. Heterocyclic chemistry by Pacquete.

NUCLEAR, RADIATION AND PHOTOCHEMISTRY
COURSE CODE: 21CHD12

Objectives

- To understand the theory and applications of photochemistry.
- To learn the fundamentals and physico-chemical applications of radiation chemistry.
- To familiarize with the concepts of nuclear chemistry including radiochemical separation techniques and nuclear power reactors.

Course Outcome

- Understand the principles of photochemistry, its experimental techniques and applications.
- Fundamentals of radiation chemistry, experimental methods of detection of radiation and applications of radioisotopes.
- General aspects of nuclear chemistry, different types of nuclear reactions, production and separation of radioisotopes and also basic features of different types of nuclear reactors.

Pedagogy

- Conventional method such as black board and chalk is used.
- Modern methods like power point presentation and animations are used in class room teaching.

Course content

UNIT-I

[16 HOURS]

Nuclear chemistry: Nuclear stability – nuclear forces, packing fraction, binding energy, liquid drop, shell and collective models. Radioactive decay – General characteristics, decay kinetics, parent –daughter decay growth relationships, determination of half-lives. Brief survey of alpha, beta and gamma decays. Nuclear reactions – Bethe‘s notation, types of nuclear reactions – specific nuclear reactions, photonuclear reactions, Oppenheimer – Phillips process, spallation reactions, Szilard-Chalmers process. Definition of Curie and related calculations. Production of radioisotopes and labelled compounds by bombardment.

Radiochemical separation techniques: carriers, solvent extraction and ion ion-exchange methods.

Nuclear power reactors: Types of nuclear power reactors, basic features and components of nuclear power reactors. An introduction to breeder reactors.

UNIT-II

[16 HOURS]

Radiation chemistry: Introduction, units, interaction of electromagnetic radiation with matter, G-value, LET of radiation. Chemical dosimetry - Fricke and ceric sulphate dosimeters. Radiolysis - cysteine, water and biphenyl. Radioisotopes as tracers, use of isotopic tracers in the elucidation of reaction mechanism, structure determination and solubility of sparingly soluble substances. ^{14}C dating, medical applications of isotopic tracers. Physico-chemical applications – isotope dilution method, activation analysis and radiometric titrations. Hazards in radiochemical work and radiation protection.

Radiation detection and measurement: Experimental techniques in the assay of radioisotopes. Radiation detectors – ionization chambers, proportional and Geiger-Muller counters – G.M. Plateau, dead time, coincidence loss, determination of dead time. Scintillation and semiconductor radiation detectors.

UNIT-III

[16 HOURS]

Photochemistry: Introduction to photochemistry, laws of photochemistry, laws of light absorption, quantum yield and its determination, factors affecting quantum yield, Actinometry - Uranyloxalate and potassium ferrioxalate actinometers, acetone and diethylketone actinometers. Term symbols for atoms and its significance. Photochemical properties of electronically excited molecules, nature of changes on electronic excitation, shapes of absorption band and Frank Condon principle. Experimental techniques to determine the intermediates in photochemical reactions. Photosensitization: by mercury, dissociation of H_2. Photochemical kinetics of: Decomposition of CH_3CHO, dissociation of HI and formation of HCl. Fluorescence and phosphorescence – theory and applications. Resonance fluorescence and quenching of fluorescence, Kinetics of colliosional quenching (Stern-Volmer equation).

Photocatalyst – Principle, application of ZnO/TiO_2 photocatalysts in the photo cleavage of dyes, environmentally hazardous waste and industrial effluents. Effect of photo degradation on COD value.

References

1. Photochemistry, Calvert and Pitts, Wiley, New York (1996).
2. Fundamentals of Photochemistry, Gohatgi-Mukherjee, New Age International Ltd., 1986.
3. Principles and Applications of Photochemistry, R. P. Wayne, Elsevier, New York (1970).
4. Photochemistry, Paul Suppan, RSC, London (1994).
5. Introduction to Semiconductor Materials and devices, M. S. Tyagi, John Wiley & Sons, 1991.
6. Nuclear Chemistry by Friedlander and Kennedy, John Wiley and Sons (1987).
7. Essentials of Nuclear Chemistry by H.J. Arnikar, Eastern Wiley (1990).
8. Nuclear Chemistry by U.N. Dash, Sultan Chand and Sons (1991).
9. Fundamentals of Radiochemistry by D.D. Sood, A.V.R. Reddy and N. Ramamoorthy.
10. Nuclear Radiation Detectors by S.S. Kapoor and Ramamoorthy, Wiley Eastern (1986).

INSTRUMENTAL METHODS OF ANALYSIS

COURSE CODE: 21CHD13

Objectives

- To understand the theory, instrumentation and applications of atomic emission spectroscopy.
- To get excel the knowledge on electro analytical techniques
- To learn the principles, instrumentation and applications of thermal methods of analysis.

Course Outcomes

After studying this course, the student to:

- Gain the knowledge on the differences between classical and instrumental methods of chemical analysis.
- Explain different types of instrumental methods employed in chemical analysis.
- Develop an understanding of the range and theories of instrumental methods available in analytical chemistry.
- Make clear distinctions among spectrometric, electro-analytical, thermal and microscopic methods.
- Gain knowledge pertaining to the appropriate instrumental techniques.
- Obtain the practical experience in selected instrumental methods of analysis.
- Develop the skills on instrumental methods for planning, developing, conducting, reviewing, conducting experimentsand reporting results.

Pedagogy

- Conventional method such as black board and chalk is used.
- Modern methods like power point presentation and animations are used in class room teaching.
- Students will be assigned numerical problems to understand the concepts.

UNIT – I

Flame photometry and Atomic absorption spectrometry: Energy level diagrams-atomic absorption spectra. Flame characteristics.Flame atomizers and electrothermal atomization.Comparison of spectral interferences, chemical and physical interferences in FP and AAS.Background correction methods in AAS.Use of organic solvents. Quantitative techniques-calibration curve procedure and the standard addition technique. Typical commercial instruments for FP and AAS (Single and double beam atomic absorption spectrophotometers), applications of FES and AAS.Qualitative analysis and quantitative evaluations.Relative detectabilities of atomic absorption and flame emission spectrometry.

Molecular luminescence spectrometry: Theoretical basis for fluorescence and phosphorescence. Singlet and triplet excited states. Variables affecting luminescence-quantum efficiency, transition types, structure and structural rigidity, temperature and solvent effects, effect of *p*H, dissolved

oxygen and concentration effect. Excitation spectra *vs* emission spectra.Origin of fluorescence, relationship between fluorescence and concentration.Fluorescence instrumentation-fluorometers and spectrofluorometers.Sensitivity and selectivity.Modification necessary to measure phosphorescence.Applications of fluorometry: inorganic and organic analyses.

Nephelometry and turbidometry: Principles, instrumentation and applications.

[16 HOURS]

UNIT – II

Electroanalytical methods: Classification. Potentiometers, galvanostats and potentiostats.

Potentiometric methods of analysis.Potentiometric electrochemical cells.The Nernst equation.Liquid junction potentials.Reference electrodes-SHE, calomel electrode and silver/ silver chloride electrode.Metallic indicator electrodes-electrodes of first kind and second kind.Redox electrodes.Membrane electrodes –membrane potential, selectivity of membranes.Glass ion selective electrodes.Crystalline solid state ion selective electrodes.Liquid-based ion selective electrodes.Gas sensing electrodes.Potentiometric biosensors.Quantitative applications.Activity *vs* concentration.Quantitative analysis using external standards and the method of standard additions.Measurement of*p*H.Clinical and environmental applications.

Electrogravimetric analysis: Theory, apparatus, cell processes, deposition and separation, electrolytic separation of metals, applications.

Coulometric methods of analysis: General discussion, coulometry at controlled potential, apparatus and general technique, applications,coulometric titrations (amperometriccoulometric)-principles, apparatus, comparison of coulometric titrations with conventional titrations, automatic coulometric titrations, applications.

Amperometric titrations: Principle, titration curve, apparatus and techniques, applications.

Voltammetry: Fundamentals of voltammetry. Cyclic voltammetry**:** Principles and applications. Stripping analysis: Stripping voltammetry-basic principles, electrodes used for stripping analysis, apparatus for stripping analysis, applications, determination of lead in water voltammetry with micro electrodes.

[16 HOURS]

UNIT – III

Thermal method of analysis: Introduction,

Thermogravimetric analysis (TGA): Types of thermogravimetric analysis, principles and general thermal decomposition curve. Factors affecting the results-heating rate, furnace, instrument control/ data handling. Applications-purity and thermal stability, evaluation of correct drying temperature, analysis of complex mixture and determination of kinetic parameters of thermal degradation.

Differential thermal analysis (DTA): General principles. Theory-variables affecting the DTA curves. Instrumentation. Applications-analysis of the physical mixtures and thermal behaviour study. Determination of melting point, boiling point and decomposition point.

Differential scanning calorimetry (DSC): Basic principle. Instrumentation-power compensated DSC, Heat flux DSC. Applications- studies of thermal transitions and isothermal crystallization. Testing the purity of the pharmaceutical samples.

Thermomechanical analysis. Dynamic mechanical analysis**.**

Enthalpimetric analysis: Thermometric titrations and direct injection enthalpimetry: Principles,

apparatus and applications.

Microscopic analysis: Principle and mechanism in characterization of compounds by scanning electron and transmission electron microscopic (SEM & TEM) techniques. Components of instruments of SEM and TEM.

[16 HOURS]

References

1. Fundamental of Analytical Chemistry, D.A. Skoog, D.M. West, Holler and Crouch 8th edition, 2005, Saunders College Publishing, New York.
2. Analytical Chemistry, G.D. Christian, 5th edition, 2001 John Wiley & Sons, Inc. India.
3. Quantitative Analysis, R.A. Day and A.L. Underwood, 6th edition,1993 Prentice Hall, Inc. New Delhi.
4. Vogel's Textbook of Quantitative Chemical Analysis, J. Mendham, R.C. Denney, J.D. Barnes and M.J.K. Thomas, 6th edition, Third Indian Reprint, 2003 Pearson Education Pvt. Ltd., New Delhi.
5. Analytical Chemistry Principles, John H. Kennedy, 2nd edition, Saunders CollegePublishing, California, 1990.
6. Instrumental Methods of Analysis by H.H. Willard, L.L. Merritt and J.A. Dean,7th Edition, CBS Publishers, New Delhi, 1988.
7. Principles and Practice of Analytical Chemistry, F.W. Fifield and Kealey, 3rd edition, 2000, Blackwell Sci., Ltd. Malden, USA.
8. Modern Analytical Chemistry, David Harvey, McGraw Hill, New Delhi, 2000.
9. Introduction to Instrumental Analysis, Braun, Pharm. Med. Press. India.
10. Instant Notes of Analytical Chemistry, Kealey and Haines, Viva Books Pvt. Ltd., New Delhi, 2002.
11. Analytical Transmission Electron Microscopy, An Introduction for OperatorsThomas, Jürgen, Gemming, Thomas., Springer, 2014.
12. Scanning Transmission Electron Microscopy, Imaging and Analysis.Pennycook, Stephen J., Nellist, Peter D. (Eds.), Springer, 2011.

SOFT CORE
ANALYTICAL CHEMISTRY PRACTICALS

COURSE CODE: 21CHD50 [64 HOURS]

Objectives

- To familiarize with the handling of instruments in the quantitative analysis of various samples.
- To understand the analysis of real samples like waste water, soil samples and biological samples and mixtures

Course Outcome

After studying this course, the student to:

- Get experience on analysis of various complex mixtures by following multistep reactions.
- Acquire the knowledge on handling instruments and to overcome the general problems arises during the analysis.
- Acquire industrial skills required for sampling, analytical and interpretation and presentation of results.
- Possess adequate knowledge on literature search for developed analytical methods.

Pedagogy

- Each student performs experiments as per the protocol in practical classes.
- Computer aided applications are used for the evaluation of experimental results.

[128 HOURS]

PART – III

1. Determination of calcium in limestone by redox, acid-base and complexation titrations.
2. Determination of vitamin C in orange juice by titration with cerium(IV) and with 2,6-dichlorophenol indophenol.
3. Determination of mercury in an algaecide by EDTA titration; and arsenic in ant control preparation by redox titration.
4. Determination of aluminium and magnesium in antacids by EDTA titration.
5. Analysis of a copper-nickel alloy sample for copper and nickel by EDTA titration using masking and selective demasking reactions.
6. Determination of saccharin in tablets by precipitation titration.
7. Determination of iodine value and saponification value of edible oils.
8. Determination of ascorbic acid in goose berry/bitter gourd by titrimetry and spectrophotometry using *N*-bromosuccinimide (NBS).
9. Analysis of a mixture of iron(II) and iron(III) by EDTA titration using *p*H control.
10. Determination of sulpha drugs by potentiometry using $NaNO_2$ and iodometric assay of penicillin.
11. Solvent extraction method for determination of silver as ion-associate with 1,10-phenanthroline and bromopyragallol red.
12. Electrolytic determination of copper and lead in brass.

13. Polarographic determination of copper and zinc in brass.
14. Determination of sodium, potassium and calcium in mineral waters by atomic emission spectrometry.
15. Determination of iron in mustard seeds and phosphorus in peas by spectrophotometry.
16. Analysis of waste water for anionic detergents and phenol by spectrophotometry.
17. Fluorimetric determination of riboflavin (vit.B_2) in tablets.
18. Colorimetric analysis of procaine by diazotization and coupling reaction.
19. Determination of manganese in steel by extraction-free spectrophotometry and molybdenum in steel by extractive spectrophotometry.
20. Determination of ethanol in wine by titrimetric and spectrophotometric dichromate methods

PART – IV

1. Analysis of waste waters for DO and COD by titrimetry.
2. Analysis of a ground water sample for sulphate by titrimetry (EDTA) and turbidimetry.
3. Potentiometric determination of formula and stability constant of a silver-ammonia complex ion.
4. Determination of aspirin, phenacetin and caffeine in mixture and APC tablets by solvent extraction and UV spectrophotometry.
5. Kinetic determination of urinary creatinine and purity of a commercial H_2O_2 sample.
6. Determination of chromium(III) and iron(III) in a mixture by kinetic masking methods.
7. Catalytic determination of traces of selenium in biological materials and iodide in blood serum.
8. Photometric and potentiometric titration of iron(III) with EDTA.
9. Photometric and potentiometric titration of copper with EDTA.
10. Determination of copper(II) and iron(III) in mixture by photometric titration with EDTA.
11. Analysis of brackish water for chloride content by a) spectrophotometry (mercuric thiocyanate method), b) conductometry (silver nitrate) and c) potentiometry (silver nitrate).
12. Conductometric titration of sodium acetate with HCl and NH_4Cl with NaOH.
13. Ascorbic acid determination in natural orange juice by coulometry.
14. Spectrophotometric determination of iron in natural waters using thiocyanate and 1,10-phenanthroline as reagents.
15. Determination of fluoride in drinking water/ground water by spectrophotometry(alizarin red lake method).
16. Analysis of waste water for
    a) Phosphate by molybdenum blue method
    b) ammonia-nitrogen by Nessler's method
    c) nitrite-nitrogen by NEDA method
15. Analysis of a soil sample for
    a) Calcium carbonate and organic carbon by titrimetry.
    b) Calcium and magnesium by EDTA titration.

16. Analysis of a soil sample for
    a) Nitrogen content by Kjeldahl method
    b) Available phosphorus by spectrophotometry.
    c) Nitrate-nitrogen/nitrite nitrogen/ammonia nitrogen by spectrophotometry.
    d) Sodium and potassium by flame photometry.
17. Analysis of urine for
    a) Urea and uric acid by titrimetry and spectrophotometry.
    b) Sulphate by precipitation titration after ion-exchange separation.
    c) Sugar by Benedict's reagent.
18. Analysis of blood for
    a) cholesterol by spectrophotometry
    b) Bicarbonate by acid-base titration.
19. Fluorimetric determination of quinine in an antimalarial tablet.

References

1. Fundamental of Analytical Chemistry, D.A. Skoog, D.M. West, Holler and Crouch 8thedition, 2005, Saunders College Publishing, New York.
2. Analytical Chemistry, G.D. Christian, 5th edition, 2001 John Wiley & Sons, Inc. India.
3. Quantitative Analysis, R.A. Day and A.L. Underwood, 6th edition, 1993, prentice Hall, Inc. New Delhi.
4. Vogel's Textbook of Quantitative Chemical Analysis, J. Mendham, R.C. Denney, J.D. Barnes and M.J.K. Thomas, 6th edition, Third Indian Reprint, 2003 Pearson Education Pvt. Ltd., New Delhi.
5. Analytical Chemistry Principles, John H. Kennedy, 2nd edition, Saunders College Publishing, California, 1990.
6. Quantitative Analysis of Drugs in Pharmaceutical Formulations, P. D. Sethi, 3rdedition, CBS Publishers & Distributors, New Delhi, 1997.
7. Practical Clinical biochemistry methods and interpretations, R. Chawla, J.P. BothersMedical Publishers (P) Ltd., 1995.
8. Laboratory Manual in Biochemistry, J. Jayaraman, New Age International Publishers, New Delhi, 1981.
9. Experiments on Water Pollution, D.I. Williams and D. Anglesia, Wayland Publishers Ltd., England, 1978.
10. Experiments on Land Pollution, D.I. Williams and D. Anglesia, Wayland Publishers Ltd., England, 1978.
15. Experiments in Environmental Chemistry, P.D. Vowler and D.W. Counel, Pergamon Press, Oxford 1980.
16. Manual Soil Laboratory Testing, vol.I, K.H. Head, Pentech Press, London 1980.

INORGANIC CHEMISTRY PRACTICALS
COURSE CODE: 21CHD51 [64 HOURS]

Objectives

- To familiarize with the instrumental methods of analysis for determining metals present in the different samples.
- To familiarize with the preparation and characterization of different inorganic complexes.

Course Outcome

- Determination of alloy samples and understanding the electrochemical deposition of metals.
- Preparation and characterization of coordination compounds.
- Determination of composition, stability constant and magnetic susceptibility of metal complexes.

Pedagogy

- Each student performs experiments as per the protocol in practical classes.
- Spectroscopic tools are applied for the characterization of the synthesized complexes.

Course experiments

PART-A

1. Determination of bismuth, cadmium and lead in a mixture: Analysis of a low melting alloy (Wood's alloy).
2. Simultaneous spectrophotometric determination of chromium and manganese in a steel solution.
3. Determination of chromium(III) and iron(III) in a mixture: Kinetic masking method.
4. Electrogravimetric determination of:
   a) Copper in copper sulphate
   b) Nickel in nickel suphate
   c) Copper and nickel in alloy solution
   d) Lead in lead nitrate.
5. Flame photometric determination of the following metal ions from different samples: a) sodium b) potassium and c) sodium and potassium in a mixture.
6. Polarographic estimation of cadmium and zinc.
7. Determination of iron as the 8-hydroxyquinolate by solvent extraction method.
8. Quantitative determination of nickel using dithizone and 1,10-phenanthroline by synergistic extraction.
9. Spectrophotometric determination of the *p*Ka value of methyl red.
10. Semimicro gravimetric determination of aluminium.

PART-B

1. Preparation and characterization of:
   a) Chloropentammine cobalt(III) chloride
   b) Estimation of chloride in a complex by potentiometric or ion-exchange method
   c) Record the electronic absorption spectrum of a complex and verify Tanabe Sugano diagram.
2. Preparation of *cis*- and *trans*- dichlorobis(ethylenediammine) cobalt(III)chloride. Record the UV-Vis spectra and compare it with *cis*-form. Measure the molar conductance.

3. Preparation of hexammine cobalt(III) chloride and estimate cobalt ion.
4. Determination of magnetic susceptibility of any two compounds/complexes by Gouy method.
5. Determination of the composition of iron-phenanthroline complex by:
   (d) Job's method
   (e) mole-ratio method and
   (f) Slope-ratio method.
6. Determine the stability constant of iron-tiron/iron-phenanthroline by Turner-Anderson method.
7. Preparation of potassium tris(oxalato)ferrate(III) and estimate the metal ion.
8. Preparation of acetyl acetonatomanganese(III) complex.
9. Preparation of tris(en)nickel(II) chloride and hexamine nickel(II) chloride complexes. Record electronic spectra and evaluate spectrochemical series.
10. Using chloropentammine cobalt(III) chloride, prepare nitro and nitritopentammine cobalt(III) chloride. Record the IR spectra of the isomers and interpret.
11. Estimate the chloride ion in a given complex by silver nitrate titration after ion-exchange separation.
12. Demonstration Experiments:
   (d) Recording and interpretation of IR and NMR spectra of complexes.
   (e) Spectrochemical series-Evaluation of Dq value.
   (f) DNA interaction with metal complexes by UV-visible absorption and viscosity methods.

References

1. Advanced Physico-Chemical Experiments – J. Rose.
2. Instrumental Analysis Manual - Modern Experiments for Laboratory – G.G. Guilbault and L.G. Hargis.
3. A Text Book of Quantitative Inorganic Analysis – A.I. Vogel, 5th edition.
4. Experimental Inorganic Chemistry – G. Palmer.
5. Inorganic Synthesis – O. Glemser.
6. Experimental Inorganic/Physical Chemistry- Mounir A. Malati.
7. Quantitative Chemical Analysis – Daniel C. Harris, (2006) 7th edition.
8. Spectrophotometric Determination of Elements – Z. Marczenko

ORGANIC CHEMISTRY PRACTICALS
COURSE CODE: 21CHD52 [64 HOURS]

Objectives

- To understand the concepts of isolation and purification of natural products.
- To familiarize with the estimation of different functional groups in organic compounds.

Course Outcome

- The isolation of caffeine, carotene, lycopene, cincole, azelaic acid and piperine from respective natural sources.
- Estimation of ketones, sugars, nitro and amino groups in natural products.
- Interpret UV, IR, NMR and MS data of different organic compounds.

Pedagogy

- Each student performs experiments as per the protocol in practical classes.
- Spectroscopic tools are applied for the characterization of isolated natural products.

Course experiments

PART-A

1. Fractional crystallization: separation of mixture of naphthalene and biphenyl.
2. Thin layer chromatography: Separation of plant pigments.
3. Column chromatography: Separation of *o*- and *p*-nitro aniline
4. Isolation of piperine from pepper.
5. Isolation of caffeine from tea.
6. Isolation of azelaic acid from castor oil.
7. Isolation of carotene from carrot.
8. Isolation of lycopene from tomato.
9. Isolation of cincole from eucalyptus leaves.

PART-B

Isolation of natural products & estimations:

1. Estimation of ketones by haloform reaction.
2. Estimation of sugars by Bertrand's method.
3. Estimation of nitro groups.
4. Estimation of amino group.
5. Determination of enol content by Meyer's method.
6. Determination of iodine value of an oil or fat.
7. Determination of saponification value of oil.
8. Determination of equivalent weight of carboxylic acid by silver salt method

Interpretation of Spectra: Structural elucidation of some simple organic compounds by UV, IR, NMR and mass. Spectra have to be provided by the Teachers/ Examiners.

References

1. Vogel' text book of practical organic chemistry, V edition, B. S. Furniss, A. J. Hannaford, P. W. G. Smith, A. R. Tatehell.
2. Elementary practical organic chemistry, Part-III: Quantitative organic analysis, By Arthur I, Vogel.
3. Laboratory manual of Organic Chemistry by B. B. Dey and M. V. Sitaraman.
4. Practical Organic Chemistry by Mann F. G. and Saunders.
5. Natural products: A laboratory guide by Raphael Ikhan.

PHYSICAL CHEMISTRY PRACTICALS

Objectives **COURSE CODE: 21CHD53** **[64 HOURS]**

- To understand the significance of various factors influencing the reaction rate in proposing the reaction mechanism.
- To understand electrochemical and spectrophotometric methods of quantification of samples, and also determination of physico-chemical parameters of some important samples.

Course Outcome

- Students can able to develop experimental skill and interpretation of plausible mechanisms of reactions.
- Gain practical knowledge on the theoretical basis of electrochemistry, thermodynamics, and spectrophotometry experiments.
- This helps in academics, research and industries.

Pedagogy

- Each student performs experiments as per the protocol in practical classes.
- Electrochemical and spectrophotometric tools are used to conduct the experiments.

Course experiments

PART-A

1. Determination of order of reaction for the acid hydrolysis of methyl acetate and evaluation of activation parameters.
2. Evaluation of Arrhenius parameters for the reaction between $K_2S_2O_8$ and KI (First order reaction).
3. Study of kinetics of autocatalytic reaction between oxalic acid and $KMnO_4$ and determine the order of reaction with respect to $KMnO_4$.
4. Kinetics of saponification of ethyl acetate by conductivity method and study the effect of dielectric constant of the medium (using CH_3OH).
5. Study of effect of salt (ionic strength) on the kinetics of reaction between potassium persulphate and potassium iodide (second order reaction).
6. Spectrophotometric kinetics of oxidation of indigocarmine (IC) by chloramine-T (CAT) – Determination of order of reaction with respect to [CAT] and [IC].
7. To study the acid catalysed kinetics of oxidation of glycine by chloramine-T (CAT) - determination of order of reaction with respect to [CAT] and [glycine].
8. Study the phase diagram of three component system (Glacial acetic acid-Chloroform-water system / Glacial acetic acid-Acetone-Water system).
9. Study the rate of corrosion and inhibition efficiency of an inhibitor (thiourea) on mild steel/Al/Cu by weight loss method.

PART-B

1. Conductometric titration of orthophosphoric acid against NaOH.
2. Conductometric titration of a mixture of HCl, CH_3COOH and $CuSO_4$ against NaOH.
3. Conductometric titration of thorium nitrate with potassium tartarate.
4. Potentiometric titration of mixture of weak acids (acetic acid and monochloroacetic acid) against NaOH.
5. Dwtermination of pK_a values of phosphoric acid by potentiometric / pH metric method.

6. Potentiometric titration of mixture of KCl+KBr+KI against $AgNO_3$.
7. Potentiometric titration of FAS against ceric sulphate and sodium metavenadate, determine the concentration of FAS and redox potential.
8. Potentiometric titration of lead nitrate against EDTA and determine the concentration of lead nitrate solution.
9. Determination of *p*K value of an indicator (methyl orange/methyl red).
10. Spectrophotometric analysis of a mixture of (a) $KMnO_4$ and $K_2Cr_2O_7$.
11. Study of complex formation between ferric salt and salicylic acid.

References

1. Practical Physical Chemistry – A.J. Findlay.
2. Experimental Physical Chemistry – F. Daniels *et al*.
3. Selected Experiments in Physical Chemistry – Latham.
4. Experiments in Physical Chemistry – James and Prichard.
5. Experiments in Physical Chemistry – Shoemaker.
6. Advanced Physico-Chemical Experiments – J. Rose.
7. Practical Physical Chemistry – S.R. Palit.
8. Experiments in Physical Chemistry – Yadav, Geol Publishing House.
9. Experiments in Physical Chemistry – Palmer.
10. Experiments in Chemistry – D.V. Jahagirdar, Himalaya Publishing House, Bombay, (1994).
11. Experimental Physical Chemistry – R.C. Das and B. Behera, Tata Mc Graw Hill.

SOFT CORE

DISSERTATION/PROJECT WORK–SOFT CORE

COURSE CODE: 21CHD54

Course Outcome

After studying this course, a student will be to:

- Carry out literature survey on the problem/s to be solved.
- Learn and follow suitable research methodologies to propose and to perform Experiments.
- Attain the state of ability to take up research work.
- Better understanding about research articles, patents, book chapters or books on relevant research problem.
- Acquire skills of writing research reports in the form of articles or thesis.

Student may take up Project Work/ Dissertation under the guidance of the faculty of the department during the IV Semester as a Soft Core course.

SOFT CORE
AUTOMATED METHODS AND REAL SAMPLE ANALYSIS
COURSE CODE: 21CHD55

Course content

Objectives

- To understand the instrumentation and applications of automated methods of analysis.
- To familiarize with analysis of real samples and clinical analysis.

Course Outcome

- Understand various types of automated methods of analysis.
- Identify activities that can be fully or partially automated.
- Automated chemical analysis will be very helpful in the clinical as well as pharmaceutical field to perform the purity analysis of the sample, although the sample size is very small, expensive and fast analysis.

Pedagogy

- Conventional method such as black board and chalk is used.
- Modern methods like power point presentation and animations are used in class room teaching.
- Students will be assigned numerical problems to understand the concepts.

UNIT-I

[16 HOURS]

Automated methods of analysis: An overview, definition, distinction between automatic and automated systems, advantages and disadvantages by automation, types of automated techniques. Nondiscrete techniques, segmented flow methods and basic equipment, special techniques and devices, theoretical considerations and problems, applications. Single channel and multi channel auto analysers, BUN analyzers, automatic glucose analyzers and ammonia in water analyzers, COD analyzers, CFA in industry. Non-segmented flow methods: Flow injection analysis. Principles, types of dispersion, factors affecting dispersion, applications of small, medium and large dispersions. Stopped flow methods, flow injection titrations. Discrete methods: Centrifugal fast scan analyzer, automatic multipurpose analyzers, Automatic elemental analyzer, automated analyzer based on multi layer film-principles, film structure, instrumentation applications. Comparison of discrete and non-discrete methods. Advantages of flow injection measurements over continuous flow measurements.

UNIT-II

[16 HOURS]

Analysis of real samples-real sample, choice of analytical method-defining the problem, investigating the literature, choosing or devising a method, testing the procedure, analysis of standard samples, using other methods, standard addition to the sample. Accuracy in the analysis of complex materials.

Decomposing and dissolving the sample- sources of error in decomposing and dissolution. Decomposing samples with inorganic acids. Microwave decomposition. Combustion methods for decomposing organic samples. Decomposition of inorganic materials with fluxes.

Clinical Analysis- Introduction, features of clinical analysis. Composition of blood, collection and preservation of samples. Common determinations - serum electrolytes, blood glucose and blood urea nitrogen, uric acid, albumin and globulins, acid and alkaline phosphates, barbiturates,

chloride, sodium and potassium, bicarbonate, serum creatinine and cholesterol. Urine analysis-Principle components. Sample collection and preservation. Determination of creatinine, chloride, uric acid, ammonia, ascorbic acid, bilirubin and calcium.

References

1. Fundamental of Analytical Chemistry, D.A. Skoog, D.M. West, Holler and Crouch 8th edition, 2005, Saunders College Publishing, NewYork.
2. Analytical Chemistry, G.D. Christian, 5th ed., 2001 John Wiley & Sons, Inc,India.
3. Quantitative Analysis, R.A. Day and A.L. Underwood, 6th edition,1993 prenticeHall, Inc. NewDelhi.
4. Vogel's Textbook of Quantitative Chemical Analysis, J. Mendham, R.C. Denney,J.D. Barnes and M.J.K. Thomas, 6th edition, Third Inidan Reprint.2003 PearsonEducation Pvt. Ltd., NewDelhi.
5. Analytical Chemistry Principles, John H. Kennedy, 2nd edition, Saunders College Publishing, California,1990.
6. Principles and practice of analytical chemistry. Fifield andKealey.
7. Instant Notes of Analytical Chemistry, Kealey and Haines, Viva Books Pvt.Ltd.,2002.

BIOINORGANIC PHOTOCHEMISTRY
COURSE CODE: 21CHD56

Objectives

- To understand the photochemistry of inorganic compounds.
- To familiarize with the applications of fluorescents and chromogenic sensing and labeling.
- To learn photodynamic inactivation of microorganisms.

Course Outcome

- Basic concepts of photochemistry and photochemical reactions.
- Understand many organometallic compounds as fluorescent agents in the detection of cations, anions and toxic ions in the living system.
- Theory of photodynamics, and photocatalysis.

Pedagogy

- Conventional method such as black board and chalk is used.
- Modern methods like power point presentation and animations are used in class room teaching.

Course content

UNIT-I **[16 HOURS]**

Introduction, Philosophy of bioinorganic photochemistry

Fundamentals: Light and matter. Nature of light, Accessible light sources and Interaction between light and matter.

Formation and properties of electronic excited states: Wave mechanics and quantum numbers and Electronic excitation.

Photophysical deactivation of electronic excited states: Spontaneous deactivation, Quenching and Coordination and organometallic compounds.

Photochemical reactions: Photochemical reaction channels, Intramolecular photoreactions, Photodissociation and photoionization, Photoisomerization, Intermolecular photoreactions, the coordination compound specificity. Ligand field photochemistry, Photochemistry from LC or LLCT states, Inner-sphere charge transfer photochemistry, Outer-sphere charge transfer photochemistry, Photosensitized reactions, Homogeneous photocatalysis.

Natural photo-processes involving inorganic compounds

From interstellar space to planetary atmospheres: Homogeneous systems: from interstellar space to planetary atmospheres and primitive soup models. Heterogeneous photochemistry in ice phases.

UNIT-II

[16 HOURS]

Applications: Fluorescent and chromogenic sensing and labeling: Cations as targets in biochemical sensing Cations common in biological systems, Fluorescent detection of toxic cations, Fluorescent and chromogenic sensing of anions, Common anions and Toxic anions. Optical detection of neutral molecules. Nanoparticles in biochemical sensing and labeling.

Therapeutic strategies; Photobio-stimulation, Photo-activation of drugs, Photodynamic therapy, Mechanisms of PDT and PTT. Photosensitizers, Inorganic photosensitizers, Supporting role of metal ions in photodynamic therapy, and Combination of polypyrrolic photosensitizers and metallo-pharmaceuticals, Recent PDT development and Nanomedical methods.

Photodynamic inactivation of microorganisms: Bacteria, Viruses, Fungi and Parasites.

Phototoxicity and photoprotection: Chemical and physical photoprotection. Inorganic sunscreens.

Photocatalysis in environmental protection: Development of homo- and heterogeneous methods. Homogeneous photocatalysis and heterogeneous photocatalysis. Water and air detoxification. Other applications of photocatalysis.

References

1. Bioinorganic Photochemistry- Grazyna Stochel, Malgorzata Brindell, Wojciech Macyk, Zofia Stasicka, Konrad Szacilowski. Wiley Publishers (2009).
2. Photochemistry and Photophysics of Coordination Compounds I-Volume Editors: Balzani, V., Campagna, Springer Publications.Vol.280, 2007.
3. Photochemistry and Photophysics of Coordination Compounds II - Volume Editors: Balzani, V., Campagna, Springer Publications.Vol.281, 2007.

MEDICINAL CHEMISTRY

COURSE CODE: 21CHD57

Objectives

- To familiarize with the methods of isolation, structural elucidation and synthesis of carotenoids and vitamins.
- To learn the basics of medicinal chemistry.
- To understand the synthesis and applications of synthetic drugs.

Course Outcome

- To acquire the knowledge of biological significances of Carotenoids and vitamins.
- Understand the pharmacodynamics, pharmacokinetics and chemotherapy of several drugs.
- Synthesis and mechanism of drug actions of antimalarial, anticancer agents and cardiovascular drugs.

Pedagogy

- Conventional method such as black board and chalk is used.
- Modern methods like power point presentation and animations are used in class room teaching.

Course content

UNIT-I

[16 HOURS]

Carotenoids: Methods of isolation. Structure elucidation and synthesis of β-carotene. Structural relationship of α-, β- and γ-carotenes.

Vitamins: Introduction, constitution, synthesis and biological significance of thiamine, riboflavin, pyridoxine, biotin, ascorbic acid, vitamin A_1 & A_2, E_1 and E_2 , B_{12} and K groups.

UNIT-II

[16 HOURS]

Medicinal chemistry: Introduction, pharmacodynamics, pharmacokinetics, chemotherapy, metabolites antimetabolites, agonists and antagonists. Classification of drugs on the basis of therapeutic action. Concept of pro drug and soft drug. Theories of drug activity: Occupancy theory, rate theory, induced fit theory, concept of drug receptors. Evaluation methods: Free-Wilson analysis, Hansch-analysis, ID_{50} and IC_{50} (mathematical derivation of equation excluded).

Antipyretics: Aspirin, paracetamol, phenacetin, novalgin and their mechanism of action.

Antimalarials: Structure, synthesis and mechanism of action of quinine and chloroquine.

Hypnotics: Analgesics and sedatives: phenoborbitol, chlordiazepoxide, meprobamate.

Stimulants: Structure, action and synthesis of caffeine.

Antineoplastics: Structure, pharmacological action and synthesis of 5-flurouracil, chlorambucil, cyclophosphaminde and podophyllotoxin.

Cardiovascular drugs: Introduction, synthesis of dithiazem, verapamil, methyldopa, atenolol and oxprenolol.

References

1. Organic Chemistry, VI edition, Robert T. Morrison, Robert N. Boyd.
2. Organic Chemistry, Vol-II by I. L. Finar.
3. A text book of synthetic drugs, O. D. Tyagi and M. Yadav.
4. Synthetic drugs, Gurdeep R. Chatwal.
5. Medicinal chemistry by Graham Patrick.

QUANTUM CHEMISTRY AND BIOSENSORS

COURSE CODE: 21CHD58

Objectives

- To understand the applications of quantum mechanics to HMO theory.
- To learn the basics of biosensors and their applications.

Course Outcome

- Applications of quantum chemical methods in the theoretical evaluation of energies of molecules and reactions.
- Development of chemical and biochemical sensors and their applications in the determination of biomolecules.

Pedagogy

- Conventional method such as black board and chalk is used.
- Modern methods like power point presentation and animations are also used in class room teaching.
- Students will be assigned to solve the numerical problems.

Course content

UNIT-I

16 HOURS]

Applications of quantum mechanics: Variation theorem: Statement and proof, application of variation theorem to a particle in one dimensional box, linear oscillator, H and He-atoms. Molecular orbital theory, LCAO-MO approximation, application to hydrogen molecule ion (H^{2+}), energy levels of H^{2+}, bonding and antibonding molecular orbitals, energy distribution, potential energy diagrams. Valence bond theory (VB), theory of H_2 molecule, Heitler-London method, energy levels, various modifications of Heitler-London wave function. Comparison of MO and VB theories. SCF method for many electron atom. Slater Orbitals –Effective nuclear charge (ENC), expressions for slater orbitals for 1s, 2s, 3s, 2p and 3d electrons (no derivation), Slater's rules for calculation of ENC. Theories of valence – Introduction, linear and non-linear variation functions, secular equations, coulombic, exchange, normalization and overlap integrals, secular determinants.

Huckel molecular orbital theory: Outline of method, assumptions. Application to ethylene, allyl radical, cyclopropenyl radical, butadiene, cyclobutadine, bicyclobutadine and benzene. Calculation of delocalization energy, charge density, π-mobile bond order and free valence.

UNIT-II

[16 HOURS]

Biosensors: Introduction, electrochemical biosensors: Amperometric, potentiometric and conductometric biosensors. Optical based biosensors: Surface plasma resonance, chemiluminesence, fibre optic biosensors, piozoelectronic sensors, mass selective and thermal sensors. Bio-recognition elements in biosensors, immobilization methods, principles of biorecognition, natural, semi-synthetic and synthetic biorecognition elements. Metabolism sensors: Glucose sensors, galactose sensors. Determination alcohol, ascorbic acid, D-isocitrate, oxalate, oxaloacetate, nitrite, nitrate, carbon monoxide, glycerol, triglycerides and sucrose. Biosensors using coupled enzyme reactions.

Applications of biosensors: Determination of glucose in blood, survey of biosensor methods for the determination of glucose. Determination of copper (I) in water using anodic stripping voltammetry.

References

1. Introductory Quantum Chemistry – A.K. Chandra. Second Edition, Tata McGraw Hill Publishing Co. Ltd., (1983).
2. Quantum Chemistry – Eyring, Walter and Kimball. John Wiley and Sons, Inc.
3. Quantum Chemistry –I.N. Levine. Pearson Education, New Delhi, (2000).
4. Theoretical Chemistry – S. Glasstone. East West Press, New Delhi, (1973).
5. Quantum Chemistry – R.K. Prasad, New Age International Publishers, (1996).
6. Valence Theory – Tedder, Murel and Kettle.
7. Surface chemistry: Theory and applications, J. J. Bikertman, Academic press, (1972).
8. Chemical Kinetics, K. J. Laidler 3rd Edn., Harper International Edn., (1087).
9. Test Bok of Physical Chemistry, S. Glasston, McMillan India Ltd., 2nd Edn. (1986).
10. Physics at Surfaces, A. Zangwill, Combridge University Press (1988).
11. Surface Crystallography, L. J. Clarke, Wiley-Interscience (1985).
12. Biosensors: Fundamentals and Applications, Bansi Dhar Malhotra and Chandra Mouli Pandey, Smither Group Co., 2017, UK.
13. Biosensors: Techniques and Instrumentations in Analytical Chemistry, Frieder Scheller and Florian Schubert, Vol. 11, Elsevier Sci. Publishers, 1992.
14. Chemical Sensors and Biosensors, Brian R. Eggins, John Wiley & Sons Ltd, UK, 2004.

J.S.S. College of Arts, Commerce and Science
(Autonomous)
Ooty Road, Mysuru-570 025

DEPARTMENT OF ZOOLOGY (PG)

Programme outcome, Programme specific outcome, Course outcome and curriculum for Postgraduate Zoology
(2018-2019 & onwards)

Program Outcome

1. Imbibe the knowledge with facts and figures related Zoology.
2. Understand the basic concepts, fundamental principles, and the scientific theories related to various scientific phenomena and their relevancies in the day-to-day life.
3. Identify, formulate, research literature, and analyze complex problems reaching substantiated conclusions using first principles of mathematical, biological, physical and chemical sciences.
4. Will be able to think creatively to propose novel ideas in explaining facts and figures or providing new solution to the problems.
5. Develop scientific outlook not only with respect to Zoology but also in all aspects related to life.
6. Realize that interdisciplinary knowledge in other faculties can have greatly and effectively influence which inspires in evolving new scientific theories and inventions.
7. Imbibe ethical, moral and social values in personal and social life leading to highly cultured and civilized personality.
8. Develop various communication skills such as reading, listening, speaking, etc.
9. Realize that acquiring knowledge is a continuous process and in combination with untiring efforts and positive attitude and other necessary qualities leads towards a successful life.

Programme Specific outcome:

At the completion of M.Sc. in Zoology the students are able to:

1. Understand the classification and taxonomic aspects of the animal world (chordates and non-chordates). The students will be able to identify the taxonomic group of a given animal based on the external characteristics.
2. Understand the basic concepts of Animal physiology. The students will be able to identify and understand the important life processes which are essential for continuation of life on earth.
3. Understand the nature and structure of biomolecules and basic concepts of Biological chemistry.
4. Understand the concepts of Genetics, Cell Biology and Molecular Biology.
5. Understand the basic principles and concepts of environmental science, ecology and nature conservation.
6. Understand the importance of knowledge of wild life and animal behaviour for conservation and balancing the nature.
7. Understand the tools and techniques employed in Biological research and experiments.
8. Understand the process of evolution.
9. Understand the concept and applications of sericulture, apiculture, animal husbandry, Lac culture etc.

JSS COLLEGE OF ARTS, COMMERCE AND SCIENCE
OOTY ROAD, MYSURU
PG DEPARTMENT OF ZOOLOGY
Syllabus Adopted from the academic year 2018-19

Semester	HC / SC	Paper title	CREDITS			Total Credits
			L	T	P	
I	HC - 1.1	Biosystematics & Non Chordata	2	0	2	**4**
	HC - 1.2	Biological Chemistry	2	0	2	**4**
	HC - 1.3	Cytogenetics	2	0	2	**4**
	SC - 1.4	Tools and techniques in Biology	3	1	0	**4**
	SC - 1.5	Chronobiology	3	1	0	**4**
	SC - 1.6	Histology and Histopathology	3	0	1	**4**
	Any two of the Soft core paper may be opted					**20**
II	HC - 2.1	Chordata	2	0	2	**4**
	HC - 2.2	Animal Physiology	2	0	2	**4**
	HC - 2.3	Entomology	2	0	2	**4**
	SC - 2.4	Developmental Biology	3	0	1	**4**
	SC - 2.5	Immunology	3	1	0	**4**
	SC - 2.6	Evolutionary Biology	3	1	0	**4**
	Any two of the Soft core paper may be opted					**20**
III	HC - 3.1	Molecular Biology & Biotechnology	2	0	2	**4**
	HC - 3.2	Reproductive Biology	2	0	2	**4**
	HC - 3.3	Ecology and Wildlife**	2	0	2	**4**
	SC - 3.4	Ethology *	3	1	0	**4**
	SC - 3.5	Pollution and Toxicology *	3	1	0	**4**
	OE - 3.6	Concepts of Zoology	3	1	0	**4**
	Any one of the Soft core paper may be opted** * Field visits are included in this paper**					**20**
IV	HC - 4.1	Advanced Genetics and Computational Biology	2	0	2	4
	HC - 4.2	Applied Zoology*	2	0	2	4
	HC - 4.3	Project	0	2	6	**8**
	*** Field visits are included in this paper**					**16**

Total credits

Hard Core - 52 Credits

Soft Core - 20 Credits

Open Elective - 04 Credits

Total credits required to complete M.Sc Course - 76 Credits

M.Sc, I SEMESTER
HC 1.1 Non Chordata

32hrs

Course Outcome:
After completing the course student will be able to

1. Understand the classification of major and minor invertebrate phyla
2. Give some examples and basic characteristics of some examples of each phylum
3. Understand the evolutionary pathway and its significance
4. Adaptive characters of animals coming under different invertebrate phyla

UNIT I Basic concepts of animal taxonomy: 8 hrs

A. Introduction and history of taxonomy
B. Species concept
C. Zoological classification - theories of classification - taxonomic ranks – hierarchy
D. Zoological nomenclature: Binomial nomenclature, trinomial nomenclature-ICZN
E. taxonomical keys: key to the species
F. Linnaean taxonomy and classical taxonomy - level of taxonomy.

Unit II : Classification, Locomotion and Nutrition: 8 hrs

A. General Characteristics of Non chordata.
B. Locomotion: Muscle filaments and myonemes,
Flagella and cilia. Amoeboid movement.
C. Nutrition in Protozoa: Filter feeding in polychaetes, Filter feeding and digestion in Deuterostomia and molluscs.
D. Respiration:
Structure and function of respiratory organs- Skin, gills, book lungs and Trachea. Respiratory pigments

Unit III: 8 hrs

A. Excretion and osmoregulation:
Osmoregulation in fresh water and marine Invertebrates
Structure and function of excretory organs- Coelom, Coelomoducts, Nephridia, Maliphigian tubules and Coxal glands
B. Nervous system:
Primitive nervous system: Coelenterata and Echinodermata
Advanced nervous system: Annelida, Arthropoda(Crustacea and insecta) and Mollusca (Cephalopod)
C. Sense organs and their importance

Unit IV: 8 hrs

A. Invertebrate paleontology and larval forms:
Free living and parasitic Larval forms
B. Fossil: types and importance of fossil study, overview of Geological Time Scale

NON CHORDATA –PRACTICALS 4x16=64 Hrs

1. PROTOZOA; 4x12=48 hrs

Slides : 1) *Trypanosoma cruzi* 2) Plasmodium – signet ring stage 3) Ceratium 4)*Leishmania donovani* 5) Vorticella 6) Noctiluca 7) Radiolaria 8*) Entamoeba histolytica* 9) Foraminifera 10) Opalina

2. PORIFERA;

a) Slides: 1)Sponge spicules 2)Sponge gemmules

b) Specimen: 1) Grantia 2) Euspongia 3) Clypeaster

3. CNIDARIA:

a) Slides: 1) Obelia polyp and Medusa 2) Pennaria 3) Aurelia-tentaculocyst

b) Specimens: 1) Physalia 2) Gorgonia 3) Spongodus 4) Zoanthus 5) Favia 6) Pennatula 7)Sea anemone 8) *Corallium rubrum*

4. HELMINTHES:

a) Slides: 1) *Fasciola hepatica* 2) *Ancylostoma*

b) Specimens: 1) Planaria 2) Male and female *Ascaris lumbricodes* 3) *Taenia solium* 4)

5. ANNELIDA:

a) Slides: 1) Leech 2) Earthworm setae

b) Specimens: 1)Neries 2) *Chloea flava* 3) *Pheretima postuma* 4) Terebella 5) Eurythoe

6. ARTHROPODA:

a) Slides: 1) Daphnia 2) Sacculina 3) T.S of Peripatus

b) Specimens: 1) Balanus 2) Lepas 3) Palinurus 4) Scolopendra 5) Rhinocerous beetle 6)Spider 7) Gongylus 8) Belostoma 9) Limulus 10) Squilla 11) Eupagarus 12) Julus

7. MOLLUSCA :

Specimens: 1) Aplysia 2) Glochidium 3) Loligo 4) Chiton 5) Cypreae 6) Octopus 7)Sanguinolaria 8) Chicoreus 9) Ficus 10) Lambis 11) Mytillus 12) Doris 13) Onchidium 14) Oliva 15) Murex 16) Turritella 17) Cardium

8. ECHINODERMATA:

Specimens: 1) Sea Urchin 2) Linckia 3) Echinodiscus 4) Holothuria 5) Antedon

9. MINOR PHYLA: —1) Lingula

10. LARVAL FORMS:

Slides: 1) Cercaria 2) Trochophore 3) Megalopa larva 4) Nauplius 5) Zoea 6) Mysis

7) Phyllosoma 8) Protozoea 9) Bipinnaria 10) Veliger 11) Tornaria

12) Glochidium 13) Pluteus

11. Field Study: Visit to different areas around the college campus, to observe and study Non chordates in their natural habitat. **4x2=8 hrs**

II. Study of Nervous system, Respiratory system, Reproductive system and Excretory system in invertebrates by employing computer animation/charts: **4x2=8 hrs**

REFERENCES :

1. Barnes, R.D.1974. Invertebrate Zoology, III edition. W.B Saunders Co., Philadelphia
2. Barrington, E.J.W, 1976. Invertebrate Structure and Function. Thomas Nelson and Sons Ltd.,London.
3. Hyman L,H. 1940. The invertebrates. Vol. 1. Protozoa through Ctenophora, McGraw hill Co.,N.Y.
4. Hyman. L H. 1959. The Invertebrates smaller coelomate groups, Vol. V. McGraw Hill Co.,
5. Hyman. L. H. 1951. The Invertebrates. Vol. 2. McGraw Hill Co., N.Y.
6. Hyman. L H. 1968. The invertebrates Vol. 8. McGraw Hill Co., N.Y and London.
7. Simpson, G C. Principles of Taxonomy.

M.Sc, I SEMESTER
HC -1.2 BIOLOGICAL CHEMISTRY

32 hrs

Course Outcome:

After completing the course student will be able to

1. Identify the five classes of polymeric biomolecules and their monomeric building blocks.
2. Explain the specificity of enzymes (biochemical catalysts), and the chemistry involved in enzyme action.
3. Understand types, Structure, biochemical properties and functions of vitamins.
4. Explain how the metabolism of organic compounds leads ultimately to the generation of large quantities of ATP.

UNIT I Chemical Bonds and Carbohydrates: 8 Hrs

A. Structure of an atom, orbitals, chemical bonds - covalent, co-ordinate, ionic and hydrogen; Vander-Waal's force; hydrophobic interactions; Normality and Molarity of solutions.

B. Carbohydrates – Chemistry and biological properties

UNIT II Proteins and Lipids: 8 Hrs

A. Proteins- Chemistry and biological properties, Christian Anfinsen's experiment, Biological values of proteins

B. Lipids: Chemistry, triglycerides; prostaglandins and steroids –biosynthesis, Chemical importance of lipids.

UNIT III Enzymes: 8 Hrs

A. Enzymes: Nomenclature – current status; factors influencing velocity of enzyme reaction, enzyme dynamics and enzyme inhibition.
Ribozymes and abzymes; co-enzymes, isozymes, clinical importance.

UNIT IV Nucleic acids & Vitamins: 8 Hrs

A. Nucleic acids: Chemistry, alternative models of DNA,

B. Vitamins and trace elements – chemical nature, vitamins as co-enzymes, Deficiency diseases, role of trace elements

Biological Chemistry practicals 4x16=64 Hrs

1. Qualitative analysis for identification of carbohydrates (Starch, Glycogen, Sucrose, Lactose, Maltose, Glucose, Fructose).
2. Qualitative analysis for identification of Proteins (Egg albumin, Casein, Gelatin, Peptone)
3. Precipitation reaction of proteins (Egg albumin, Peptone)
4. The absorbance curves for two dyes and demonstration of Beer-Lambert's law.
5. Estimation of amino acids by Sorenson's formal titration (Arginine, Alanine, Leucine, lysine)
6. Determination of concentration of Glucose and Maltose by calibration curve.
7. Determination of amylase activity.
8. Determination of effect of temperature, pH and incubation period on amylase activity.
9. Test for non-esterified fatty acid.
10. Demonstration of gel electrophoresis.

REFERENCES

1. Barrington, E. J. W (1976) An introduction to general and comparative endocrinology, Oxford University press, London.
2. Conn, E. E., Stumpt, P. K., Bruencing, G. and Dol, R. G. 1995. Outlines of Biochemistry. Pub. John Wiley, Singapore.

3. Eckert, R and Randall, D. 2002, Animal physiology, 2nd Edn, W.H..Freman
4. Guyton. A.G. 1986, Text book of Medical Physiology, 7th Edn., Saunders Publication
5. Harper, H. A. 1993. A review of Physiological Chemistry, Lange Medical Publication, 2nd Edn.
6. Lehninger, A. L., Nelson, D. L. and Cox, M. M., 2nd Edn. 1993. Principles of Biochemistry,CBS Publishers and Distributors, New Delhi.
7. Oser, B. L. (Ed.) 1993. Hawk's Physiological Chemistry. Tata Graw Hill Publishing Co. Ltd.New Delhi.

M.Sc., I SEMESTER
HC – 1.3 CYTOGENETICS

32 Hrs

Course Outcome:

After completing the course student will be able to

1. Described the fundamental molecular principles of genetics
2. Understood the structure and function of DNA & RNA
3. Understand about the transmission, distribution, arrangement, and alteration of genetic information and how it functions and is maintained in populations
4. Described the basics of genetic mapping
5. Explain basic structure of animal cell and its organelles
6. Describe the functions and organization of cell organelles

Unit I: Introduction to the Cell & Cell Organelles **8 hrs**

A. The origin and evolution of the cell, From molecules to first cell, from Prokaryotes to eukaryotes, from single cell to multicellular organisms.
B. Membrane Structure and Function,
C. Structural organization and functions of intracellular organelles- The nucleus, Mitochondria, Lysosomes, Peroxisomes, Golgi apparatus, and endoplasmic reticulum.

Unit II: Cell Cycle and Cell signalling **8 Hrs**

A. Phases of cell cycle.
B. Biochemical studies with oocytes, eggs and early embryos.
C. Regulation of cell cycle: Molecular mechanisms regulating mitotic events.
   Regulation of cell cycle progression.
   Check points in cell cycle regulation.
   Cell cycle control in polytene cells.
D. Molecular basis of signal transduction
E. Cellular aging and death: (a)Causes of aging
   (b)Cellular changes due to aging
   (c)Theories of aging
   (d) Apoptosis
   (e) Longivity genes

UNIT III Gene mutations **8 Hrs**

A. Types of mutations (Spontaneous, Induced, Base substitutions and frameshifts - Transitions, Transversions, gain in function, loss in function, Neutral mutations),
B. Molecular mechanism of mutations (Base analogs, alkylating agents); Detection of mutations: Dominant lethal test, Sex-linked recessive lethal test, II-III translocations, Ames test, P-mediated mutagenesis

UNIT IV Chrmosomal mutations **8 Hrs**

A. Structure and organization of eukaryotic chromosomes
B. Structural and numerical variations of chromosomes, Chromosomal rearrangements and their cytogenetic consequences with examples from plants, Drosophila and Man,

Practical applications of chromosome rearrangements - Balancers and attached X-chromosome in Drosophila. Cytogenetic effects of ionizing and nonionizing radiations

CYTOGENETICS PRACTICALS **4X16 =64 Hrs**

1) Life cycle of *Drosophila melanogaster* 1x4=04hrs
2) Preparation of culture media. Culture of Drosophila - Methods of maintenance. 1x4=04hrs
3) Study of morphology of *Drosophila melanogaster* 1x4=04hrs
4) Mounting of Sex comb of *Drosophila melanogaster* 1x4=04hrs
5) Mounting of Wing of *Drosophila melanogaster* 1x4=04hrs
6) Study of mutants of *D. melanogaster* 1x4=04hrs
7) Preparation of genital plate of *D. melanogaster* 2x4=08hrs
8) Chi square Analysis of F1, F2 and Test cross progeny in *Drosophila melanogaster* to understand pattern of inheritance of different characters and to demonstrate. 3x4=12hrs
   a) Law of segregation
   b) Law of Independent assortment
   c) Sex-linked inheritance
9) Temporary squash preparation of Mitotic chromosomes from root tip meristem of *Allium cepa* 2x4=08hrs
10) Temporary squash preparation of Meiotic chromosomes from testis of *Poicelocerus pictus* 2x4=08hrs
11) Study of Barr body using buccal smear of volunteers 1x4=04hrs

REFERENCES:

1. Alberts, B., A. Jhonson, J. Lewis, M. Raff, K. Roberts and P. Walter 2008. Molecular Biology of the cell. V Ed. Garland Science, New York.
2. Brachet, J. 1985. Molecular Cytology, Academic Press, N. Y.
3. Furukawa, R., and M. Fechheimer. 1997. The structure, function and assembly of actin filament bundles. Int. Rev. Cytol. 175: 29-90.
4. Lewin B. (1997) Gene VI Oxford University Press, Oxford
5. Lodish, H., A. Berk, C.A Kaiser, M.P. Scott, A Bretscher, H. Ploegh, P. Matsudaira. 2008. Sixth Edition, Molecular Cell Biology. W. H. Freeman and Co., N. Y.
6. Pollard, T. D. and W. C. Earnshaw. 2002. Cell Biology. Saunders
7. Russel P.J (1998) Genetics. The Benjamin Cummings Publishing Co Inc.
8. Snustad D.P and M.J.Simons. (1997) Principles of Genetics. John Wiley and Sons Inc. N.Y.
9. Strickberger M.W. (1977) Genetics. MacMillan Collier Co. Pvt Ltd
10. Watson J.D, Hopkins, N.H, Roberts J.A, Steitz and A.M.Weiner. (1987) Molecular biology of gene. The Benjamin Cummings Publishing Co Inc.
11. Wolfe, A. 1995. Chromatin: Structure and function. Academic Press, N. Y.

****

M.Sc., I SEMESTER
SC – 1.4 TOOLS AND TECHNIQUES OF BIOLOGY

48 hrs

Course Outcome:
After completing the course student will be able to

1. Describe the methodology involved in biotechniques.
2. Describe the applications of bioinstruments
3. Demonstrate knowledge and practical skills of using instruments in biology and medical field.
4. Perform techniques involved in molecular biology and diagnosis of diseases
5. Update current knowledge regarding biomedical engineering involving new methods and the instrumentation.

UNIT I: MICROSCOPY: 12hrs

Basic principles of microscopy, Types of microscopes and their biological applications Bright-field microscope, numerical aperture, limit of resolution, types of objectives, ocular & stage micrometers, Electron Microscope, SEM, Confocal microscope.
Dark-field microscope
Phase-contrast microscope
Differential interference contrast microscope
Fluorescence microscope
Photomicrography and image processing

UNIT II: SEPARATION TECHNIQUES: 12hrs

Centrifugation - Basic principles, Types of rotors, Clinical, high speed & ultracentrifuge
Electrophoresis – Agarose and polyacrylamide gel, Two-dimensional, Isoelectrofocussing
Chromatography - Paper and Thin layer chromatography, Column chromatography, Gel filtration, Ion-exchange, Affinity, Introduction to FPLC and HPLC

UNIT III: 12hrs

A. Radio-tracer techniques
Unit of radioactivity and half life, Measurement of radioactivity (β and γ emission), Applications of radioisotopes, Safety measures
B. Techniques in immunodetection: Immunoblotting and immunofluorescence
C. Immunological techniques: Immunodiffusion and Imunoelectrophoresis

UNIT IV: 12hrs

A. Cell culture techniques: Design and functioning of tissue culture laboratory; Culture media, essential components and preparation; Cell viability testing
B. Cytological techniques: Mitotic & Meiotic chromosome preparations from insects and vertebrates Chromosome banding techniques (G-, C-, Q-, R- banding etc.)
C. Molecular cytological techniques: In situ hybridization (radiolabelled & non-radiolabelled methods), FISH, and Restriction banding
D. Molecular biology techniques: Southern hybridization and Northern hybridization DNA sequencing Polymerase chain reaction (PCR)

TUTORIALS 2x16 = 32 Hrs

REFERENCES

1. Alberts et al: Molecular Biology of the Cell, Garland, 2002
2. Karp: Cell and Molecular Biology, John Wiley & Sons, 2002
3. Lodish et al: Molecular Cell Biology, Freeman, 2000
4. Pollard & Earnshaw: Cell Biology, Saunders, 2002
5. Ruthman: Methods in Cell Research, Bell & Sons, 1970.

6. Boyer: Modern Experimental Biochemistry and Molecular biology (2nd Ed.), Benjamin/Cumin, 1993
7. Freifelder: Physical Biochemistry (2nd Ed.), Freeman, 1982
8. Holme and Peck: Analytical Biochemistry (3rd Ed.), Tata McGraw Hill, 1998
9. Plumer: An Introduction to Practical Biochemistry (3rd Ed.), Tata-McGraw Hill, 1990
10. Switzer and Garrity: Experimental Biochemistry 92nd Ed.), Freeman, 1999
11. Wilson and Walker: Practical Biochemistry (3rd Ed.), Cambridge Univ. Press, 2000

*****

M.Sc., I SEMESTER
SC – 1.5 CHRONOBIOLOGY

48 hrs

Course Outcome:

After completing the course student will be able to

1. Understand the concept of Chronobiology
2. Identify the way by which circadian rhythms affect life from the genome to the complex behaviour of the individual
3. Acknowledge the role of Chronobiology and chronodisruption on several physiopathological events
4. Acknowledge the input of the synchronizers on homeostasis
5. Characterize the biological relevance of several chronotypes
6. Acknowledge the relevance of circadian rhythms on therapeutic interventions
7. Acknowledge the importance of scientific research on Chronobiology
8. To interpret study designs and scientific parameters related to Chronobiology.

UNIT I: Introduction: **4 hrs**

History, Biological rhythms, Biological clocks, Significance of biological timekeeping

UNIT II: Biological rhythms: **10 hrs**

A. Types of rhythms- Circadian, Circatidal,Circalunar, Circannual
B. Methods of measurement
C. Properties: Entrainment, Re-entrainment, Phase angle difference, Freerun, Phase shift, Phase response curve, Arrhythmia.

UNIT III: Factors influencing biological rhythms: **10 hrs**

A. Environmental: Photoperiod -Photoreception and photo-transduction;
   The physiological clock and measurement of day length;
   Role of photic and non-photic cues in seasonality,Other zeitgebers
   Reversal of roles of principal and supplementary cues.
B. Evolution of photoperiodism: comparative studies; Circannual rhythms and seasonality.

UNIT III: Circadian pacemaker system: **8 hrs**

A. Suprachiasmatic nuclei, B. Pineal gland, C. Optic lobes.

UNIT IV: Molecular basis of circadian rhythms **8 hrs**

A. Clock genes, B. Drosophila, C. Mouse

UNIT V: Applied Chronobiology: **8 hrs**

A. Human circadian rhythms: Melatonin: Input or output signal of the clock system, Clock function (dysfunction); Human health and diseases
B. Applications of circadian rhythm principles: Jet-lag/shift work, Depression and

sleep disorders, Chronopharmacology and Chronotherapy

TUTORIALS **2X16=32 Hrs**

References

1. Binkley, S. (1990): The clockwork sparrow: time, clocks, and calendars in biological organisms, Prentice-Hall, New Jersey.
2. Chandrashekaran, M. K. (1985): Biological rhythms, Madras Science Foundation, Chennai.
3. Jay. C. Dunlap, Jennifer. J. Loros, Patricia J. DeCoursey (ed). 2004: Chronobiology Biological Timekeeping, Sinauer Associates, Inc. Publishers, Sunderland, MA, USA
4. Nelson, R. J. (2000) An Introduction to Behavioural Endocrinology, 2nd edition, Sunderland Publishers, Massachusetts.
5. Saunders D.S., C.G.H. Steel, X., afopoulou (ed.)R.D. Lewis. (3rd Ed) 2002: Insect Clocks, Barens and Noble Inc. New York, USA
6. Shapiro, C. M. and Heslegrave, R. J. (1996): Making the shift work, Joli Joco Publications, Inc. Toronto.
7. Vinod Kumar (ed 2002) : Biological Rhythms Narosa Publishing House, Delhi/ Springer-Verlag, Germany

******

M.Sc., I SEMESTER
SC – 1.6 HISTOLOGY AND HISTOPATHOLOGY

48 Hrs

Course Outcome:

After completing the course student will be able to

1. Understand the applications of dyes and its classification.
2. Know the functional morphology of various mammalian organs.
3. Imbibe the knowledge on histochemical techniques.
4. Describe the etiology and pathology of liver cirrhosis and atheroscleorsis.
5. Explain histopathology of breast and prostate tumours.

UNIT – I Basics of Histology **8Hrs**

A. Objectives and applications
B. Tissue fixation : Objectives, methods, chemical fixatives-types and chemistry of fixation; Physical methods-:freezing and microwave fixation; choice of fixatives, fixation artifacts.
C. Dyes. –Natural and Synthetic, Classification

UNIT-II Functional Morphology (mammalian) **8 Hrs**

A. Histological organization of GI tract- stomach and intestine,
B. Histological organization of lungs & kidney
C. Histological organization of spleen & thymus,
D. Bone and bone marrow.

Unit-III Histochemistry **8 Hrs**

A. Principles and methods of application
B. Classical histochemical Techniques: for localization of glycoproteins (PAS), nucleic acids (Feulgen) and steroid dehydrogenase activity.

Unit-IV Immunohistochemistry **8 Hrs**

A. Principles, method of application
B. Imunohistochemistry techniques for localization of proteins in endocrine cells (Pituitary cell types or islet of Langherhans)

C. Immunofluorescence: In situ hybridization of nucleic acids

UNIT-V Histopathology **8 Hrs**

A. Morphological alterations in cells due to disease,
B. Types of degeneration: clouding, hyaline, hydrophic and fatty degeneration.
C. Etiology, pathogenesis and histopathology of Liver cirrhosis and atheroscelerosis
D. Neuropathology of alcoholism and methanol poisioning.

Unit-VI Histopathology of tumors **8 Hrs**

A. Malignant and non-malignant
B. Types of carcinoma
C. histopathology of breast and prostate tumors

PRACTICALS **2x8= 16 Hrs**

I. Histology:

1. Microtomy and staining: Hematoxylin-eosin - Demonstration 2x2=4 hrs
2. Histology: 2x2=4 hrs

Observations of permanent slides of mammalian organs – stomach, intestine, spleen, liver, kidney, lungs, testis, epididymis, vas deferens, ventral prostate, seminal vesicle, ovary, uterus and Fallopian tube.

II. Histometry: **2x3=6hrs**

Histometrical measurements and statistical analysis of some tissues.

III. Histopathology: **2x1=2hrs**

Study of histopathological changes (permanent slides) – gastric ulcers, cirrhosis of liver, breast tumors, cystic follicles of ovary, pancreas in diabetics, cryptorchid testis and leukemia.

REFERENCES:

1. Boyd,W. 1976:A text book of Pathology. Structure and function in disease, 4th edition. Lea and Fibiger, Philadephia.
2. Pearse, A.G.E. (1980): Histochemistry, theoretical and Applied ,J & A, Churchill Ltd., London.
3. Rogers, A.W.(1983): Cells and Tissues, An introduction to Histology and Cell Biology, Academic Press, NY.
4. Telford, I.R. and Bridgman,C.F.(1990). Introduction to Functional Histology, Harper and Row, NY.

******

M.Sc., II SEMESTER
HC – 2.1 CHORDATA

32 Hrs

Course Outcome:

After completing the course student will be able to

1. Understand the classification of chordates
2. Give some examples and basic characteristics of some examples of protochordates
3. Give some examples and basic characteristics of some examples of vertebrates
4. Understand the evolutionary pathway and its significance
5. Analyse adaptive characters of animals coming under different vertebrate classes

UNIT I General characters and outline classification of Chordata **8hrs**

A. General and Comparative study: Comparision of three Protochordates, Subphyla in terms of General comparision, Habits and habitats,

B. Alimentary canals and associated glands, Pharynx, Food and feeding and excretory system in Protochordates.
C. Adaptive radiation in vertebrates – fishes, amphibians, reptiles, aves and mammals

UNIT II **8hrs**

A. **Integument and its Derivatives**: Epidermal Integument or Skin Functions, Structure & its Derivatives (Glands, Scales and scutes, digital cornifications, horns, feathers, hairs), Integument in different classes of Chordates.
B. **Nervous system**- Development of Brain, spinal cord, Peripheral nerves and sense organs

UNIT III **8hrs**

A. **Respiratory System**: Introduction Respiratory organs: Gills (Internal or true gills, External or Larval gills). Lungs and Ducts, Accessory Respiratory organs and Swim Bladders.
B. **Circulatory system:** Evolution of heart and aortic arches

UNIT IV **8hrs**

A. **Digestive System:** Introduction Embryonic Digestive Tract
Alimentary Canal: Divisions, Digestive Glands
B. **Urinogenital System:** Vertebrate kidneys and ducts, Gonads and their ducts

CHORDATA PRACTICALS **4x16=64 Hrs**

1. **Protochordates**: Specimens:1)Amphioxus , Herdmania
Slides- Salpa (sexual), Doliolum

2. **Fishes** : 1) *Rhinobatus* 2) *Hippocampus* 3) Goldfish (aquarium fish) 4) *Clarius*
5) *Anabas* 6) Coffer fish 7) *Acipenser* 8) *Periopthalmus* 9) *Triacanthus*
10) *Notopterus* 11) *Exocoetus* 12) *Diodon hysterix* 13) *Echenenis neucrates*

3. **Amphibians** : 1) Ichthyophis 2) Axolotl Larva 3) *Rana tigrina* 4) *Amblystoma*

4. **Reptiles** : 1) *Calotes* 2) *Mabuya* 3) Chameleon 4) *Phrynosoma* 5) *Chelone mydas*
5) Varanus 6)*Naja naja* 7) Krait 8) Hydrophis 9)Viper

5. **Birds** : 1) Blue jay 2) Indian koel -male and female 3) Kite

6. **Mammals** : 1) Guinea pig 2)Domestic cat 3) Loris 4) *Megaloderma lyra* (bat)
5) Pangolin

7. **Integuments of vertebrates**: Scales of fish, Hoofs, nails, horns, claws,
plastron and carapace of tortoise, snout of saw fish

8. **Osteology :**
1) **Skull and lower jaw**:- a) Crocodile b) Bird c) Carnivore mammal (dog)
d) Herbivore mammal (horse)
2) **Types of vertebrae**:- a) Procoelous b) Ophisthocoelous c) Amphicoelous
d) Amphiplatian e) Heterocoelous f) Axis and atlas vertebrae.

II. Study of following systems in rat by employing computer animation/charts:
a) Circulatory system b) Nervous system c) Reproductive system
d) Digestive system e) Sense organs f) Urinary system

REFERENCES :

1. Alexander, R. M. 1975. The Chordata. Canbridge University Press, London.
2. Barrington, E.J.W. 1965. The Biology of Hemichordata and Protochordata, Oliver and Boyd, Edinbourgh.
3. Colbert, E. H, 1969. Evolution of the vertebrates, John Wiley and Sons, Inc., N.Y.
4. Kent, C. G. 1954. Comparative anatomy of vertebrates
5. Kingsley, J.S. 1962. Outlines of Comparative anatomy of vertebrates. Central book depot Allahabad.

M.SC., II SEMESTER
HC – 2.2 ANIMAL PHYSIOLOGY

32 Hrs

Course Outcome:

After completing the course student will be able to

1. Understand the mechanism of transport of molecules, stepwise release of energy , aerobic and anaerobic respiration
2. Describe the physiology of digestive and respiratory system of human beings.
3. Understand the blood composition, types, groups and circulatory system.
4. Describe the physiology of excretory system and nervous system of human beings.
5. Know the physiology of sense organs, muscles and reproductive system.

UNIT I: Membrane Transport, Bioenergetics & Circulation — 8 Hrs

A. Membrane Transport:

Molecular mechanisms of passive and active transport.

B. Bioenergetics:

a) Energy – Concept, laws of thermodynamics
b) Redox potential
c) Stepwise release of energy through cytochromes, production of ATP, uncoupling of oxidative phosphorylation,inhibitors.
d) Anaerobic and aerobic breakdown of glucose, alternate pathway – HMP shunt and glucoronic acid pathway.
e) Citric acid cycle as common metabolic pathway.

C. Circulation:

a) Major types of body fluids and their composition.
b) Neurogenic and myogenic hearts.
c) Mammalian heart – cardiac cycle, ECG.

UNIT II: Physiology of excitation & Excretion — 8 Hrs

A. Muscle Physiology:

a) Molecular organization of sarcomere.
b) Mechanism of contraction with emphasis on sliding filament and Davies models, regeneration of storage phosphate.
c) Physiological adaptations of muscles for jumping, swimming and flight.

B. Neurophysiology:

a) Axonal and synaptic transmission of nerve impulses.
b) Synaptic integrity, synaptic plasticity.
c) Molecular mechanism of sensory transduction and neural output in receptor cells.

C. Excretion:

a) Comparative physiology of excretion in animals- Nitrogenous wastes and waste elimination.
b) Mammalian kidney- Structure and physiology of urine formation.

Unit III: Basic Concepts of Endocrinology **8 hrs**

A. Chemical messengers:
Autocrine, Paracrine and endocrine secretions,
Types of hormones, an overview of human endocrine system

B. Hormone synthesis: Peptide and steroid hormones.
Role of Hormones in homeostasis- Glucose and Water balance

C. Hypothalamus and pituitary gland:
Structure, function and control of hypothalamic hormones.
Pituitary hormones and their physiological actions
chemical structure and. Feedback regulation. Pathophysiology.
Hyppothalamo - hypophysial portal system

D. Pineal gland–Structure and function**.**

Unit IV: **8 hrs**

A. Thyroid gland: Structure, function and biosynthesis of thyroid hormone

B. Parathyroid : Structure and PTH – Calcitonin – Role of hormones in calcium and phosphate metabolism.

C. Adrenal gland hormones
Adrenal cortex hormones: Corticoids: role played in Stress management – Aldosterone and the rennin- angiotensin system
Adrenal medullary hormones: Catecholamines as emergency hormones

D. Gastrointestinal hormones: Secretion, control and function

E. Pancreatic Hormones: Insulin and glucagons, their role in the regulation of Carbohydrate, protein and lipid metabolisms.

ANIMAL PHYSIOLOGY PRACTICALS **4x16=64 Hrs**

1. Estimation of Proteins by Lowry *et al* method. (in tissue sample from slaughter house)
2. Determination of serum cholesterol. (Clinical sample)
3. Determination of glucose content by Anthrone method. ((in tissue sample from slaughter house)
4. Estimation of liver and skeletal muscle glycogen. (in tissue sample from slaughter house)
5. Determination of serum/ blood urea by DAMO method. (Clinical sample)
6. Estimation of creatinine in the urine sample.
7. Total count of RBC and WBC.
8. Differential count of WBC
9. Response of RBC's to Hypertonic, hypotonic and isotonic solutions
10. Observation of permanent slides of T.S of endocrine glands
    a. Pituitary gland b. Thyroid gland c. Adrenal gland d. Pancreas
11. Identification of chemical structures of steroid hormones

REFERENCES:

1. Adler N. T (1981) Neurcendocrinology of Reproduction, Physiology and Behaviour.Austin, C. R and R. V. Short (eds) (1972) Reproduction in mammals. (1) Germ cells andFertilization (2) Embryonic and Foetal development (3) Hormones in Reproduction (4) Reproduction pattern (5) Artificial control of reproduction, Cambridge University press,London.
2. Barrington, E. J. W (1976) An introduction to general and comparative endocrinology,Oxford University press, London
3. Raghavendra Puri (2003) Mammalian endocrinology Vol. I & II, Dominant Publishers and Distributors, New Delhi.
4. Eckert, R and Randall, D. 2002, Animal physiology, 2nd Edn, W.H..Freman

5. Guyton. A.G. 1986, Text book of Medical Physiology, 7th Edn., Saunders Publication

M.Sc., II SEMESTER
HC – 2.3 ENTOMOLOGY

32hrs

Course Outcome:
After completing the course student will be able to

1. Understand insects encountered in agricultural fields.
2. Envisage an insight on economically important pests of various foods, fiber and household
3. Understand various insect pest management methods and its significance
4. Learn to apply various agricultural equipment and understand the effect of chemicals and its dosages in agricultural pest management
5. Learn to apply the pest control methods wisely to minimise ecological backlash
6. Discuss the evolutionary significance of insect plant interaction and insect animal interaction.

Unit I: General Entomology **10 hrs**

A. Classification of class Insecta up to orders with suitable examples; Integument appendages.

B. Insect Endocrinology

I. Insect Hormones and their regulation**:** Chemistry and functions of hormones, Hormones in metamorphosis, Ecdysis and Diapause

II. Semiochemicals:**:** Allelochemicals and Pheromones (Primer & releaser)

Unit II: Agricultural Entomology **10hrs**

A. Role of insects in plant pollination

B. Insects pests: Classification and categories of pests, origin and emergence of pests, pest out breaks and pest resurgence
Structure, life history, significance, nature of damage and control methods of major pests of sugarcane, Paddy and Coconut.

C. Structure, life history, significance, nature of damage and control measures of stored grain pests: (a) *Sitophilus* (b) *Trogoderma* (c) *Rhizopertha* (d) *Tribolium* (e) *Bruchus* (f) *Sitotruga* (g) *Ephestia*

Unit III: General and household insect pests **06hrs**

A. Structure, life history, significance, nature of damage and control measures of following general pests: (a) grasshoppers & locusts (c) termites (d) aphids (e) hairy caterpillars

B. Household pests: Cockroaches, Ants, Wasps, Silverfish, furniture beetle, and their control

Unit IV: Medical Entomology **06hrs**

A. Insect vectors: Role of insect as vectors of human diseases (Malaria, filariasis, Kala azar and their control)
Mosquitoes as pests and their control.
Housefly: A human health hazard and its control

B. Arboviral diseases: Dengue, chicken gunya, swine flu.

PRACTICALS: **4x16=64 Hrs**

1. Collection and preservation of dead insects for systematic studies & field report 4x4=16 hrs
2. Identification of different insects upto orders- House fly, Cockroach :
Mosquitoes, stored grain beetles, destructive insects, important crop and household pests
4x4=16 hrs

4. Fixing and preservation of dead insects by Plastination technique. 4x4=16 hrs
5. Field studies of insects to understand their habit: Ants, Butterflies, termite, wasps, Moths. 4x2=08 hrs
6. Study of insect mouth parts: Mosquito, Cockroach, House fly, Butterfly 4x2=08 hrs

REFERENCES:

1. Awasti V.B. 2009 Introduction to general entomology 3rd Ed. Scientific publication (India), Jodhpur
2. Awasti V.B.2007, Agricultural Insect Pests and their control. Scientific publishers (India) Jodhpur
3. Trigunayat M.M. 2009, A Mannual of practical entomology, scientific publishers, Jodhpur, India.
4. Dhaliwal G.S. Ramsingh and B.S. Chillar 2006, Essentials of Agricultural entomology. Kalyani Publishers, New Delhi.
5. L . K Jha. Applied Agricultural Entomology. New central book agency. Culcutta

M.Sc., II- SEMESTER
SC – 2.4 DEVELOPMENTAL BIOLOGY

48 Hrs

Course Outcome:

After completing the course student will be able to

1. Understand the molecular concepts of developmental biology during fertilization.
2. Know about Noble prize concepts during frog development viz., Nucleocytoplasmic interactions.
3. Explain on axis development in drosophila.
4. Describe endocrine and molecular control in metamorphosis of insects and amphibians.
5. Explain the various stages of chick embryonic development.

Unit I:

A) Introduction : Descriptive V/s. Experimental Embryology **8hrs**

B) Fertilization : a) An overview of structure and differentiation of egg and sperm
b) General sequence and molecular events during fertilization

Unit II: Early development - I **8 hrs**

a) Nucleocytoplasmic interactions in early development: An overview of Nuclear transplantation experiments in Amphibians and mammals
b) Creations of multicellularity: Cleavage-Regulatory mechanism
c) Gastrulation: Morphogenetic movements and regulatory mechanisms in amphibian and mammalian embryo.

Unit III: Early development - II **8hrs**

a) Morphogenetic determinants and their role in development:
Yellow cytoplasm in Ascidians, Polar body in Mollusca, Pole plasm in *Drosophila*

b) Laying down the embryonic body plan :
Determination of embryonic axes in *Drosophila* – Anterior-posterior (maternal effect genes) & Dorsoventral; Amphibians (cell-cell interaction) & Mammals (Hox Genes)

c) Cell lineage studies and cell death genes in *Caenorhabditis elegans*.

Unit IV: Morphogenesis –I **8 hrs**

a) Early embryogenesis in Drosophila : Regional specification by. Segmentation genes: Gap genes, Pair rule genes, Segment polarity genes, and Homeotic genes.
b) Cellular differentiation and morphogenesis:
i. Neuronal v/s epidermal fate specification in *Drosophila*.

ii. Vulval induction in Caenorhabditis elegans.

Unit V: Morphogenesis-II **8 hrs**

a) Role of Cell Adhesion molecules in morphongenesis : Cadherins and Fibronectins
b) Genetics of imaginal discs and transdetermination
c) Limb development-an over view :
i. Proximo-distal axis specification in developing limb.
ii. Cell death and formation of digits.

Unit VI: Post embryonic development **8 hrs**

a) Metamorphosis : Endocrine and molecular control of metamorphosis in insects and amphibians b) Types of growth c) Regeneration : Types, Blastema formation,Sources of cells for regeneration d) Abnormal development as seen in Teratogenesis.

PRACTICALS **16X2=32Hrs**

1. Study of internal changes during early development of frog & chick (permanent slides) 3X2=06hrs
2. Development of chick-Embryo mounting-permanent preparation 2X2=04hrs
3. Study of early developmental stages of *Drosophila* (Live Observation of embryo) and dechorionation and observation of embryos 2X2=04hrs
4. Study of Imaginal discs – the precursors of adult structures in *Drosophila* 3X2=06hrs
5. Demonstration of window technique to observe chick embryo development 2X2=04hrs
6. Effect of thyroid hormone on development in frog 2X2=04hrs
7. Study of various developmental stages in frog up to tadpole stage 2X2=04hrs

REFERENCES:

1. Balinsky, B.I., 1965. An introduction to embryology, W.B.Saunders company.
2. Gilbert, S. F. 2006, Developmental Biology, 8th Ed.Sinauer Associates Inc.,
3. Kalthoff, 2000, Analysis of Biological Development, 2nd Ed., McGraw-Hill Science, New Delhi, INDIA. Massachusetts, USA.
4. Vasudeva Rao, 1994. Developmental Biology: A modern synthesis, Oxford & IBH, New Delhi.
5. Wolpert, Beddington, Brockes, Jessell, Lawrence,Meyerowitz, (3rd Ed., 2006)Principles of Development, , Oxford University Press, New Delhi, INDIA.
6. Wolpert, L, Beddington, R Jessell, T. Lawrence P, Meyerowitz, E, Smith J., 2001, Principles of Deveopment Oxford University Press Oxford.
7. Ann Kiessling and Scott C. Anderson, Human Embryonic Stem Cells: An Introduction to the Science and Therapeutic Potential, 2003. Jones and Bartlett Publishers, Boston MA, USA

****

M.Sc., II SEMESTER
SC – 2.5 IMMUNOLOGY

48hrs

Course Outcome:

After completing the course student will be able to

1. Outline the key components of the innate and adaptive immune responses.
2. Describe about cell types and organs which are involved in an immune response¬
3. Describe the Infectious diseases, hypersensitivity, autoimmune disorders,¬ immunodeficiency diseases

Unit I: Introduction to immunity **8hrs**

A. History; types of immunity – Innate and acquired immunity.
B. Cells and Organs of immune system: Cells: Lymphocytes (T & B cells), monocytes, macrophage; eosinophills, basophills, neutrophils and mast cells.
C. Primary and secondary lymphoid organs: Bone marrow, Thymus, Spleen, Lymph nodes

Unit II: Antigens and Immunoglobulins **8hrs**

A. Antigens: factors influencing immunogenicity, adjuvant, epitope, hapten
B. Immunoglobulins: Basic structure of the immunoglobulin;
Types and functions of immunoglobulins.
C. Monoclonal antibodies:Antigen-antibody reactions

Unit III: Immune response **8hrs**

A. Humoral and cell mediated immune responses
B. Primary and secondary immune modulation; Cytokines; role of complement system in immune response (Classical pathway, Alternate pathway);
C. Immune response against bacterial (tuberculosis), parasitic (malaria) and viral (HIV) infections;

Unit IV Immunotechniques **8hrs**

A. Agglutination; Precipitation;
B. Immunofluorescence; RIA, ELISA, Immuno-electrophoresis and Western blotting.

Unit V Major histocompatibility complex and Hypersensitivity **8hrs**

A. Transplantation and graft rejection,
B. Genetic organization of H2 and HLA complexes, HLA typing;
C. Immediate and delayed hypersensitivity.

Unit VI Vaccines and Vaccination **8hrs**

A. Types of Vaccines and their significance
B. Vaccine delivery systems.
C. Congenital and acquired immunodeficiencies

TUTORIALS **2X16=32 Hrs**

References:

1. Austyn, J.M. and Kathym, J. Wood. 1993. Principles of cellular and molecular Immunology. Oxford University Press. Oxford.
2. Benjamin, Elisunshine, Geoffrey Leskowitz.1996. Immunology: A short course. 3rd Edition. New York.
3. Kubey, J.M. 1990. Essential Immunology. 6th Edition. Blackwell Scientific Publication, New York.
4. Rao, C.V. 2002. An introduction to Immunology. Narona Publishing House, New Delhi.
5. Rotti, I. 1994. Essential Immunology. Blackwell, London.
6. Stibes, D.P. and Terr, A.I. 1991. Basic and Clinical Immunology. 7th Edition. Appleton and Large. California.

M.Sc., II SEMESTER
SC – 2.6 EVOLUTIONARY BIOLOGY

48 Hrs

Course Outcome:
After completing the course student will be able to

1. Understand that many of the organisms that inhabit the Earth today are different from those that inhabited it in the past
2. Understand that the propositions underlying Darwin's theory of evolution.
3. Explain adaptation, providing examples from several different fields of biology
4. Explain how the molecular record provides evidence for evolution
5. Understand the Human origin and evolution.

UNIT I Emergence of concept of evolution: 8 Hrs

A. Pre Darwinian concepts, Darwinism and its impact in the development of synthetic theory.
B. Neodarwinism: Birth of population genetics, Components of population genetics, Mendelian population, gene pool, allele frequencies and genotype frequencies,

UNIT II Speciation: **8 Hrs**

A. Concept of species,
B. Types of species
C. Models of speciation,
D. Patterns and mechanisms of reproductive isolation,
E. Hybridization, polyploidy and speciation.

UNIT III Molecular evolution 8 Hrs

A. Phyletic gradualism and punctuated equilibrium.
B. Micro and macroevolution.
C. Molecular evolution: Selectionists theory of evolution, Neutral theory of evolution and Molecular clock and emergence of non-darwinism,

UNIT IV Phylogeny 8 Hrs

A. Phylogenetic trees : Construction with nucleic acid and amino acid sequences,
B. Types of trees and Techniques employed in construction of phylogenetic trees,
C. Molecular phylogenetics of Homo sapiens.

UNIT V Population genetics and Evolution 8 Hrs

A. Gene pool, gene frequency, Hardy-Weinberg Law.
B. Destabilizing forces of evolutionary equilibrium (Mutation, Migration, Selection, Meiotic drive and genetic drift).
C. Founder effect, Isolating mechanisms and speciation.
D. Micro Macro and Mega evolution, Co-evolution.

UNIT VI Genome and Evolution **8 Hrs**

A. Genes and gene clusters
B. Origin of new genes by gene duplication (Ohno's concept)
C. Selfish DNA
D. Karyotypic evolution (Drosophila).

TUTORIALS 2X16=32Hrs

REFERENCES:

1. Dobzhansky Th, (1951) Genetics and origin of species, 3rd Edn. Chapman and Hall, London.
2. Dobzhansky Th, Ayala F.J, Stebbins G.L and J.M. Valentine, (1976) Evolution, Surjeet Publication, New Delhi.
3. Futuyama D.J (1986) Evolutionary Biology, Sinuauer Associates Inc. USA
4. Hartl D.L (2000) A primer of population genetics, Sinuauer Associates Inc. USA
5. Jha A.P (1992) Genes and Evolution - John Wiley Publicaion, New Delhi

6. King M (1993) Species evolution - The role of chromosomal change. The Cambridge University Press, Cambridge

M.Sc., III SEMESTER
HC – 3.1 MOLECULAR BIOLOGY AND BIOTECHNOLOGY

32 hrs

Course Outcome:
After completing the course student will be able to

1. Know nucleic acids, DNA replication and its mechanism.
2. Understand transcription and its modifications.
3. Explain genetic code, enzymes, factor and the process of translation.
4. Analyse gene regulation, lytic and lysogenic cycles in prokaryotes.
5. Understand gene regulation in eukaryotes.
6. Explain molecular mechanism of DNA damage repair.

Part A: Molecular Biology

Unit I Introduction to nucleic acids **8hrs**

A. DNA Replication: i) Enzyme components of replication unit ii) Mechanism with emphasis on Dna A in initiation, Co-ordinated synthesis, End replication in eukaryotes iii) Fidelity.
B. Transcription: i) Transcription apparatus and process (RNA polymerase, cisregulatory elements, terminators, transcription factors). ii) Post transcriptional modifications of mRNA in eukaryotes (G-cap, Poly tail, Splicing).
C. Translation: i) Genetic code (major features, usage of different codons). ii) Enzymes, factors and the process (Aminoacyl t-RNA synthatase, Peptidyl transferase, IFs, EFs, RFs and Ribosome)

Unit II Gene regulation **8hrs**

A. Gene regulation in Prokaryotes: (i) Regulation at transcription initiation: Eg. lac operon (+ve and -ve control) (ii) Regulation beyond transcription initiation: trp attenuator (iii) Regulation in Lambda Phage - Lytic and lysogenic cycle induction.
B. Gene regulation in Eukaryotes: (a) Transcriptional activators (b) Transcriptional repression: (i) direct repression, indirect repression (ii) Gene silencing by modification of histones and DNA (c) RNA interference
C. Molecular basis of homologous recombination: Models and protein machinery
D. Molecular mechanisms of DNA damage repair**.**

Part B: Biotechnology

Unit III: **8 hrs**

A. **Genetic engineering:**
Definition, objectives and outline of recombinant DNA technology procedure.
Enzymes**:** Restriction Enzymes; DNA ligase, Klenow enzyme,
T4 DNA polymerase, Polynucleotide kinase, Alkaline phosphatase.
Cloning vectors: Plasmids, Phages, Cosmids, Phagemids, Artificial chromosomes (YAC, BAC, HAC),

B. **Cloning:**
Construction of Genomic and cDNA libraries.
Indetification of Recombinants: Genetic selection, Use of chromogenic substrates, Insertional inactivation.
Analysis of recombinant DNA clones: Characterization of clones, Restriction mapping, Southern hybridization.
Polymerase chain reaction and DNA sequencing-Maxam and Gilbert's method, Sanger's method, Automated DNA sequencing

Unit IV: **8 hrs**

C. **Applications of Biotechnology:**
Production of medicinally important products – vaccines, Gene therapy, AIDS therapy, Biofertilizers, biopesticides, medicine and human health

D. **Animal Biotechnology**
Animal cell and Tissue culture: Principles of cell culture, cell and tissue types, cell lines, transformation.
Cell and tissue culture media: Natural and defined, role and components of serum in culture.
Applications of tissue culture: Tissue culture in biomedical research karyological studies, amniocentesis, mutagenesis, Cytotoxicity assays.

PRACTICALS **4x16=64 Hrs**

1. Extraction of DNA by rapid method.
2. Extraction of DNA by standard method.
3. Estimation of DNA concentration by Diphenylamine method.
4. Localization of DNA in prefixed paramecium slides by Feulgen staining
5. Localization of nucleic acids in prefixed paramecium slides by Toluidine blue staining
6. Estimation of RNA concentration by Orcinol method
7. PCR amplification of DNA and gel electrophoresis.
8. Restriction digestion and gel electrophoresis.
9. Isolation of plasmid DNA from bacteria.
10. Molecular biology problems

REFERENCES

1. Griffiths A J F, H. J. Muller, D. T. Suzuki, R. C. Lewontin and W. M. Gelbart 2000. An introduction to genetic analysis. W. H. Greeman. New York.
2. Lewin, B 2003 Genes VIII. Oxford University Press. Oxford
3. Dale, Jeremy W and Schantz, Malcom V. 2002. From Gene to Genomes. John Wiley and Sons Ltd,NY,USA
4. Das, H.K. 2007. Text book of Biotechnology.Wiley India Pvt. Ltd. New Delhi
5. Freshney, Ian, R. 2006. Culture of Animal Cell (5th edn).Wiley- Liss publications
6. Pandian, T.T. and Kandavel, D.2008. Text Book of Biotechnology. I.K International Publishing House, New Delhi. 47
7. Primrose, S.B., Twyman, R.M., and Old, R.W. 2001. Principle of Gene Manipulation (6th edn). Blackwell Science Ltd, London
8. Singh .B.D. 2006. Biotechnology. Kalyani Publishers, New Delhi
9. Sobti, R. C. and Pachauri, Suparna S. 2009. Essentials of Biotechnology. Ane Books Pvt. Ltd. New Delhi

M.Sc., III SEMESTER
HC – 3.2 REPRODUCTIVE BIOLOGY

32 hrs

Course Outcome:
After completing the course student will be able to

1. Understand structure and function of reproductive organs
2. Explain the structure of reproductive cells
3. Describe the role of internal cues in reproduction
4. Describe the role of external factors in reproduction
5. Analyse the role of endocrine glands and their secretions in reproduction
6. Identify the factors affecting fertility
7. Know different types of assisted reproductive technologies.

UNIT I: Male reproduction: **8 hrs**

A. Functional morphology of male reproductive system
B. Kinetics of spermatogenesis – wave and cycle
C. Hormonal control of mammalian testis and spermatogenesis
D. Ultrastructure of spermatozoa
E. Abnormalities of sperm
F. Brief description of histomorphology and hormonal control of male accessory organs viz., epididymis, vas deferens, seminal vesicles, ventral prostate, bulbourethral gland and preputial gland
G. Sperm maturation – morphological and biochemical events, influence of accessory organ secretions
H. Biochemistry of semen and capacitation

UNIT – II Female reproduction : **8 hrs**

A. Origin and migration of primordial germ cells; genetic and hormonal control of differentiation of gonads and gonadal ducts in mammals.
B. Female Reproductive System-Functional morphology of mammalian ovary, Fallopian tube and uterus.
C. Ovarian steroid hormones and their actions

UNIT III: Reproductive cycles in Mammals: **8 hrs**

A. Comparison of estrous and menstrual cycles
B. Menstrual cycle : Different phases, changes in the ovary and uterus and hormonal control
C. Implantation – Process, Types and hormonal control
D. Pregnancy – length of gestation, hormonal control
E. Parturition – Process of birth and influence of hormones
F. Lactation – Hormonal control of mammary gland, development and lactogenesis

UNIT – IV: Fertility and reproductive management **8 hrs**

A. Fertility control – Need, principles of different male and female temporary and permanent contraceptive methods.
B. Assisted Reproduction: Causes of infertility, Artificial insemination, different methods of assisted reproduction (*In-vitro* Fertilization, Gamete Intra Fallopian tube Transfer, Zygote Intra Fallopian tube Transfer).

PRACTICALS **16X4=64 hrs**

1. Demonstration of surgical technique by video clipping
2. Counting of spermatozoa in semen sample collected from volunteers
3. Staining of spermatozoa for abnormalities in semen samples collected from volunteers /clinical samples
4. Study of different contraceptive devices
5. Observation of permanent Histology slides
   a. Comparative morphology of ovary
   b. Comparative morphology of testis
   c. Comparative study of male accessory organs
   d. Comparative study of female accessory organs
6. Observation of permanent slides of T.S of endocrine glands
   a. Pituitary gland b. Thyroid gland c. Adrenal gland d. Pancreas

REFERENCES

1. Adler N. T (1981) Neurcendocrinology of Reproduction, Physiology and Behaviour.
2. Austin, C. R and R. V. Short (eds) (1972) Reproduction in mammals. (1) Germ cells andFertilization (2) Embryonic and Foetal development (3) Hormones in Reproduction (4) Reproduction pattern (5) Artificial control of reproduction, Cambridge University press,London.
3. Barrington, E. J. W (1976) An introduction to general and comparative endocrinology,Oxford University press, London
4. Raghavendra Puri (2003) Mammalian endocrinology Vol. I & II, Dominant Publishers and Distributors, New Delhi.
5. Muneeth Kainth (2005) Chordate Embryology, Dominant Publishers and Distributors, New Delhi.
6. Moudgal, N. R. Yoshinaga K Rao, A. J. and P. R. Adiga (1991) Perspectives in primate reproductive biology. Wiley Eastern Ltd., New Delhi, Bangalore
7. Paul Wassar man and Jimmy D. Neill (2005) Knogbil and neill's physiology of reproductive volume 1st and 2nd and 3rd edition
8. Jones, R. E (1991) Human Reproductive Biology press N.Y
9. Knobil, E and Neil J. D (1994) The physiology of reproduction, Vol. I & II. Raven press, New York.

M.Sc., III SEMESTER
HC – 3.3 ECOLOGY AND WILDLIFE

32 hrs

Course Outcome:

After completing the course student will be able to

1. Demonstrate and Understand ecological relationships between organisms and their environment.
2. Present an overview of diversity of life forms in an ecosystem.
3. Explain and identify the role of the organism in energy transfers
4. Describe the Habitat ecology and Resource ecology
5. Understand the types of environmental Pollution and their management
6. Scope, Values and Conservation strategies of wildlife.

Part-A Ecology

UNIT - I **8 hrs**

A. Ecosystem: Historical account, Scope, Basic concepts and Approaches to the study of Environmental Biology. Components of Environment - An overview of abiotic factors and Biotic factors. Concepts of habitat and Ecological niche. Ecotone and Edge effect. Food chains, Food-webs and their structure in Ecological Pyramids in aquatic, terrestrial and parasitic Environments.

B. Population Ecology: Introduction. An overview of important population attributes – Density, Natality, Growth rates, Growth forms and concept of carrying capacity, Patterns in human population growth and its explosion -Remedial measures. Mortality - life tables and survivorship curve, sex ratio, age distribution, dispersal and dispersion, aggregation and Allee's principle, population fluctuation and cyclic oscillations and Population interactions.

UNIT - II **8 hrs**

A. Community Ecology Concept of community - community structure and attributes, concept of climax Species diversity in community and it's measurement- Alpha diversity- Simpson's diversity index, Shannon index, Fisher's alpha, rarefaction. Beta diversity- Sorensen's similarity index, Whittaker's index, Evenness, Gamma diversity. Drivers of species diversity loss and conservation.

B. Bioecology of Freshwater Zooplankton: Definition, Types and adaptations of Zooplankton. Brief study of organizations, life cycles and Ecological importance of Rotifers, Cladocerans, Copepods-Calanoids, Harpacticoids and Cyclopoids, and Ostracods. Mass culturing of Zooplankton.

C. Microbial Ecology: Ecological role, beneficial and pathogenic Microorganisms. Indicator Microorganisms. Role of microorganisms in biodegrading and bioremediation of organic and metal pollution.

Part B Wildlife Biology

UNIT – III **8hrs**

A. Scope and values of wildlife (Ecological, Aesthetic, Scientific, Recreational, Medicinal)

B. Causes of wildlife depletion: Degradation and destruction of natural habitats, Exploitation for commercial purposes, Deforestation, Agricultural expansion, Urbanization and Industrialization, forest fires and hunting.

C. Wildlife corridors, Human-wildlife conflicts

D. Wildlife awareness and education, Wildlife and tribal welfare

UNIT – IV

A. Conservation strategies: Red data book, protected area network, Role of NGOs in conservation.

B. Wildlife act and legislation: Wildlife Protection Act 1972; Biological Diversity Act 2002.

C. Wildlife conservation projects in India (with special reference to Project Tiger, Project Hungul and Gir Project)

D. In-situ conservation: Bioreserves, National parks, Wildlife sanctuaries and Safari's in India

E. Management of Bioreserves, National parks, Wildlife sanctuaries and Safari.

F. Ex-situ conservation: Zoo garden, Management of Zoos, Captive breeding, Artificial insemination, Cryopreservation (techniques and applications) Germplasm banks,

PRACTICALS: **4X16=64 Hrs**

1. Qualitative and Quantitative study of freshwater planktons.
2. Determination of species diversity by Shannon-Weiner Index
3. Determination of species diversity by Simpson's index
4. Field visit to Sewage pond, Natural lake (and if possible river): Collection of water samples and study of physico-chemical parameters such as colour, pH, temperature, conductivity, total solids and turbidity
5. Estimation of Dissolved Oxygen in three natural (sewage, pond and Tap) water samples.
6. Estimation of free Carbon di-Oxide in three natural (sewage, pond and Tap) water samples.
7. To study the relationship between Dissolved Oxygen and free Carbon di-Oxide, if any, in three natural (sewage, pond and Tap) water samples.
8. Determination of BOD in three natural (sewage, pond and Tap) water samples
9. Determination of COD in three natural (sewage, pond and Tap) water samples
10. To study the relationship between BOD and COD, if any, in three natural (sewage, pond and Tap) water samples
11. Collection, observation of planktons (Phytoplankton and Zooplankton) from polluted and non-polluted water bodies.
12. Estimations of bacterial abundance in different water samples – using DEMT.
13. Visit to RMNH, Mysore, to study models of freshwater, marine, estuarine and terrestrial habitats.
14. Survey of Animal Population - to visit different habitats/areas in and around Mysore and collect data on some population attributes, application of Bio-statistical tests to the collected data and its interpretation.
15. Visit to nearby Zoological garden, wildlife sanctuaries, Animal rehabilitation centres.

REFERENCES

1. Begon, Harper and Townsend, 1995. Ecology: Individuals, populations and community. II edition. Blackwell Series, U.S.A.
2. Bhatia, H.S. 1998: A Text book on Environmental Pollution and Control, Galgotia, New Delhi.
3. Clarke, G.L. 1963. Elements of Ecology, . Wiley Eastern Limited. New Delhi.
4. Emmel, T.C. 1976. Population Biology, Harper and Row publishers, N.Y.
5. Kormondy, E.J. 1978. Concepts of Ecology, Prentice Hall of India Pvt. Ltd., New Delhi.
6. Odum E.P. 1971. Fundamentals of Ecology. III Edition. W.B.Saunder's Co., Philadelphia.
7. Odum, E.P. 1983. Basic Ecology, Holt Saunders, Japan.
8. Sharma, P.D. 1996: Ecology and Environment Rastogi, Publications, Meerut.
9. APHA, 1992: Standard methods for examination of water and waste water, 18th edition
10. Negi,S.S and Bahuguna, V.K. 1983. An Introduction to wildlife management. Bishen Singh Mahendra Pal Singh. Dehara Dun, India.
11. NBA. 2004. The Biological Diversity Act (2002) and Biological Diversity rules (2004). National Biodiversity Authority, India.
12. Saharia, V.B. 1982. Wildlife in India. Natraj Publishers. Dehara Dun.

M.Sc., III SEMESTER
SC 3.4 ETHOLOGY

48 Hrs

Course Outcome:
After completing the course student will be able to

1. Evaluate the learning and instinct behavior.
2. Explain the mechanisms in instinct and behaviour
3. Explain how animals learn
4. Compare learning and instinct behaviour.
5. Analyse any problem about animal behaviour
6. Explain the importance of evolution for animal behaviour.
7. Explain evolution and behaviour.
8. Explain natural selection and behaviour.
9. Explain the relationship between predators and prey
10. Explain social behaviour.

UNIT - I **8 Hrs**

A. Descriptive versus experimental approaches

B. Reflexes and complex behaviour- Latency, after discharge, summation, warm up, fatigue inhibition and feedback control

C. Instinctive Behaviour - Fixed action pattern, Types of sign stimuli and releasers as triggers, Genetic basis of instinctive behaviour.

UNIT- II **8 Hrs**

A. Development and behaviour- Causes of behavioral changes during development, development of bird song.

B. Learning- Classical conditioning experiment, latent and insight learning. Social learning, learning sets and play.

C. Importance of early experience – Critical period- Filial imprinting, Sexual imprinting in birds, Imprinting like process in mammals.

UNIT- III Foraging and anti-predator behaviour **8 Hrs**

i. Anti predator behaviour – avoiding detection through colour and Markings (Mullarian mimicry)

ii. Warning coloration
iii. Batesian mimicry

UNIT-IV Biological communication **8 Hrs**

i. Forms of signals,
ii. Visual communication with suitable examples,
iii. Auditory Communication
iv. Tactile and Chemical communication

UNIT -V Sexual Behaviour **8 Hrs**

i. Hormones and sexual behaviour – Selected examples of courtship and mating behaviour.
ii. Pheromones in Insects and Mammals
iii. Lee Boot, Whitten, Bruce, Collidge and Castro-Vandenberg effect/s
iv. Selected examples of courtship and mating behaviour

UNIT-VI Social Behaviour **8 Hrs**

i. Introduction
ii. Advantages of grouping
iii. Social organization in insects with special reference to ants and honeybees
iv. Social organization in sub human primates
v. Altruism, Kin selection and Genetic control of behaviour

TUTORIALS – On the basis of the proposed chapters. **2x16 = 32 Hrs.**

REFERENCES

1) Goodenough J.E., Mc Guire B. and Wallace R. A. (1993) Perspectives on Animal Behaviour. John Wiley and sons, New York.
2) Tinbergen (2006) Social ehaviour in Animals. J.V. Publishing House Jodhpur India.
3) Vandenbergh. J.E.(Ed) (1983). Pheromones and Reproduction in mammals. Academic Press. NewYork.
4) Agrawal, K.C. 2000. Biodiversity. Agrobios. India.

M.Sc., III SEMESTER
SC – 3.5 POLLUTION AND TOXICOLOGY

48hrs

Course Outcome:

After completing the course student will be able to

1. broader understanding of how science and the scientific method work to address environmental problems.
2. Earth's major systems (ecosystems and biogeochemical cycles), how they function and how they are affected by human activity (population growth, air, water and soil pollution, ozone depletion, global warming, and solid waste disposal).
3. the interaction of human society (urban sprawl, energy use/generation, resource consumption and economics) with the Earth's systems.

Part A - Pollution **24 hrs**

Unit I: **8 hrs**

A. Concept of Biosphere: Its components, hydrosphere, atmosphere, and lithosphere, Origin of life in the biosphere.

B. Water pollution: Definition, sources Types and classification of pollutants. Effects of Water Pollution, River Pollution, Oxygen sag curves and Eutrophication Drinking water: Collection, purification and distribution. Wastewater treatment: Primary, secondary and tertiary treatment.

Unit II: **8 hrs**

A. Atmospheric pollution: Primary and secondary air pollutants. Biological effects of Nox, SOx, SPM, Hydrocarbons, Acid rain, Global warming, Photochemical smog and Ozone hole.
B. Solid waste and Biomedical waste: Sources, collection, transport, treatment and Disposal methods.. Noise Pollution: Sources, Biological effects, Control measures and OSHA standards.

UnitIII: **8hrs**

A. Radiation & Thermal pollution: Sources, types, effects, Atmospheric fallout and abatement.
B. Environmental Impact Assessment: Basic elements, Methods Guideline for industrial EIA, Aquaculture related EIA, Transport related EIA and Water related EIA. Case studies: Konkan Railway, Silent valley, Bhopal Tragedy and Love canal tragedy, Mangalore Bojpe tragedy

Part B – Toxicology **24 hrs**

Unit IV: **8hrs**

A. General Principles of Toxicology: Introduction, Definition of toxicology Importance of Dose and Dose-response, factors influencing toxicity, Bioassay-toxicity evaluation studies using fish as model.
B. Toxic compounds: Heavy metals-Lead and mercury, Hydrocarbons- Aromatic and Aliphatic, and cyanides, and toxic gases - Bhopal tragedy.

Unit V: **8hrs**

A. Biotransformation: Bioactivation, Biodetoxification of organo phosphates and organo chorines in the bodies of animals.
B. Natural toxins, Venoms and poisons: Properties and their effects, Major Sites and mechanism of action, Toxins in lower and higher organisms, Toxin and Venom therapy.

Unit VI: **8hrs**

A. Smoking aids: Active and Passive smoking, Consumption of tobacco, Mariguana(Ganja), their effects and Prevention measures.
B. Cosmetics: Types of cosmetics, Chemical Characteristics, Applications, Exposure and risk assessment, Cosmetic safety regulations.
C. Risk assessment: Exposure assessment, Dose-Dosage, Risk characterization, Risk analysis and communications, Occupational health and illness.

TUTORIALS – On the basis of the proposed chapters **2x16 = 32 Hrs**

REFERENCES:

1. Nandini, .N. Sunitha N. and T. Sucharita 2010. Environmental Studies, Sapna Book House Bangalore
2. Frant C.L.V. 1991, Basic Toxicology II (Eds.), Hemisphere publishing corporation, Washington, London
3. Sambasiva Rao K.R.S. 1999. Pesticide impact on fish metabolism. (Eds.) Discovery Publishing House, New Delhi.
4. Bio-pesticides in Insect Pest Management 1999. S. Ignacimuthu and Alok Sen, Phoenix Publishing House Pvt., Ltd., New Delhi.
5. APHA, AWWA and WEF. 1992: Standard Methods for Examination of Water and Wastewater, XVIII Ed, American Public Health Association. NY, USA
6. Nebel, B.T. and Wrigly R.T. 1998. Environmental Science, VI Ed. Prentice Hall New Jersey, USA

7. Hosetti, B.B. 2001. A Text Book of Applied Aquatic Biology, Daya Publishing House, Delhi.
8. Hassall, K.A. 1990. The Biochemistry and uses Pesticides structure, metabolism and Mode of action and uses in crop protection, John Wiley & Sons. Inc.
9. Pandey, K. and J.P. Shukla, 1990. Elements of Toxicology. Radha publ. New Delhi.

M.Sc., III Semester:
OPEN ELECTIVE-(For Science discipline students).
CONCEPTS OF ZOOLOGY.

48 Hrs

Course Outcome:
After completing the course student will be able to

1. Broader understanding of Zoology and its concepts
2. Understand the concepts and basics of animals taxonomy
3. Understand the basics of histology
4. Describe the structure and basic functions of organ systems
5. Explain ecological concepts and effects of environmental pollution
6. Explain the mechanism of inheritance.

1. Introduction: **8 Hrs**

a) Branches of animal science: Taxonomy, Animal Physiology, Genetics, Developmental Biology, Evolution, Ethology, Ecology, Applied Zoology, Entomology, Histology, c) Indian Wildlife- Status, Causes of wildlife depletion, Wildlife corridors, Conservation strategies- *In situ* and *Ex situ* d) e) Animals and human welfare.

2. Animal Taxonomy: **4 Hrs**

a) Carl Linnaeus – Taxonomic hierarchy: Kingdom, Division, Phylum, Class, Order, Family and Binomial nomenclature

3. Animal cells and Tissues : **8 Hrs**

a) Brief description of animal cell (light and ultra structure) b) Functions of cell organelles c) Structure and functional diversity in animal cell d) Cell division: Types and significance e) Structure and functions of basic tissues.

5. Structure and functions of organ systems: **16 Hrs**

a) Human alimentary canal and outlines of digestion and absorption
b) Respiration: Human respiration – exchange of gases.
c) Circulation : Structure of human heart, Blood vessels and capillaries, composition of blood, blood coagulation.
d) Excretion : Mammalian kidney and urine formation.
e) Locomotion in vertebrates – Swimming, walking running, flying
f) Nervous system and their functions, A brief account of human endocrine system
g) Reproduction : Asexual and sexual reproduction, significance of sexual reproduction, outlines of human reproduction and fertility control

6. Ecology and Environmental Biology: **8 Hrs**

a) Abiotic and Biotic factors b) Environmental Pollution – brief account of Air, Water and Noise pollution.

7. Heredity: **4 Hrs**

a) Continuity of life – Mendel's laws b) Structure of chromosomes c) DNA and RNA

TUTORIALS **2x16=32 Hrs**

REFERENCES :

1. Barnes, R. D. 1974. Invertebrate Zoology, III edition, W. B. Saunders Co., Philadelphia.
2. Barrington, E. J. W. 1976. Invertebrate structure and function. Thomas Nelson and Sons
3. Ltd., London

4. Hyman L. H. 1940. The invertebrates Vol.1 Protozoa through Ctenophora, McGraw hill
5. co., N. Y.
6. Hyman. L. H. 1968. The Invertebrates Vol.8 McGraw Hill Co., N. Y and London.
7. Parker, T. J. Haswell, W. A. 1961. Text book of Zoology, Vol.I, Macmillon Co., London.
8. Russel – Hunter, W.D 1969. A. biology of higher invertebrates, Mac millon Co., Ltd.,
9. London.
10. Barrington, E. J. W. 1965. The Biology of Hemichordata and Protochordata – Oliver and Boyd, Edinbourgh.
11. Clark, W. E 1963. History of the Primates IV Edn., Univ. of Chicago Press, Chicago.
12. Malcom Jollie, 1962. Chordata morphology – East-West Press Pvt. Ltd., New Delhi.
13. Romer, A. S. 1966. Vertebrate Paleontolgy, 3rd Ed., Univ. of Chicago Press, Chicago.
14. Romer A. S., 1960. Vertebrate body, 3rd Ed., W. B. Saunders Co., Philadelphia.
15. Young. J. Z., 1950. Life of vertebrates The Oxford University Press, London
16. Young J Z 1957 Life of mammals, Oxford University Press, London.

M.Sc., IV SEMESTER
HC – 4.1 ADVANCED GENETICS AND COMPUTATIONAL BIOLOGY

32 hrs

Course Outcome:
After completing the course student will be able to

1. Understand the genomic organization of prokaryotes and eukaryotes.
2. Know the applications of various model organisms in genomic research.
3. Able to analyse the pedigree, psychosomatic disorders, prenatal diagnosis and genetic counselling.
4. Recognise few heritable diseases in man.
5. Understand the basic concepts of genomics
6. Understand the basic concepts of proteomics
7. Understand the nucleic acid and proteinr databases and tools**.**

Part A-Advanced Genetics

Unit I: Genome organization: 3 hrs

Prokaryotes, Eukaryotic nuclear genomes - C-value paradox, Eukaryotic organelle genomes Split Genes Mobile genetic elements in Prokaryotes (bacteria) and Eukaryotes (Drosophila, maize and humans), Genome Projects of model organisms (*C. elegans*, *Drosophila* and Mouse).

Unit II: Cancer Genetics: 5 hrs

Cancer incidence and mortality, types of cancer, causes of cancer, properties of cancer cells, Genetic basis of Carcinogenesis- Oncogenes: proto-oncogenes, oncogenes, retroviral oncogenes in human cancer. Tumor suppressor genes: Functions of tumor suppressor gene products. Cancer as a multistep process. Animal models of cancer research: Transgenic mouse and Drosophila models.

Unit III: Human genetics: 5 hrs

History of human genetics, pattern of inheritance, pedigree analysis. Human genome: Organization, distribution of genes, gene families. Genetic basis of syndromes and disorders: Cystic fibrosis, Neurofibromatosis, Schizophrenia, Anxiety disorder, Congenital heart diseases, Dyslexia.

Unit IV: Quantitative genetics: 3hrs

Introduction, types of quantitative trait, Nature of quantitative traits and their inheritance-Polygenic inheritance (Multifactorial hypothesis) – analysis of continuous variation; Variations associated with polygenic traits.

Part B-Computational Biology

Unit VII: Introduction and Scope of the Computational Biology 4 hrs

Genomics: Definition and types of genomics Structural genomics: whole genome shotgun sequencing, gene annotation, gene families and clusters. Orthologs and paralogs. Functional genomics: Transcriptome, Microarray technology.

Unit VIII: Proteomics: 4 hrs

Definition, Protein structure determination, protein domains, protein folding, Computer aided protein structure analysis, Protein-protein interactions, Protein microarrays.

Unit IX: Nucleic acid sequence and Protein analysis: 4 hrs

Alignment, similarity searches including remote similarity searches, secondary structure element, motifs, Single nucleotide polymorphism (SNP), Two dimensional polyacrylamide gel electrophoresis, Mass Spectrometry.

Unit X: Genomics and proteomics databases and tools: 4 hrs

Nucleic acid sequence databases and tools: Genbank, UCSC, ENSEMBL, EMBL, DDBJ, BLAST vs FASTA, file formats-FASTA, GCG, Genscan and ClustalW. Protein sequence databases and tools: Uni- prot, PDB, PIR, BLAST, PSI- BLAST (steps involved in use and interpretation of results).

PRACTICALS:

1. Study of mitotic chromosomes of *Drosophila* species- *Drosophila melanogaster*, *Drosophila nasuta*.
2. Preparation of metaphase chromosomes from bone marrow cells of mouse.
3. Karyotypic studies of normal human chromosomes and syndromes.
4. Creation of pedigrees and study of patterns of inheritance.
5. Studies on phenotypes of different diseases and syndromes.
6. Study of Quantitative characters: Sternopleurals, Acrosticals – mean, standard deviation.
7. Data mining for sequence analysis.
8. Web– based tools for sequence searches and homology screening-BLAST, FASTA
9. Nucleic acid sequence databases: GenBank retrieval, GeneScan.
10. Proteomics data bases: Uni-Prot, PROSITE, PDB, PIR, ProtParam.
11. Annotations: ORF finder, Use of ARTEMIS or any other suitable software

REFERENCES:

1. The Human Genome 2001, Nature Vol. 409.
2. The Drosophila Genome. 2000, Science Vol. 267.
3. The Caenorhabditis elegans genome 1998. Science Vol. 282.
4. Introduction to Genetic Analysis. Griffiths, Anthony J.F.; Miller, Jeffrey H.; Suzuki, David T.; Lewontin, Richard C.; Gelbart, William M. New York: W.H. Freeman & Co.; 1999
5. Fundamental Neuroscience. Larry R. Squire, Darwin Berg, Floyd Bloom, and Sascha du Lac. Third Edition, Academic Press; 3 edition (2008)
6. Principles of Neural Science. Eric R. Kandel, James H. Schwartz, and Thomas M. Jessell. McGraw-Hill Medical; 4 edition(2000)
7. Neurogenetics: Scientific and Clinical Advances (Neurological Disease and Therapy) David R. Lynch, Informa HealthCare; 1 edition (2005)
8. The Molecular and Genetic Basis of Neurologic and Psychiatric Disease. Roger N Rosenberg, Salvatore DiMauro, Henry L Paulson, and Louis Pt (2007) Lippincott Williams & Wilkins; Fourth edition

9. Bioinformatics for Dummies, Claverie J. M., Notredame C., (2nd Ed., 2007), Wiley Publishing, Inc., New York, USA
10. Brown T. A. 2007, Genomes 3. Garland Science Publishing, New York.
11. A.Malcolm Campbell and Laurie J.Heyer. Discovering Genomimcs, Proteomics and Bioinformatics. 2004. Low Price edition. Pearson Education, Inc.

M.Sc., IV SEMESTER
HC – 4.2 APPLIED ZOOLOGY

32 hrs

Course Outcome:

After completing the course student will be able to

1. Explain plant insect interaction, origin of pest and its control.
2. Understand vectors and its communicable diseases.
3. Explain races of silkworm their disease and its control.
4. Know about the importance of insects in forensic science and medicine.
5. Know about aquaculture and its practices in India.

UNIT I: Aquaculture **8hrs**

Aquaculture in India: an overview – nutritional value and food security - Site selection and preparation of culture ponds - Fish culture: carps, marine fishes and ornamental fishes. Prawn culture: Freshwater prawns and marine shrimps. Fattening of crabs. Crayfish and Lobster - Molluscs: mussels, clams, chanks and oysters including pearl oyster. Live feeds: micro algae, micro-invertebrates (*Artemia* nauplii, Rotifers, Cladocerans, Copepods, Ostracodes) and worms as live baits – Water quality management and maintenance of sanitation - Plant and animal nutrients - Balanced diet (iso-nitrous and iso-caloric) - Artificial feed formulation – Low cost feed formulation - Aquatic weeds.

UNIT II: Sericulture **8hrs**

Salient features of Saturnidae and Bombycidae. Mulberry and non mulberry silkworms, classification based on voltinism, moulting and geographic origin.

Morphology and life cycle of *Bombyx mori*. Structure and functions of Silk glands.

Silkworm rearing technology: Building, equipments, disinfection, environmental factors, Seed cocoons, preservation, grainage activity, LSPs, egg production, incubation, artificial hatching.

Pests and diseases: Protozoan, Fungal, Viral and Bacterial diseases and their control measures. Silkworm pests and Predators

UNIT III: Apiculture **8hrs**

Scope and its importance, Classification and morphology of honey bees, species and races of honey bees, tribal life and bee hunting. sex seperation, comb building, orientation of comb, communication, collection of propolis and water.

Honey and its chemical composition, medicinal importance.

Eonomic importance of honey, wax, bee pollination, pollen and Venom.

UNIT IV: Vermiculture **8hrs**

A. Introduction to vermiculture. Definition, meaning, history, economic importance, their value in maintenance of soil structure. Useful species : Local species and Exotic species of earthworms. Role of four R's.

B. Taxonomy Anatomy, Physiology and Reproduction of Lumbricidae and Eudrilidae.

C. Earthworm Farming (Vermiculture) for home gardens, larger scale, Extraction (harvest), vermicomposting harvest and processing.

D. Nutritional Composition of Vermicompost for plants, comparison with other fertilizers

E. Enemies of Earthworms, Sickness

PRACTICALS: **16X4=64 hrs**

1. Study of morphometric characters of Indian major carps.
2. Diversity of fishes.
3. Collection of phytoplankton and zooplankton from natural resources and their identification.
4. Study of morphology of honey bee and cast system.
5. Mounting of mouth parts, stinging apparatus of honey bee.
6. Study of digestive system of honeybee.
7. Study of structure and types of honey comb.
8. Study of bee plants.
9. Study of morphology of lifecycle of *Bombyx mori*
10. Study of digestive and silk gland of *Bombyx mori*
11. Study of Non mulberry silkworms and their food plants.
12. Field trip- Collection of native earthworms & their identification
13. Study of systematic position& External characters of locally available earthworm species.
14. Mounting of setae and identification of earthworm species.
15. Study of equipments used in Vermiculture.

REFERENCES

1. Ashok Kumar (2009) Textbook of Animal Diseases
2. Edwards, C.A. and J.R. Lofty (1977) "Biology of Earthworms" Chapman and Hall Ltd., London.
3. G.S. Shukla, V.B. Upadhyay (2006) Economic Zoology.
4. Kevin, A and K.E.Lee (1989) " Earthworm for Gardeners and Fisherman" (CSIRO, Australia, Division of Soils)
5. Lee, K.E. (1985) "Earthworms: Their ecology and Relationship with Soils and Land Use" Academic Press, Sydney.
6. Pradip. V Jabde, (2005) Text Book of Applied Zoology.
7. R. L. Kotpal (2000) Modern Textbook of Zoology. Rastogi Publications
8. Satchel, J.E. (1983) "Earthworm Ecology" Chapman Hall, London.
9. Wallwork, J.A. (1983) "Earthworm Biology" Edward Arnold (Publishers) Ltd. London.

M.Sc., IV SEMESTER
HC – 4.3 Project

Course Outcome:

After completing the course student will be able to

1. understand the concepts of Project Management for planning to execution of projects
2. find importance of reference work Using tools of information such as periodical , journals, online resources
3. break work down the tasks of project and determine handover procedures
4. Interpret, analyse and presentation of the results obtained and compare with similar works and draw conclusion.

M.Sc., Examination
(Scheme CBCS)
M.Sc., ZOOLOGY
HARD CORE- Model question paper

Time: 3 hrs **Max Marks: 70**

Instructions: ***1. Answer all questions***
2. Illustrate your answer wherever necessary

I. Write short notes on the following: **[8×2=16]**

1.
2.
3.
4.
5.
6.
7.
8.

II. Write elaborate notes on any FIVE of the following: **[5×6=30]**

9.
10.
11.
12.
13.
14.
15.
16.

Q3. Answer the following: **[2×12=24]**

17. (i)
Or
(ii)

18. (i)
Or
(ii)

M.Sc Examination
(Scheme CBCS)
M.Sc., ZOOLOGY
Softcore - Model question paper

Time: 3 hrs **Max Marks: 70**

Instructions: ***1. Answer all questions***
2. Illustrate your answer wherever necessary

I. Write short notes on the following: **[8×2=16]**

1.
2.
3.
4.
5.
6.
7.
8.

II. Write elaborate notes on any FIVE of the following: **[5×6=30]**

9.
10.
11.
12.
13.
14.
15.
16.

Q3. Answer the following: **[2×12=24]**

17. (i)
Or
(ii)

18. (i)
Or
(ii)

M.Sc Examination
(Scheme CBCS)
M.Sc., ZOOLOGY
Open Elective-Model question paper

Time: 3 hrs **Max Marks: 70**

Instructions: ***1. Answer all questions***
2. Illustrate your answer wherever necessary

I. Write short notes on the following: **[8×2=16]**

1.
2.
3.
4.
5.
6.
7.
8.

II. Write elaborate notes on any FIVE of the following: **[5×6=30]**

9.
10.
11.
12.
13.
14.
15.
16.

Q3. Answer the following: **[2×12=24]**

17. (i)
Or
(ii)

18. (i)
Or
(ii)

JSS COLLEGE OF ARTS, COMMERCE & SCIENCE

(An Autonomous College of University of Mysore)

Re-accredited by NAAC with 'A' grade

OOTY ROAD, MYSORE-570 025, KARNATAKA

ESTD-1964

SYLLABUS

M.VOC. (FOOD PROCESSING & ENGINEERING)

2021-2022

DEPARTMENT OF FOOD PROCESSING AND ENGINEERING

Scheme of Instruction For M. Voc. (Food Processing & Engineering) year 2021-22								
General Education Component								
(L-Lecture; T-Tutorial; P-Practical/Practice) (1 Credit = 15 Hrs)								
Semesters	**Paper No.**	**Title**	**L:T:P**	**Theory Hours**	**Tutorial Hours**	**Practical Hours**	**Total Hours**	**Total Credits**
Sem I	G .1	Food Chemistry	2:0:1	30	0	15	45	3
	G - 2	Food and Nutrition	2:0:1	30	0	15	45	3
								06
Sem II	G-3	Food Microbiology	2:0:1	30	0	15	45	3
	G-4	Biostatistics	2:0:1	30	0	15	45	3
								06
Sem III	G-5	Information Communication Technology	2:0:1	30	0	15	45	3
	G-6	Product development and Entrepreneurship	2:0:1	30	0	15	45	3
								06
Sem IV	G-7	Food marketing	2:0:1	30	0	15	45	3
	G-8	Food standards, Regulatory Affairs and IPR Issues	2:0:1	30	0	15	45	3
								06

General Component

Semester - I **MFA 510**

Sl. No.	Paper I : Food Chemistry	Hrs
1.	Introduction to food chemistry, its role in processing and food formulations,	1
2.	Moisture in foods: Role and type of water in foods, Functional properties of water, role of water in food spoilage, Water activity and sorption isotherm, Molecular mobility and food stability.	2
3.	Dispersed systems of foods: Physicochemical aspects of food dispersion system: a) Sol b) gel c) foam d) emulsions.	1
4.	Carbohydrates: Functional characteristics of different carbohydrates. Maillard reaction, caramelization, methods to control non enzymatic reactions. Starch and Dietary fibres, Functional properties of polysaccharides, natural vegetable gums, carbohydrate composition of various natural foods.	5
5.	Proteins in foods: Protein content and composition in various foods- cereal grains, legumes and oilseed proteins, proteins of meat, milk, egg and fish. Functional properties of proteins in foods – water and oil binding, foaming, gelation, emulsification. Effect of processing on functional properties of proteins-heat processing alkali treatments, chilling, freezing, dehydration and radiations. Unconventional sources of proteins- SCP fish protein concentrates, leaf proteins	5
6.	Lipids in foods: Role and use of lipids /fat, occurrence, fat group classification, Physicochemical aspects of fatty acids in natural foods, hydrolysis, reversion,. Chemical aspects of lipolysis, auto-oxidation, antioxidants, Technology of fat and oil processing: Refining, Hydrogenations, Inter etherification, Safety use of oils and fats in food formulation.	5
7.	Vitamins and minerals, Dietary sources, requirements, Allowances, Enrichment, Restorations, Fortifications, Losses of vitamins and minerals, Optimization and retention of vitamins and minerals	2

8.	Enzymes in food industry, Carbohydrases (Amylases, cellulases, pectinases,) Proteases, Lipases and oxidases in food processing.	2
8.	Chemistry of food flavour: definitions of flavour, Flavourmatics / flavouring compounds, Sensory assessment of flavour, Technology for flavour retention.	2
9.	Food additives: Buffer systems/ salts / Acids, Chelating agents and sequestrants, Antioxidants, Antimicrobial agents, Non- nutritive and low calorie sweetners, Stabilizer and thickeners,	2
10.	Food colours, natural and synthetic, Regulatory aspects –Natural and synthetic permitted food colours.	1
11.	Food toxicants – anti nutritional factors and their occurrence, effects and methods of elimination or inactivation- protease inhibitors, lectins, lathyrogens, phytates and flatulence factors.	2
12.	Food Contaminants, Pesticidal residues – permitted limits. Toxicology and public health.	2

Sl. No.	**Practical**	**Hrs**
1.	Determination of moisture content of foods using different methods	3
2.	Determination of crude proteins by microkjeldahl method	3
3.	Determination of crude fat by soxlet method	3
4.	Determination of acid value, saponification value and iodine number of fat/ oil	3
5.	Determination of minerals and acid insoluble ash and estimation of Calcium and phosphorus	3
6.	Assay of amylases, papain and lipases	3
7.	Detection of common food adulterants	3
8.	Determination of food colors	3

MODEL QUESTION PAPER

CODE NO: MFA 510

Semester - I

Food Chemistry

TIME: 3 hrs **Max marks: 70**

Instructions: Draw neat and labeled diagram wherever necessary.

1. Answer all the questions in one sentence or a word 10 X 1 = 10

   a. ----------
   b. ----------
   c. ----------
   d. ----------
   e. ----------

2. Answer any four of the following questions 4 X 5 = 20

   a. ----------
   b. ----------
   c. ----------
   d. ----------
   e. ----------

3. Answer any four questions of the following 4 X 10 = 40

   a. ----------
   b. ----------
   c. ----------
   d. ----------
   e. ----------

(Note- 10 Marks may be divided in to 6+4 or 5+5)

I SEMESTER PRACTICAL EXAMINATION

Food Chemistry

PRACTICAL

SCHEME OF EXAMINATION

DURATION: 3 Hours

Maximum Marks: 70

Practical proper: 60

Record marks: 10

NOTE :- Candidates are required to submit the records duly signed by the teacher-in charge and certified by the Head of the Department

1. Determination of moisture content of foods using different methods
2. Determination of crude proteins by microkjeldahl method
3. Determination of crude fat by soxlet method
4. Determination of acid value, saponification value and iodine number of fat/ oil
5. Determination of minerals and acid insoluble ash and estimation of Calcium and phosperus
6. Assay of amylases, papain and lipases
7. Detection of common food adulterants
8. Determination of food colors

General Component

Semester – I **MFA 520**

Sl. no.	Paper II :Food and Nutrition	Hrs
1.	Introduction to Food: Definition, classification and constituents of food : Carbohydrates, Fats , Proteins ,Fat soluble vitamins-A, D, E and K , Water soluble vitamins – Thiamin, Riboflavin, Niacin, Pyridoxine, Folate, Vitamin B12 and Vitamin C, Minerals – Calcium, Iron, Zinc, Iodine and Flourine.	4
2.	Functions of food, Effect of deficiency & overconsumption of dietary sources on health, Basic Food Groups, Recommended dietary Allowance (RDA), Food guide pyramid, Dietary fibers, Functions of water in body. Balanced Diet: Concept of Balanced Diet: Definition, food groups used in planning balanced diets.	5
3.	Traditional and contemporary methods of food processing and quality evaluation of food products	3
4.	Nutrition: Basic terms used in Nutrition, relationship between food, health and nutrition, Bioavailability of nutrients. Basal Metabolic Rate (BMR). Protein quality, Dietary allowances and standards for different age groups: Adult man/woman, Preschool children, Adolescent children, pregnant woman. Geriatric nutrition, Nutrition for athletes	10
5.	Digestion and absorption of carbohydrates, proteins and fats. Factors influencing the sensory acceptability and digestion of foods	2
6.	Food Design: Nutritive values of cereals, pulses, oil seeds, fruits, vegetables, fish, meat and eggs. Nutrient composition of foods and Energy calculations	3
7.	Antinutritional factors: Sources and harmful effects of anti vitamins (e.g.: avidin, dicoumarol), Natural toxicants, (e.g.: Lathyrus sativa).Food adultrants- structure and harmfull effects of - Butter yellow, lead chromate and malachite green.	3

Sl. no.	Practical	Hrs
1.	Sensory acceptability of food products: Physical Attributes (Appearance, color, texture, taste and overall acceptansibility). Texture measurement of food products by instrumental methods. Preparation of food labelling. Formulation for foods for target groups (weaning, pre-school children, geriatric, therapeutic foods etc.). Processing of spices for traditional products. Storage and shelf determination.	9h
2.	Estimation of iron in drumsticks	3h
3.	Estimation of Calcium in ragi	3h

MODEL QUESTION PAPER

CODE NO: MFA 520

Semester - I

Food and Nutrition

TIME: 3 hrs **Max marks: 70**

Instructions: Draw neat and labeled diagram wherever necessary.

1. Answer all the questions in one sentence or a word 10 X 1 = 10

f. ----------
g. ----------
h. ----------
i. ----------
j. ----------

2. Answer any four of the following questions 4 X 5 = 20

f. ----------
g. ----------
h. ----------
i. ----------
j. ----------

3. Answer any four questions of the following 4 X 10 = 40

f. ----------
g. ----------
h. ----------
i. ----------
j. ----------

(Note- 10 Marks may be divided in to 6+4 or 5+5)

I SEMESTER PRACTICAL EXAMINATION

Food and Nutrition

PRACTICAL

SCHEME OF EXAMINATION

DURATION: 3 Hours

Maximum Marks: 70

Practical proper: 60

Record marks: 10

NOTE :- Candidates are required to submit the records duly signed by the teacher-in charge and certified by the Head of the Department

1. Sensory acceptability of food products: Physical Attributes (Appearance, color, texture, taste and overall acceptansibility).
2. Texture measurement of food products by instrumental methods.
3. Preparation of food labelling.
4. Formulation for foods for target groups (weaning, pre-school children, geriatric, therapeutic foods etc.).
5. Processing of spices for traditional products.
6. Storage and shelf determination.
7. Estimation of iron in drumsticks
8. Estimation of Calcium in Ragi

General Component

Semester – II **MFB 510**

Sl. no.	Food Microbiology	Hrs
1.	**Microbiology:** Introduction, historical developments in food microbiology; prokaryotes and eukaryotes. **Microscopy**: Different types of microscopes, their construction and working principles. Simple microscope (dissection microscope), Compound microscope - bright field, dark field, phase contrast, stereomicroscope and fluorescence microscope. Principle, construction and applications of Scanning and Transmission electron microscopes. **Classification of microbes:** Haeckel's three- kingdom, Whittaker's five-kingdom classification and Cavalier-Smith's eight kingdom classification. Morphology of microbes. **Pure culture techniques-** Serial dilution, Pour plate, Spread plate, Streak plate and Micromanipulator technique Microbial growth, growth curve. Sources of microorganism in foods . Factors affecting heat resistance; Pasteurization and sterilization. Factors affecting growth-intrinsic and extrinsic factors controlling growth of microorganisms.	9
2.	**Disinfection & disinfectants:** Definition of terms - Disinfectants, antiseptics, sanitizers, Microbicides: virucide, algicide, fungicide and sporicide. Microbistatic: bacteriostatic and fungistatic. Use and mode of action - Alcohols, Aldehydes, Halogens, Phenols, Heavy metals, Quaternary Ammonium compounds and Sterilizing gases (ethylene oxide).	2
3.	**Food preservatives-** heating process, irradiation, low temperature storage, chemical preservatives and high-pressure processing of foods; control of water activity.	2
4.	**Foods microbiology and public health:** Food poisoning, types of food poisonings, important features etc; bacterial agents of food borne illness, food poisoning by *Clostridium- C. Botulinum, Salmonella-salmonellosis, Bacillus cereus*, and non bacterial agents of food borne illness: poisonous algae-types of illness, Study of Neurotoxic Shellfish Poisoning (NSP) and Diarrheic Shellfish Poisoning (DSP), and fungi-Aflatoxin (a brief account)**.**	5
5.	**Food spoilage:** Fruits and vegetables, spoilage of canned foods; methods of isolation and detection of microorganisms or their products in food; conventional methods; rapid methods, retention of microbes, (newer techniques)-immunological methods; fluorescent anti body, radioimmunoassay, principles of ELISA, PCR (Polymerase chain reactions**)**	4

6.	Indicators microorganisms; microbiological criteria of foods and their significance; the HACCP system and food safety used in controlling microbiological hazards, applications of hurdle technology for controlling microbial growth.	2
7.	**Microbiology of Fermented foods:** Cereals, Vinegar, Oriental foods, Alcoholic beverages.	2
8.	**Microbiology of milk & milk products:** cheese, butter, ice cream, and milk powder etc	2
9.	**Microbiology of cereal & cereal products:** bread, biscuits, confectionary etc	2

Sl. no.	**Practical**	**Hrs**
1.	Equipments used in microbiology laboratory,	15
2.	Study of microscope and observation of microbial slides,	
3.	Methods of sterilization and preparation of media, ,	
4.	Staining techniques- Simple, Negative and Gram's staining	
5.	Effects of environmental factors on growth of microorganisms,	
	Assignment-microbiological analysis of market samples- milk & milk products, fresh & processed fruits and vegetables, Cereal & bakery products	

MODEL QUESTION PAPER

CODE NO: **Semester - II**

Food Microbiology

TIME: 3 hrs **Max marks: 70**

Instructions: Draw neat and labeled diagram wherever necessary.

PART-A

I. Write short notes for the following(any 5): **(5x2=10)**

1. ----------
2. ----------
3. ----------
4. ----------
5. ----------
6. ----------

PART-B

II. Answer any 4 of the following: **(4x5=20)**

1. ----------
2. ----------
3. ----------
4. ----------
5. ----------

PART –C

III. Answer any 4 of the following: **(4x10=40)**
IV.

1. ----------
2. ----------
3. ----------
4. ----------
5. ----------

II SEMESTER PRACTICAL EXAMINATION

Food Microbiology

PRACTICAL

SCHEME OF EXAMINATION

DURATION: 3 Hours

Maximum Marks: 70

Practical proper: 60

Record marks: 10

NOTE :- Candidates are required to submit the records duly signed by the teacher-in charge and certified by the Head of the Department

Equipments used in microbiology laboratory, study of microscope, observation of microbial slides, preparation and sterilization of media, methods of sterilization, staining techniques, effects of environmental factors on growth of microorganisms,

Assignment-microbiological analysis of market samples- milk & milk products, fresh & processed fruits and vegetables, Cereal & bakery products

General Component

Semester - II **MFB 520**

Sl. no.	Biostatistics	Hrs
1.	Statistical concepts: Data structure, sampling methods, collection, classification and tabulation of data, graphical and diagrammatic representation, histogram, frequency polygon, frequency curve, bar graph, pie chart etc.	4
2.	Measure of Central Frequency: Mean, median, mode.	2
3.	Measure of dispersion of data: Range, semi-interquartile range, mean deviation, standard deviation, standard error, coefficient of variation, confidence limits.	5
4.	Types of distribution of data: Normal, Binomial, Poisson.	7
5.	Z-test, t-test, ANOVA, multiple comparisons, LSD and DMRT, Chi-square test.	4
6.	Regression estimate, correlation coefficient.	4
7.	Experimental designs, data transformation.	4

Sl. no.	Practical	Hrs
1.	Analytical Problems / calculations	15

MODEL QUESTION PAPER

CODE NO: Semester - II

Biostatistics

TIME: 3 hrs **Max marks: 70**

Instructions: Draw neat and labeled diagram wherever necessary.

PART-A

V. Write short notes for the following(any 5): (5x2=10)

7. ----------
8. ----------
9. ----------
10. ----------
11. ----------
12. ----------

PART-B

VI. Answer any 4 of the following: (4x5=20)

6. ----------
7. ----------
8. ----------
9. ----------
10. ----------

PART –C

VII. Answer any 4 of the following: (4x10=40)
VIII.

6. ----------
7. ----------
8. ----------
9. ----------
10. ----------

II SEMESTER PRACTICAL EXAMINATION

Biostatistics

PRACTICAL

SCHEME OF EXAMINATION

DURATION: 3 Hours

Maximum Marks: 70

Practical proper: 60

Record marks: 10

NOTE :- Candidates are required to submit the records duly signed by the teacher-in charge and certified by the Head of the Department

1.Analytical Problems / calculations

Semester – III **MFC 510**

Sl no.	Information Communication Technology	Hrs
1.	The humanitarian supply chain - Definition, system of organizations, people, technology, activities, information and resources involved in moving a product or service from supplier to customer.	5
2.	Beneficiary Identification – Challenge in food assistance to ensure that assistance goes to the right beneficiaries. Charitable organisations and NGO's involved in disaster management world over.	5
3.	Role of Mobile Technologies, handheld devices, RFID, scanners in HLRC as well as in SCM of food industry from farm to fork. Building blocks of ICT and role of Big Data, IOT, Data mining, Mapping technology, smart systems.	5
4.	Explain the Role of SCM system and all its components in food manufacturing organisations. How can ICT help to maintain the quality of Raw materials in food supply chain?	5
5.	Role of ICT in systems such as LIFO/FIFO/JIT/QR/VMI and **cost optimisation** in SCM system of a food manufacturing setup.	5
6.	Role of ICT in QSR industry. Importance of cold chain maintenance to maintain quality of Raw materials from farm to fork. Role of ICT in monitoring cold chain maintenance.	5
7.	Explain communication and types. Role of communication through modern media/technologies. Discipline and courtesies to be followed in official communication to maintain decorum.	5

SL.no.	Practical	Hrs
1.	Software use in mapping Technology, Tracking, web portals in crisis management in case of a disaster.	2
2.	Requirement development for food processing unit SCM software.	3
3.	Application of software for SCM system and ERP.	5

MODEL QUESTION PAPER

CODE NO: Semester – II

Information Communication Technology

TIME: 3 hrs **Max marks: 70**

Instructions: Draw neat and labeled diagram wherever necessary.

PART-A

IX. Write short notes for the following(any 5): **(5x2=10)**

13. ----------
14. ----------
15. ----------
16. ----------
17. ----------
18. ----------

PART-B

X. Answer any 4 of the following: **(4x5=20)**

11. ----------
12. ----------
13. ----------
14. ----------
15. ----------

PART –C

XI. Answer any 4 of the following: **(4x10=40)**
XII.

11. ----------
12. ----------
13. ----------
14. ----------
15. ----------

II SEMESTER PRACTICAL EXAMINATION

Information Communication Technology

PRACTICAL

SCHEME OF EXAMINATION

DURATION: 3 Hours

Maximum Marks: 70

Practical proper: 60

Record marks: 10

NOTE :- Candidates are required to submit the records duly signed by the teacher-in charge and certified by the Head of the Department

I. Software use in mapping Technology, Tracking, web portals in crisis management in case of a disaster.
II. Requirement development for food processing unit SCM software.
III. Application of software for SCM system and ERP.

General Component

Semester - III **MFC 520**

Sl. no.	PRODUCT DEVELOPMENT AND ENTRPREUNERSHIP	Hrs
1	Sensory evaluation of foods - Importance, need and application for product formulation, Basic tastes, threshold tests for basic tastes, Sensory panel, type, selection and training. Types of sensory tests- Subjective and objective sensory evaluation. Instrumental tests for sensory attributes – color, texture and odor.	8
2	Product Development - Designing new product – types and drawing forces, Need for product development. Stages of product development, Consumer research. Role of sensory evaluation in consumer product acceptance.	5
3	Entrepreneurship - Starting and managing an enterprise - Steps in preparing a business plan, Components of management, Developing managerial skills, Managing a food industry. Factors influencing entrepreneurship groups Qualities of an entrepreneur	6
4	Consumer Behaviour & Marketing - Factors influencing food purchases, product acceptance, purchasing trends. Changing food trends.	3
5	Special food processing technologies and novel food ingredients – Membrane technology (reverse osmosis and ultra-filtration), agglomeration, agitation, air classification, extrusion, automation in food industries.	8

Sl. no.	Practical	Hrs
1	Sensory analysis: Different types of sensory tests for basic tastes and sensory attributes of products.	5
2	Project on different sensory techniques and responses utilizing prepared food products, analysis and presentation of sensory data.	3
3	Stepwise development of a new food product, standardization, acceptability studies and submission of project report.	4
4	Survey on types of convenience foods / consumer behaviour / analysis of food labelling.	3

MODEL QUESTION PAPER

CODE NO: MFC 520 Semester – III

PRODUCT DEVELOPMENT AND ENTRPREUNERSHIP

TIME: 3 hrs **Max marks: 70**

Instructions: Draw neat and labeled diagram wherever necessary.

PART-A

XIII. Write short notes for the following(any 5): (5x2=10)

19. ----------
20. ----------
21. ----------
22. ----------
23. ----------
24. ----------

PART-B

XIV. Answer any 4 of the following: (4x5=20)

16. ----------
17. ----------
18. ----------
19. ----------
20. ----------

PART –C

XV. Answer any 4 of the following: (4x10=40)

XVI.

16. ----------
17. ----------
18. ----------
19. ----------
20. ----------

III SEMESTER PRACTICAL EXAMINATION

PRODUCT DEVELOPMENT AND ENTRPREUNERSHIP PRACTICAL

SCHEME OF EXAMINATION

DURATION: 3 Hours

Maximum Marks: 70

Practical proper: 60

Record marks: 10

NOTE: - Candidates are required to submit the records duly signed by the teacher-in charge and certified by the Head of the Department

I. Different types of sensory tests
II. Methods of Sensory analysis for basic tastes and sensory attributes of products.
III. Stepwise development of a new food product, standardization and acceptability studies.
IV. Survey on types of convenience foods.
V. Market survey and identification of consumer behaviour.
VI. Survey on types of analysis of food labelling.
VII. Preparation of project reports on different sensory techniques and responses utilizing prepared food products
VIII. Presentation of the project proposed and analysis of sensory data.

General Component

Semester – IV **MFD 510**

Sl. No.	Food Marketing	Hrs
1.	Food Marketing: Definition, meaning, characteristics of rural and urban marketing	3
2.	Opportunities and challenges marketing food products by small scale entrepreneurs	2
3.	Rural marketing segmentation, rural consumer behavior, changing trends in rural consumer selection and decision, marketing process and influential factors, marketing needs for export products.	5
4.	Urban marketing segmentation, urban consumer behavior, changing trends in urban consumer selection and decision, marketing process and influential factors	5
5.	Product design, innovativeness presentation, services, prices, method of pricing, network for sourcing raw materials and distribution of products in both rural and urban area.	4
6.	Designing advertisement, campaign, sales promotion, choice of media, techniques, personal selling and publicity	4
7.	Online Marketing: Target population, product packing, distribution through courier and other mode of transportation.	3
8.	Food packaging, labelling for consumer acceptability	2
9.	Relevant of marketing information system, market research in accessing consumer behavior	2

Sl. No.	Practical	Hrs
1.	Regulatory aspects and food hygiene and safety for packing and marketing of food products. Costing of food products. Visit to marketing federation, cooperatives APMCs and other marketing organization and institution for familiarization of	15

	marketing strategy, handling and transportation of fresh package products, perishable goods and self stable and transport table. Financial management, securing financial support, advancing the products for marketing, bulk and retail sales, recalling the products recovery of advances.	

MODEL QUESTION PAPER

CODE NO: Semester – IV

Food Marketing

TIME: 3 hrs **Max marks: 70**

Instructions: Draw neat and labeled diagram wherever necessary.

PART-A

XVII. Write short notes for the following(any 5): **(5x2=10)**

25. ----------
26. ----------
27. ----------
28. ----------
29. ----------
30. ----------

PART-B

XVIII. Answer any 4 of the following: **(4x5=20)**

21. ----------
22. ----------
23. ----------
24. ----------
25. ----------

PART –C

XIX. Answer any 4 of the following: **(4x10=40)**

21. ----------
22. ----------
23. ----------
24. ----------
25. ----------

IV SEMESTER PRACTICAL EXAMINATION

PRACTICAL

Food Marketing

SCHEME OF EXAMINATION

DURATION: 3 Hours

Maximum Marks: 70

Practical proper: 60

Record marks: 10

NOTE :- Candidates are required to submit the records duly signed by the teacher-in charge and certified by the Head of the Department

1.Regulatory aspects and food hygiene and safety for packing and marketing of food products. Costing of food products

2.Visit to marketing federation, cooperatives APMCs and other marketing organization and institution for familiarization ofmarketing strategy, handling and transportation of fresh package products, perishable goods and self stable and transport table.

3.Financial management, securing financial support, advancing the products for marketing, bulk and retail sales, recalling the products recovery of advances.

General Component

Semester – IV **MFD 520**

Sl. No.	Food Standards, Regulatory Affairs and IPR Issues	Hrs
1.	Introduction to concepts of food quality, food safety, food quality assurance and food quality management; objectives, importance and functions of quality control, Current challenges to food safety	3
2.	Principles of food quality assurance, total quality management (TQM)–good manufacturing/management practices, good hygienic practices, good lab practices, general awareness and role of management practices in quality control	3
3.	Microbial quality control: determination of microorganisms in foods by cultural, microscopic, physical, chemical methods. Statistical quality control in food industry Food adulteration, nature of adulterants, methods of evaluation of food adulterants and toxic constituents	3
4.	Food safety management, applications of HACCP in food safety, concept of food trace ability for food safety, Food safety and Standards Act 2006: salient provision and prospects	3
5.	Role of national and international regulatory agencies, Bureau of Indian Standards (BIS), AGMARK, Food Safety and Standards Authority of India (FSSAI)	3
6.	Introduction to WTO agreements: SPS and TBT agreements, Codex Alimentarious Commission ,, International organization for standards (ISO) and its standards for food quality and safety (ISO 9000 series, ISO 22000, ISO 15161,ISO 14000)	5
7.	Food safety in USA, USFDA, Legislation in Europe: Directives of the official journal of the EU, council regulations, food legislation in UK. Regulating methods for food analysis, case studies. Enforcers of Food Laws Approval Process for Food Additives ,Nutritional Labeling	5
8.	Concept of property, rights, duties and their correlation; History and evaluation of IPR; Copyrights and related rights. Distinction among Various forms of IPR. Patent rights/protection and	5

	procedure; Infringement or violation; Remedies against infringement; Indian Patent Act 1970 and TRIPS; Geographical indication and Industrial design	
Sl. No.	**Practical**	**Hrs**
1.	Study of food regulations in various countries ; study of nutritional labeling of packaged food items by visiting food market, Visit the websites of FSSAI, BIS, AGMARK, ISO, Codex Alimentarius Commission , USFDA Study of patent law in India and the procedure for grant of patent in India	15

MODEL QUESTION PAPER

CODE NO: Semester – IV

Food Standards, Regulatory Affairs and IPR Issues

TIME: 3 hrs **Max marks: 70**

Instructions: Draw neat and labeled diagram wherever necessary.

PART-A

XX. Write short notes for the following(any 5): (5x2=10)

31. ----------
32. ----------
33. ----------
34. ----------
35. ----------
36. ----------

PART-B

XXI. Answer any 4 of the following: (4x5=20)

26. ----------
27. ----------
28. ----------
29. ----------
30. ----------

PART –C

XXII. Answer any 4 of the following: (4x10=40)

26. ----------
27. ----------
28. ----------
29. ----------
30. ----------

IV SEMESTER PRACTICAL EXAMINATION

PRACTICAL

Food Standards, Regulatory Affairs and IPR Issues

SCHEME OF EXAMINATION

DURATION: 3 Hours

Maximum Marks: 70

Practical proper: 60

Record marks: 10

NOTE :- Candidates are required to submit the records duly signed by the teacher-in charge and certified by the Head of the Department

1. Study of food regulations in various countries ;

2.study of nutritional labeling of packaged food items by visiting food market, Visit the websites of FSSAI, BIS, AGMARK, ISO, Codex Alimentarius Commission , USFDA

3.Study of patent law in India and the procedure for grant of patent in India

ಜೆಎಸ್ಎಸ್ ಮಹಾವಿದ್ಯಾಪೀಠ

ಜೆಎಸ್ಎಸ್ ಕಲಾ, ವಾಣಿಜ್ಯ ಮತ್ತು ವಿಜ್ಞಾನ ಕಾಲೇಜು

(ಸ್ವಾಯತ್ತ)

ಬಿ.ಎನ್. ರಸ್ತೆ, ಮೈಸೂರು – ೫೭೦ ೦೨೫

ಕನ್ನಡ ಸ್ನಾತಕೋತ್ತರ ವಿಭಾಗ

ಪಠ್ಯ – ಪಾಠಕ್ರಮ – ಪರೀಕ್ಷಾ ಯೋಜನೆ

ಚಾತುರ್ಮಾಸ ಯೋಜನೆ (ಸಿಬಿಸಿಎಸ್-ಸಿಎಜಿಪಿ)

೨೦೨೧-೨೨

ಮೊದಲನೆಯ ವರ್ಷ ಎಂ.ಎ. ಕನ್ನಡ

ಮೊದಲನೆಯ ಚತುರ್ಮಾನ (ಆಗಸ್ಟ್ – ಡಿಸೆಂಬರ್ ೨೦೧೯)

ಪಠ್ಯ–ಪಾಠಕ್ರಮ ಮತ್ತು ಪರೀಕ್ಷಾ ಯೋಜನೆ

ಪತ್ರಿಕೆ ಸಂಖ್ಯೆ	ಪತ್ರಿಕೆಗಳ ಶೀರ್ಷಿಕೆ	ಕ್ರೆಡಿಟ್ ವಿನ್ಯಾಸ	ಕ್ರೆಡಿಟ್‌ಗಳ ಸಂಖ್ಯೆ	ಬೋಧನಾ ಗಂಟೆಗಳು (ವಾರಕ್ಕೆ)		ಪರೀಕ್ಷಾ ಅವಧಿ (ಗಂಟೆಗಳಲ್ಲಿ)	ಪರೀಕ್ಷಾ ಅಂಕಗಳು	ಆಂತರಿಕ ಮೌಲ್ಯಮಾಪನ ಅಂಕಗಳು	ಒಟ್ಟು ಅಂಕಗಳು
				ಉಪನ್ಯಾಸ	ಟ್ಯುಟೋರಿಯಲ್				
	ಪ್ರಧಾನ ವಿಷಯಗಳು (**Hard core**)								
೧	ಪ್ರಾಚೀನ ಕನ್ನಡ ಸಾಹಿತ್ಯ : ಪಠ್ಯ – ಆದಿಪುರಾಣ ಸಂಗ್ರಹ (ಸಂ: ಎಲ್. ಗುಂಡಪ್ಪ)	೩:೧	೪	೩	೧	೩	೭೦	೩೦	೧೦೦
೨	ಪ್ರಾಚೀನ ಕನ್ನಡ ಸಾಹಿತ್ಯದ ಹಿನ್ನೆಲೆ	೨:೧	೩	೨	೧	೩	೭೦	೩೦	೧೦೦
೩	ಕನ್ನಡ ಛಂದಸ್ಸಿನ ಅಧ್ಯಯನ	೩:೧	೪	೩	೧	೩	೭೦	೩೦	೧೦೦
೪	ವಿಮರ್ಶೆಯ ಅಧ್ಯಯನ	೨:೧	೩	೨	೧	೩	೭೦	೩೦	೧೦೦
೫	ಉಪ ಪ್ರಧಾನ ವಿಷಯಗಳು (**Soft core**) ವಿದ್ಯಾರ್ಥಿ ಈ ಕೆಳಗಿನ ಯಾವುದಾದರೂ ಒಂದು ವಿಷಯವನ್ನು ಆಯ್ಕೆ ಮಾಡಿಕೊಂಡು ಮುಂದಿನ ಮೂರು ಚತುರ್ಮಾನಗಳಲ್ಲಿಯೂ ಅದೇ ವಿಷಯವನ್ನು ಮುಂದುವರಿಸತಕ್ಕದ್ದು								
೫.೧	ಭಾಷಾವಿಜ್ಞಾನ ಅಧ್ಯಯನ : ಭಾಷಾ ವಿಜ್ಞಾನದ ಮೂಲತತ್ತ್ವಗಳು	೩:೧	೪	೩	೧	೩	೭೦	೩೦	೧೦೦
೫.೨	ಜಾನಪದ ಅಧ್ಯಯನ : ಜಾನಪದ ಸಾಹಿತ್ಯದ ತಾತ್ವಿಕ ಅಧ್ಯಯನ	೩:೧	೪	೩	೧	೩	೭೦	೩೦	೧೦೦
೫.೩	ಚಾರಿತ್ರಿಕ ಅಧ್ಯಯನ : ಕರ್ನಾಟಕ ಸಾಂಸ್ಕೃತಿಕ ಚರಿತ್ರೆ	೩:೧	೪	೩	೧	೩	೭೦	೩೦	೧೦೦

ಮೊದಲನೆಯ ವರ್ಷ ಎಂ.ಎ. ಕನ್ನಡ

ಎರಡನೆಯ ಚತುರ್ಮಾಸ (ಜನವರಿ –ಮೇ ೨೦೨೦)

ಪಠ್ಯ–ಪಾಠಕ್ರಮ ಮತ್ತು ಪರೀಕ್ಷಾ ಯೋಜನೆ

ಪತ್ರಿಕೆ ಸಂಖ್ಯೆ	ಪತ್ರಿಕೆಗಳ ಶೀರ್ಷಿಕೆ	ಕ್ರೆಡಿಟ್ ವಿನ್ಯಾಸ	ಕ್ರೆಡಿಟ್‌ಗಳ ಸಂಖ್ಯೆ	ಬೋಧನಾ ಗಂಟೆಗಳು (ವಾರಕ್ಕೆ)		ಪರೀಕ್ಷಾ ಅವಧಿ (ಗಂಟೆಗಳಲ್ಲಿ)	ಪರೀಕ್ಷಾ ಅಂಕಗಳು	ಆಂತರಿಕ ಮೌಲ್ಯಮಾಪನ ಅಂಕಗಳು	ಒಟ್ಟು ಅಂಕಗಳು
				ಉಪನ್ಯಾಸ	ಟ್ಯುಟೋರಿಯಲ್				
	ಪ್ರಧಾನ ವಿಷಯಗಳು (**Hard core**)								
೧	ಮಧ್ಯಕಾಲೀನ ಕನ್ನಡ ಸಾಹಿತ್ಯ : ಪಠ್ಯ	೩:೧	೪	೩	೨	೩	೭೦	೩೦	೧೦೦
೨	ಮಧ್ಯಕಾಲೀನ ಕನ್ನಡ ಸಾಹಿತ್ಯದ ಹಿನ್ನೆಲೆ	೨:೧	೩	೨	೨	೩	೭೦	೩೦	೧೦೦
೩	ದ್ರಾವಿಡ ಭಾಷಾವಿಜ್ಞಾನ	೨:೧	೩	೨	೨	೩	೭೦	೩೦	೧೦೦
೪	ಕನ್ನಡ ವಿಮರ್ಶೆ : ಆಯ್ದ ಲೇಖನಗಳು	೩:೧	೪	೩	೨	೩	೭೦	೩೦	೧೦೦
೫	ಉಪ ಪ್ರಧಾನ ವಿಷಯಗಳು (**Soft core**) ಕೆಳಗಿನ ಪತ್ರಿಕೆಗಳಲ್ಲಿ ವಿದ್ಯಾರ್ಥಿಯು ಹಿಂದೆ ಆಯ್ಕೆ ಮಾಡಿಕೊಂಡ ಪತ್ರಿಕೆಯನ್ನೇ ಈ ಚತುರ್ಮಾಸದಲ್ಲಿಯೂ ಅಧ್ಯಯನ ಮಾಡಬೇಕು.								
೫.೧	ಭಾಷಾವಿಜ್ಞಾನ ಅಧ್ಯಯನ : ಕನ್ನಡ ವ್ಯಾಕರಣಗಳ ತೌಲನಿಕ ಸಮೀಕ್ಷೆ	೩:೧	೪	೩	೨	೩	೭೦	೩೦	೧೦೦
೫.೨	ಜಾನಪದ ಅಧ್ಯಯನ : ಜನಪದ ಸಂಸ್ಕೃತಿಯ ತಾತ್ವಿಕ ಅಧ್ಯಯನ	೩:೧	೪	೩	೨	೩	೭೦	೩೦	೧೦೦
೫.೩	ಚಾರಿತ್ರಿಕ ಅಧ್ಯಯನ : ಕನ್ನಡ ಸಾಹಿತ್ಯ ಚರಿತ್ರೆ (೧೩ನೆಯ ಶತಮಾನ)	೩:೧	೪	೩	೨	೩	೭೦	೩೦	೧೦೦
೬	<u>ವಿಶೇಷ ಉಪ ಪ್ರಧಾನ ವಿಷಯಗಳು</u> (**Special Soft core**) ವಿದ್ಯಾರ್ಥಿಗಳು ಈ ಚತುರ್ಮಾಸದಲ್ಲಿ ಯಾವುದಾದರೂ ಒಂದು ವಿಶೇಷ ಉಪ ಪ್ರಧಾನ ವಿಷಯವನ್ನು ಆಯ್ಕೆ ಮಾಡಿ ಅಧ್ಯಯನ ಮಾಡಬೇಕು								
೬.೧	ಕನ್ನಡ ಸಂಸ್ಕೃತಿ ಚಿಂತನೆ (ಆಯ್ದ ಲೇಖನಗಳು)	೩:೧	೪	೩	೨	೩	೭೦	೩೦	೧೦೦
೬.೨	ಮಹಿಳೆ : ಸಮಾಜ-ಸಾಹಿತ್ಯ (ಆಯ್ದ ಲೇಖನಗಳು)	೩:೧	೪	೩	೨	೩	೭೦	೩೦	೧೦೦

ಎರಡನೆಯ ವರ್ಷ ಎಂ.ಎ ಕನ್ನಡ

ಮೂರನೆಯ ಚತುರ್ಮಾಸ (ಆಗಸ್ಟ್ – ಡಿಸೆಂಬರ್ ೨೦೨೦)

ಪಠ್ಯ–ಪಾಠಕ್ರಮ ಮತ್ತು ಪರೀಕ್ಷಾ ಯೋಜನೆ

ಪತ್ರಿಕೆ ಸಂಖ್ಯೆ	ಪತ್ರಿಕೆಗಳ ಶೀರ್ಷಿಕೆ	ಕ್ರೆಡಿಟ್ ವಿನ್ಯಾಸ	ಕ್ರೆಡಿಟ್‌ಗಳ ಸಂಖ್ಯೆ	ಬೋಧನಾ ಗಂಟೆಗಳು (ವಾರಕ್ಕೆ)		ಪರೀಕ್ಷಾ ಅವಧಿ (ಗಂಟೆಗಳಲ್ಲಿ)	ಪರೀಕ್ಷಾ ಅಂಕಗಳು	ಆಂತರಿಕ ಮೌಲ್ಯಮಾಪನ ಅಂಕಗಳು	ಒಟ್ಟು ಅಂಕಗಳು
				ಉಪನ್ಯಾಸ	ಟ್ಯುಟೋರಿಯಲ್				
	ಪ್ರಧಾನ ವಿಷಯಗಳು (Hard core)								
೧	ತೌಲನಿಕ ಸಾಹಿತ್ಯ : ಪಠ್ಯ : ಮಹಾಕಾವ್ಯ ಮತ್ತು ನಾಟಕ	೨:೧	೩	೨	೨	೩	೭೦	೩೦	೧೦೦
೨	ಆದುನಿಕ ಕನ್ನಡ ಸಾಹಿತ್ಯದ ಹಿನ್ನೆಲೆ	೨:೧	೩	೨	೨	೩	೭೦	೩೦	೧೦೦
೩	ಭಾರತೀಯ ಕಾವ್ಯಮೀಮಾಂಸೆ	೨:೧	೩	೨	೨	೩	೭೦	೩೦	೧೦೦
೪	ಸಂಶೋಧನ ವಿಧಾನ ಮತ್ತು ಗಣಕ ಜ್ಞಾನ	೨:೧	೩	೨	೨	೩	೭೦	೩೦	೧೦೦
೫	**ಉಪ ಪ್ರಧಾನ ವಿಷಯಗಳು (Soft core)** ಕೆಳಗಿನ ಪತ್ರಿಕೆಗಳಲ್ಲಿ ವಿದ್ಯಾರ್ಥಿಯು ಹಿಂದೆ ಆಯ್ಕೆ ಮಾಡಿಕೊಂಡ ಪತ್ರಿಕೆಯನ್ನೇ ಈ ಚತುರ್ಮಾಸದಲ್ಲಿಯೂ ಅಧ್ಯಯನ ಮಾಡಬೇಕು.								
೫.೧	ಭಾಷಾ ವಿಜ್ಞಾನ ಅಧ್ಯಯನ : ಉಪಭಾಷಾ ವಿಜ್ಞಾನ (ಕನ್ನಡ)	೪:೧	೪	೪	೨	೩	೭೦	೩೦	೧೦೦
೫.೨	ಜಾನಪದ ಅಧ್ಯಯನ : ಕರ್ನಾಟಕ ಜನಪದ ಕಲೆಗಳು	೪:೧	೪	೪	೨	೩	೭೦	೩೦	೧೦೦
೫.೩	ಚಾರಿತ್ರಿಕ ಅಧ್ಯಯನ : ಶಾಸನಶಾಸ್ತ್ರ ಆಯ್ದ ಪಠ್ಯಗಳೊಡನೆ	೪:೧	೪	೪	೨	೩	೭೦	೩೦	೧೦೦
೬	**ಮುಕ್ತ ಐಚ್ಛಿಕ (Open Elective)**								
೬.೧	ಕನ್ನಡ ಭಾಷೆ ಸಾಹಿತ್ಯ (ಪ್ರಾಚೀನ, ಮಧ್ಯಕಾಲೀನ, ಆಧುನಿಕ)	೪:೧	೪	೪	೨	೩	೭೦	೩೦	೧೦೦

ಎರಡನೆಯ ವರ್ಷ ಎಂ.ಎ ಕನ್ನಡ

ನಾಲ್ಕನೆಯ ಚತುರ್ಮಾಸ (ಜನವರಿ–ಮೇ ೨೦೨೧)

ಪಠ್ಯ–ಪಾಠಕ್ರಮ ಮತ್ತು ಪರೀಕ್ಷಾ ಯೋಜನೆ

ಪತ್ರಿಕೆ ಸಂಖ್ಯೆ	ಪತ್ರಿಕೆಗಳ ಶೀರ್ಷಿಕೆ	ಕ್ರೆಡಿಟ್ ವಿನ್ಯಾಸ	ಕ್ರೆಡಿಟ್‌ಗಳ ಸಂಖ್ಯೆ	ಬೋಧನಾ ಗಂಟೆಗಳು (ವಾರಕ್ಕೆ)		ಪರೀಕ್ಷಾ ಅವಧಿ (ಗಂಟೆಗಳಲ್ಲಿ)	ಪರೀಕ್ಷಾ ಅಂಕಗಳು	ಆಂತರಿಕ ಮೌಲ್ಯಮಾಪನ ಅಂಕಗಳು	ಒಟ್ಟು ಅಂಕಗಳು
				ಉಪನ್ಯಾಸ	ಟ್ಯುಟೋರಿಯಲ್				
	ಪ್ರಧಾನ ವಿಷಯಗಳು (Hard core)								
೧	ಆಧುನಿಕ ಕನ್ನಡ ಸಾಹಿತ್ಯ : ಪಠ್ಯ : ಕಾವ್ಯ, ಕಾದಂಬರಿ	೨:೧	೩	೨	೨	೩	೭೦	೩೦	೧೦೦
೨	ಪಾಶ್ಚಾತ್ಯ ಕಾವ್ಯಮೀಮಾಂಸೆ	೨:೧	೩	೨	೨	೩	೭೦	೩೦	೧೦೦
೩	ಸಮೂಹ ಮಾಧ್ಯಮ	೨:೧	೩	೨	೨	೩	೭೦	೩೦	೧೦೦
೪	ಅವಧಿಕ ಕಾರ್ಯ	೧:೨	೩	೧	೪	೩	೭೦	೩೦	೧೦೦
೫	ಉಪ ಪ್ರಧಾನ ವಿಷಯಗಳು (Soft core) ಕೆಳಗಿನ ಪತ್ರಿಕೆಗಳಲ್ಲಿ ವಿದ್ಯಾರ್ಥಿಯು ಹಿಂದೆ ಆಯ್ಕೆ ಮಾಡಿಕೊಂಡ ಪತ್ರಿಕೆಯನ್ನೇ ಈ ಚತುರ್ಮಾಸದಲ್ಲಿಯೂ ಅಧ್ಯಯನ ಮಾಡಬೇಕು.								
೫.೧	ಭಾಷಾವಿಜ್ಞಾನ ಅಧ್ಯಯನ : ಕನ್ನಡ ಭಾಷಾಸ್ವರೂಪ : ಆಯ್ದ ಪಠ್ಯಗಳು	೩:೧	೪	೩	೨	೩	೭೦	೩೦	೧೦೦
೫.೨	ಜಾನಪದ ಅಧ್ಯಯನ : ಕನ್ನಡ ಜನಪದ ಸಾಹಿತ್ಯ (ಆಯ್ದ ಪಠ್ಯಗಳು)	೩:೧	೪	೩	೨	೩	೭೦	೩೦	೧೦೦
೫.೩	ಚಾರಿತ್ರಿಕ ಅಧ್ಯಯನ : ಕರ್ನಾಟಕ ಸಂಸ್ಕೃತಿ (ಆಯ್ದ ಪಠ್ಯಗಳು)	೩:೧	೪	೩	೨	೩	೭೦	೩೦	೧೦೦

ಪ್ರಧಾನ ವಿಷಯ	: ೫೨ ಕ್ರೆಡಿಟ್
ಉಪಪ್ರಧಾನ ವಿಷಯ	: ೧೬ ಕ್ರೆಡಿಟ್
ವಿಶೇಷ ಉಪಪ್ರಧಾನ ವಿಷಯ	: ೦೪ ಕ್ರೆಡಿಟ್
ಮುಕ್ತ ಐಚ್ಛಿಕ	: ೦೪ ಕ್ರೆಡಿಟ್
ಒಟ್ಟು ಟ್ಯುಟೋರಿಯಲ್ ಮತ್ತು ಪ್ರಾಯೋಗಿಕ ತರಗತಿಗಳು	: ೭೬ ಕ್ರೆಡಿಟ್

ಆಯಾ ಪತ್ರಿಕೆಗಳಿಗೆ ಅನುಸಾರವಾಗಿ ಈ ಕೆಳಗಿನ ಪ್ರಾಯೋಗಿಕ ಅಭ್ಯಾಸಗಳನ್ನು ಪತ್ರಿಕೆಗಳು ಒಳಗೊಂಡಿರುತ್ತವೆ.

೧. ಪದ್ಯ ಓದುವ ಕ್ರಮ, ಅರ್ಥೈಸುವ ಕ್ರಮ, ವಿಶ್ಲೇಷಣೆ ಮತ್ತು ವಿಮರ್ಶೆ

೨. ಭಾವಸ್ವಾರಸ್ಯ, ಸಂಭಾಷಣಾ ಕೌಶಲ, ಸನ್ನಿವೇಶಗಳ ಪರಿಚಯ

೩. ವಸ್ತು, ಪಾತ್ರ, ಭಾಷೆ ಬಳಕೆ, ರಚನೆ, ತಂತ್ರಗಾರಿಕೆ

ಮೊದಲನೆಯ ವರ್ಷ ಎಂ.ಎ ಕನ್ನಡ

ಮೊದಲನೆಯ ಚತುರ್ಮಾಸ

ಮೊದಲನೆಯ ಚತುರ್ಮಾಸ (ಆಗಸ್ಟ್-ಡಿಸೆಂಬರ್ ೨೦೧೮)

ಪ್ರಧಾನ ವಿಷಯಗಳು (Hard Core)

KNA 050: ಪತ್ರಿಕೆ: ೧ ಪ್ರಾಚೀನ ಕನ್ನಡ ಸಾಹಿತ್ಯ : ಪಠ್ಯ (೩:೧=೪)

ಪಂಪ: ಹಿನ್ನೆಲೆ, ಇತಿವೃತ್ತ, ಕೃತಿಗಳು

ಪಠ್ಯ: **ಆದಿಪುರಾಣ ಸಂಗ್ರಹ-(ಸಂ) ಎಲ್.ಗುಂಡಪ್ಪ**: ಪ್ರಸಾರಾಂಗ, ಮೈಸೂರು ವಿ.ವಿ., ಮೈಸೂರು

ಪರಾಮರ್ಶನ ಕೃತಿಗಳು:

೧. ನಾಡೋಜ ಪಂಪ	: ಮುಳಿಯ ತಿಮ್ಮಪ್ಪಯ್ಯ
೨. ಪಂಪ ಒಂದು ಅಧ್ಯಯನ	: ಜಿ.ಎಸ್. ಶಿವರುದ್ರಪ್ಪ
೩. ಪಂಪ ಕೆಲವು ಮುಖಗಳು	: ಸಿ.ಪಿ. ಕೃಷ್ಣ ಕುಮಾರ್
೪. ಕನ್ನಡ ಸಾಹಿತ್ಯ ವಿಶ್ವಪ್ರಜ್ಞೆ	: ಸಿ.ಪಿ. ಸಿದ್ಧಾಶ್ರಮ
೫. ಮತ್ತೆ ಮತ್ತೆ ಪಂಪ	: ಜಿ. ಎಚ್ ನಾಯಕ
೬. ಆದಿಪುರಾಣ ದೀಪಿಕೆ	: ಪಂ. ನಾಗರಾಜಯಗಯ್ಯ, ತ.ಸು.ಶಾಮರಾಯ

KNA 020:ಪತ್ರಿಕೆ: ೨ ಪ್ರಾಚೀನ ಕನ್ನಡ ಸಾಹಿತ್ಯದ ಹಿನ್ನೆಲೆ(೨:೧=೩ ಕ್ರೆಡಿಟ್)

೧. ಸಾಹಿತ್ಯ ಹಿನ್ನೆಲೆಯಲ್ಲಿರುವ ಅಂಶಗಳು : ಕಾಡು, ಕಡಲು, ಪರ್ವತ, ಅಷ್ಟಾದಶ ವರ್ಣನೆಗಳು ಮುಂತಾದವುಗಳ ಭೌಗೋಳಿಕ ನೆಲೆಯಲ್ಲಿ ರೂಪಿತವಾದ ಸಾಹಿತ್ಯ

೨. ವಿವಿಧ ಕಾಲಘಟ್ಟಗಳ ಸಾಮಾಜಿಕ ಮತ್ತು ರಾಜಕೀಯ ಸ್ಥಿತಿಗಳು ಹಾಗೂ ವಿಶೇಷವಾಗಿ ಬಾದಾಮಿ ಚಾಲುಕ್ಯರು, ಗಂಗರು, ರಾಷ್ಟ್ರಕೂಟರ ಕಾಲದ ಕನ್ನಡ ಸಾಹಿತ್ಯ, ಹೊಯ್ಸಳರ ಕಾಲದ ಚಂಪೂ ಕೃತಿಗಳು– ಇವುಗಳ ಹಿನ್ನೆಲೆಯಲ್ಲಿ ರೂಪಿತವಾದ ಸಾಹಿತ್ಯ ಪರಂಪರೆ

೩. ಧಾರ್ಮಿಕ ಹಿನ್ನೆಲೆ : ಬೌದ್ಧ, ಜೈನ, ವೈದಿಕ, ಶೈವ ಧರ್ಮಗಳ ಹಿನ್ನೆಲೆಯಲ್ಲಿ ರೂಪಿತವಾದ ಸಾಹಿತ್ಯ ಪರಂಪರೆ

೪. ಸಂಸ್ಕೃತ, ಪ್ರಾಕೃತ ಭಾಷಾಸಾಹಿತ್ಯಗಳ ಪ್ರೇರಣೆ, ಪ್ರಭಾವಗಳ ಹಿನ್ನೆಲೆ– ಈ ಹಿನ್ನೆಲೆಯಲ್ಲಿ ರೂಪಿತವಾದ ಶಾಸ್ತ್ರಕೃತಿಗಳು, ಕನ್ನಡ ಜೈನ ಪುರಾಣಗಳು, ರಾಮಾಯಣ, ಮಹಾಭಾರತಗಳು

ಪರಾಮರ್ಶನ:

೧. ಕನ್ನಡ ಅಧ್ಯಯನ ಸಂಸ್ಥೆಯ ಕನ್ನಡ ಸಾಹಿತ್ಯ ಚರಿತ್ರೆಯ ಸಂಪುಟಗಳು ೧, ೨ ಮತ್ತು ೩

೨. ಸಮಗ್ರ ಕನ್ನಡ ಸಾಹಿತ್ಯ ಚರಿತ್ರೆ ಸಂಪುಟಗಳು, ಬೆಂಗಳೂರು ವಿಶ್ವವಿದ್ಯಾನಿಲಯ

೩. ಕನ್ನಡ ನಾಡಿನ ಧರ್ಮಗಳು : ಶಿ.ಚೆ. ನಂದೀಮಠ

೪. ಕರ್ನಾಟಕ ಸಂಸ್ಕೃತಿ ಸಮೀಕ್ಷೆ : ಎಚ್. ತಿಪ್ಪೇರುದ್ರಸ್ವಾಮಿ

೫. ಕನ್ನಡ ಶಾಸನಗಳ ಸಾಂಸ್ಕೃತಿಕ ಅಧ್ಯಯನ : ಎಂ.. ಚಿದಾನಂದಮೂರ್ತಿ

೬. ಜೈನಧರ್ಮ : ಮಿರ್ಜಿ ಅಣ್ಣರಾಯ

೭. ಭಾರತೀಯ ಸಂಸ್ಕೃತಿ : (ಸಂ) ಅ.ನ.. ಕೃಷ್ಣರಾಯ

೮. ಕರ್ನಾಟಕ ಪರಂಪರೆ : ಭಾಗ ೧ ಮತ್ತು ೨, ಕನ್ನಡ ಮತ್ತು ಸಂಸ್ಕೃತಿ ಇಲಾಖೆ

೯. ಚಂಪೂ ಸಾಹಿತ್ಯ : ಪಿ.ವಿ. ನಾರಾಯಣ

೧೦. ಕರ್ನಾಟಕ ಸಾಹಿತ್ಯ ಅಕಾಡೆಮಿಯ ಕನ್ನಡ ಸಾಹಿತ್ಯ ಪುನರ್ ಮೌಲ್ಯೀಕರಣ ಮಾಲೆಯ ಸಂಪುಟಗಳು

೧೧. ಕನ್ನಡ ಸಾಹಿತ್ಯ ಚಾರಿತ್ರಿಕ ಬೆಳವಣಿಗೆ (ಮಧ್ಯಕಾಲೀನ) : ಸಿ.ವೀರಣ್ಣ

KNA 030:<u>ಪತ್ರಿಕೆ: ೩ ಕನ್ನಡ ಛಂದಸ್ಸಿನ ಅಧ್ಯಯನ</u>(೩:೧=೪ ಕ್ರೆಡಿಟ್)

೧. ಅ) ಛಂದಸ್ಸಿನ ಉಗಮ, ನಿಷ್ಪತ್ತಿ ಮತ್ತು ಪ್ರಯೋಜನ

ಆ) ವರ್ಣಗಣ, ಮಾತ್ರಾಗಣ ಮತ್ತು ಅಂಶಗಣಗಳ ಸ್ವರೂಪ

ಇ) ಯತಿಯ ಸ್ವರೂಪ ಮತ್ತು ಪ್ರಸ್ತುತತೆ

೨. ಅ) ಪ್ರಾಸದ ಸ್ವರೂಪ, ಪ್ರಭೇದ ಮತ್ತು ಪ್ರಸ್ತುತತೆ

ಆ) ಖ್ಯಾತ ಕರ್ನಾಟಕಗಳ ಸ್ವರೂಪ

ಇ) ಕಂದದ ಉಗಮ ಮತ್ತು ಸ್ವರೂಪ

೩. ಅ) ತ್ರಿಪದಿಯ ಲಕ್ಷಣ ಮತ್ತು ಪ್ರಭೇದಗಳು

ಆ) ಷಟ್ಪದಿಯ ಮೂಲ, ಲಕ್ಷಣ ಮತ್ತು ಪ್ರಭೇದಗಳು

ಇ) ಸಾಂಗತ್ಯದ ಮೂಲ ಮತ್ತು ಲಕ್ಷಣ

೪. ಅ) ಹೊಸಗನ್ನಡ ಛಂದಸ್ಸು : ತತ್ತ್ವಗಳು, ಪರಿಭಾಷೆ

ಆ) ಸರಳ ರಗಳೆಯ ಮೂಲ ಮತ್ತು ಸ್ವರೂಪ

ಇ) ಸಾನೆಟ್ನ ಮೂಲ ಮತ್ತು ಸ್ವರೂಪ

ಪರಾಮರ್ಶನ ಕೃತಿಗಳು

೧. ಕನ್ನಡ ಛಂದಸ್ಸಂಪುಟ : (ಸಂ) ಎಲ್. ಬಸವರಾಜು
೨. ಕನ್ನಡ ಕೈಪಿಡಿ ಸಂಪುಟ ೧ ಭಾಗ ೨ : ಮೈಸೂರು ವಿಶ್ವವಿದ್ಯಾನಿಲಯ
೩. ಜಯದಾಮನ್ : (ಸಂ) ಎಚ್.ಡಿ. ವೇಲಣಕರ್
೪. ಕನ್ನಡ ಛಂದೋವಿಕಾಸ : ಡಿ.ಎಸ್. ಕರ್ಕಿ
೫. ಸಮಾಲೋಕನ : ತೀನಂಶ್ರೀ
೬. ಕನ್ನಡ ಛಂದಸ್ವರೂಪ : ಟಿ.ವಿ. ವೆಂಕಟಾಚಲಶಾಸ್ತ್ರೀ
೭. ಪೀಠಿಕೆಗಳು, ಲೇಖನಗಳು : ಡಿ.ಎಲ್. ನರಸಿಂಹಾಚಾರ್
೮. ಕನ್ನಡ ಛಂದೋವಿಹಾರ : ಟಿ.ವಿ. ವೆಂಕಟಾಚಲಶಾಸ್ತ್ರೀ
೯. ಛಂದೋಗತಿ : ಸೇಡಿಯಾಪು ಕೃಷ್ಣಭಟ್ಟ
೧೦. ಕನ್ನಡ ಛಂದಸ್ಸು : ಸೇಡಿಯಾಪು ಕೃಷ್ಣಭಟ್ಟ
೧೧. ಹೊಸಗನ್ನಡ ಕವಿತೆಯ ಛಂದಸ್ಸು : ಕೆ.ಜಿ. ನಾರಾಯಣಪ್ರಸಾದ್
೧೨. ಭಾರತೀಯ ಛಂದಶ್ಶಾಸ್ತ್ರ : ಪ್ರ.ಗೋ. ಕುಲಕರ್ಣಿ
೧೩. ಛಂದೋತರಂಗ : ಎಂ. ಚಿದಾನಂದಮೂರ್ತಿ
೧೪. ಹೊಸಗನ್ನಡ ಕವಿತೆಯ ಮೇಲೆ ಇಂಗ್ಲಿಷ್ ಕಾವ್ಯದ ಪ್ರಭಾವ : ಎಸ್.ಅನಂತನಾರಾಯಣ
೧೫. The Commonness in the Meters of the Dravidian Languages : S.Subrahmanyan
೧೬. A Study of Metre : T.S. Omond
೧೭.Metre, Rhyme and Free verse : G.S. Fraser

KNA 040: ಪತ್ರಿಕೆ: ೪ ವಿಮರ್ಶೆಯ ಅಧ್ಯಯನ(೨:೧=೩ ಕ್ರೆಡಿಟ್)

೧. (ಅ) Preface to Lyrical Ballads : W. Wordsworth
(ಆ) Literature & Pshychology : Carl Jung. S

೨. (ಅ) ಪ್ರಾಯೋಗಿಕ ವಿಮರ್ಶೆ, ಸ್ವರೂಪ, ವ್ಯಾಪ್ತಿ
(ಆ) ವಚನ, ಆಧುನಿಕ ಕಾವ್ಯಗಳು (ನವೋದಯ, ನವ್ಯ, ದಲಿತ, ಬಂಡಾಯ)

೩. (ಅ) ರೂಪನಿಷ್ಠ ವಿಮರ್ಶೆ, ಮಾರ್ಕ್ಸ್ ವಿಮರ್ಶೆ, ಸ್ತ್ರೀವಾದಿ ವಿಮರ್ಶೆ

೪. (ಅ) ವಸಾಹತು– ವಸಾಹತೋತ್ತರ ವಿಮರ್ಶೆ

ಪರಾಮರ್ಶನ ಕೃತಿಗಳು:

೧. ಪಾಶ್ಚಾತ್ಯ ಕಾವ್ಯಮೀಮಾಂಸೆ : ವಿ.ಎಂ. ಇನಾಂದಾರ್
೨. ಸಾಹಿತ್ಯ ವಿಮರ್ಶೆಯ ತತ್ವಗಳು :ಎಚ್.ತಿಪ್ಪೇರುದ್ರಸ್ವಾಮಿ (ಸಂ.ಶೈಲಜ ಎಚ್.ಟಿ)
೩. ಇಂಗ್ಲಿಷ್ ಭಾಷೆಯಲ್ಲಿ ಆಧುನಿಕ ಸಾಹಿತ್ಯ ವಿಮರ್ಶೆ : ಎಲ್.ಎಸ್. ಶೇಷಗಿರಿರಾವ್
೪ ಪ್ರಮಾಣ : ಗಿರಿಡ್ಡಿ ಗೋವಿಂದರಾಜು
೫. ಕಾವ್ಯಾರ್ಥ ಚಿಂತನ : ಜಿ.ಎಸ್. ಶಿವರುದ್ರಪ್ಪ
೬. ಸಾಹಿತ್ಯ ವಿಮರ್ಶೆ : ಸಿ.ಎನ್. ರಾಮಚಂದ್ರನ್
೭. ವಿಮರ್ಶೆಯ ಪರಿಭಾಷೆ : ಓ.ಎಲ್. ನಾಗಭೂಷಣಸ್ವಾಮಿ
೮. ವಿಮರ್ಶೆಯ ತತ್ತ್ವಗಳು ವಿಧಾನಗಳು :(ಸಂ) ವಿ.ಕೃ ಗೋಕಾಕ್ & ಕುಲಕರ್ಣಿ
೯. ಪ್ರಾಯೋಗಿಕ ವಿಮರ್ಶೆ :(ಸಂ)ಜಿ.ಎಸ್. ಶಿವರುದ್ರಪ್ಪ
ಎನ್.ಎಸ್. ಲಕ್ಷ್ಮೀನಾರಾಯಣ ಭಟ್ಟ
೧೦. ಓದುಗರು ಮತ್ತು ಓದುವಿಕೆ : ಸಿ.ಎನ್. ರಾಮಚಂದ್ರನ್
೧೧. ವಸಾಹತೋತ್ತರ ಚಿಂತನೆ : ಸಿ.ಎನ್. ರಾಮಚಂದ್ರನ್
೧೨. ಸ್ತ್ರೀವಾದ : ಸುಮಿತ್ರಾಬಾಯಿ ಬಿ.ಎನ್
೧೩..Literary Criticism – A Short History : W.K.Wimsatt & Cleanth Brooks
೧೪. .Contemporary Criticism : (Ed)Sethuraman V S

ಉಪಪ್ರಧಾನ ವಿಷಯಗಳು (Soft Core)

KNA 210: ಪತ್ರಿಕೆ: ೫.೧ ಭಾಷಾ ವಿಜ್ಞಾನದ ಮೂಲತತ್ತ್ವಗಳು(೩:೧=೪ ಕ್ರೆಡಿಟ್)

೧. ಭಾಷೆ: ವ್ಯಾಖ್ಯಾನಗಳು–ಲಕ್ಷಣಗಳು, ಸ್ವರೂಪ ; ಭಾಷಾ ವಿಜ್ಞಾನದ ಸ್ವರೂಪ–ವ್ಯಾಪ್ತಿ–ಪ್ರಯೋಜನಗಳು, ಭಾಷೆಯ ಉಗಮ ಸಿದ್ಧಾಂತಗಳು; ಭಾಷೆಗಳ ವರ್ಗೀಕರಣದ ಕ್ರಮಗಳು ಭಾರತೀಯ ಭಾಷೆಗಳ ವರ್ಗೀಕರಣ

೨. ಧ್ವನಿ–ಉಪಧ್ವನಿ :ವ್ಯಾಖ್ಯೆ, ಸ್ವರೂಪ ; ಧ್ವನಿವಿಜ್ಞಾನದ ಶಾಖೆಗಳು, ಧ್ವನಿಮಾ : ವ್ಯಾಖ್ಯೆ, ಸ್ವರೂಪ– ಧ್ವನಿಮಾ ನಿರ್ಣಯದ ತತ್ತ್ವಗಳು

೩.ಆಕೃತಿಮಾ : ವ್ಯಾಖ್ಯೆ, ಸ್ವರೂಪ, ವ್ಯಾಪ್ತಿ – ಆಕೃತಿಮಾ ನಿರ್ಣಯ, ನೈಡಾ ತತ್ತ್ವಗಳು, ಆಕೃತಿಮಾದ ಬಗೆಗಳು

೪. ಭಾಷಿಕ ಬದಲಾವಣೆ ; ಭಾಷಿಕ ಸ್ವೀಕರಣ, ಭಾಷೆ ಮತ್ತು ಬರಹ

ಪರಾಮರ್ಶನ ಕೃತಿಗಳು:

೧.ವರ್ಣನಾತ್ಮಕ ವ್ಯಾಕರಣ : ಎಚ್.ಎಸ್. ಬಿಳಿಗಿರಿರಿ

೨. ಭಾಷಾವಿಜ್ಞಾನದ ಮೂಲತತ್ವಗಳು : ಎಂ. ಚಿದಾನಂದಮೂರ್ತಿ

೩.ಭಾಷೆ ಮತ್ತು ಭಾಷಾವಿಜ್ಞಾನ : ಕೆ.ಕೆಂಪೇಗೌಡ

೪.ಸಾಮಾನ್ಯ ಭಾಷಾವಿಜ್ಞಾನ : ಕೆ.ಕೆಂಪೇಗೌಡ

೫.ಆಧುನಿಕ ವರ್ಣನಾತ್ಮಕ ಭಾಷಾವಿಜ್ಞಾನ : ರಾಜೇಶ್ವರೀ ಮಹೇಶ್ವರಯ್ಯ

೬.ಭಾಷೆ : (ಸಂ) ಕೆ.ವಿ. ನಾರಾಯಣ

೭.Language : Leonard Bloomfield

೮.Language : Edward Sapir

೯.A Course in Modern Linguistics : C.F. Hackett

೧೦.Modern Linguistics : S Potter

೧೧. Introduction to theoretical Linguistics : J. Lyons

೧೨. Historical Linguistics An Introduction : W.P. Lehmann

KNA 210 :ಪತ್ರಿಕೆ ೫.೧

ಜಾನಪದ ಅಧ್ಯಯನ: ಜಾನಪದ ಸಾಹಿತ್ಯದ ತಾತ್ತ್ವಿಕ ಅಧ್ಯಯನ

೧. ಜನಪದ – ಜಾನಪದ : ವ್ಯಾಖ್ಯಾನ, ಸ್ವರೂಪ, ವ್ಯಾಪ್ತಿ, ವರ್ಗೀಕರಣ ; ಆದಿವಾಸಿ (ಬುಡಕಟ್ಟು) ಮತ್ತು ನಗರ ಜಾನಪದ, ಜಾನಪದ ಮತ್ತು ಇತರ ವಿಜ್ಞಾನಗಳು, ಜಾನಪದ ಮತ್ತು ದೇಶೀವಾದ; ಜನಪದ ಸಾಹಿತ್ಯದ ವರ್ಗೀಕರಣ, ಶಿಷ್ಟ ಮತ್ತು ಜನಪದ ಸಾಹಿತ್ಯ

೨. ಜನಪದ ಗೀತೆ, ಕಥನ ಕಾವ್ಯ, ಲಾವಣಿ, ಜನಪದ ಮಹಾಕಾವ್ಯ, ಜನಪದ ಕಥೆಗಳು – ಇವುಗಳ ಸ್ವರೂಪ, ಲಕ್ಷಣ, ಹಿನ್ನೆಲೆ, ಪ್ರಕಾರ

೩. ಜನಪದ ಗಾದೆ – ಜನಪದ ಒಗಟು, ಒಡಪು, ದಂತಕತೆ, ಇತಿಹ್ಯ, ಪವಾಡ, ಪುರಾಣ ಇವುಗಳ ಸ್ವರೂಪ, ಲಕ್ಷಣ, ಹಿನ್ನೆಲೆ, ಪ್ರಕಾರ

೪. ಜನಪದ ಕ್ಷೇತ್ರಕಾರ್ಯ : ಸ್ವರೂಪ – ಕ್ಷೇತ್ರಜ್ಞರ ವ್ಯಕ್ತಿತ್ವ ಮತ್ತು ಗುಣಗಳು – ಕ್ಷೇತ್ರಕಾರ್ಯದ ಪೂರ್ವಸಿದ್ಧತೆಗಳು– ಕ್ಷೇತ್ರಕಾರ್ಯದ ಪರಿಕರಗಳು

ಪರಾಮರ್ಶನ ಕೃತಿಗಳು:

೧. ಜಾನಪದ ತತ್ತ್ವಗಳು : (ಸಂ)ಅರವಿಂದ ಮಾಲಗತ್ತಿ

೨. ಜಾನಪದ ಅಧ್ಯಯನ : ದೇಜಗೌ

೩. ಜನಪದ ಪುರಾಣಗಳು : ರಾಗೌ

೪. ಜಾನಪದ : ಜೀ.ಶಂ.. ಪರಮಶಿವಯ್ಯ

೫. ಜಾನಪದ ಸ್ವರೂಪ : ಹಾ.ಮಾ. ನಾಯಕ

೬. ಭಾರತೀಯ ಜಾನಪದ ಸಮೀಕ್ಷೆ : ದುರ್ಗಾಭಾಗವತ್ ಅನು: ಕೆ. ಮರುಳಸಿದ್ದಪ್ಪ

೭ ಭಾರತೀಯ ಪರಂಪರೆ ಹಾಗೂ ಸಾಹಿತ್ಯದಲ್ಲಿ ಒಗಟು : ದುರ್ಗಾಭಾಗವತ್ ಅನು: ಬಿ.ಎ.ವಿವೇಕ ರೈ

೮. ನಮ್ಮ ಗಾದೆಗಳು : ರಾಗೌ

೯. ಜನಪದ ಕಥಾಮಾರ್ಗಗಳು : ಹಿ.ಶಿ. ರಾಮಚಂದ್ರಗೌಡ

೧೦. ಜನಪದ ಆಟಗಳು : ಕರ್ನಾಟಕ ಜಾನಪದ ಯಕ್ಷಗಾನ ಅಕಾಡೆಮಿ

೧೧. ಜಾನಪದ ಅಧ್ಯಯನ –ಸಂಕ್ಷಿಪ್ತ ಇತಿಹಾಸ : ನಂ. ತಪಸ್ವೀಕುಮಾರ್

೧೨. ಜಾನಪದ ಕೆಲವು ಮುಖಗಳು : ಜೀ.ಶಂ. ಪರಮಶಿವಯ್ಯ

೧೩. ಜನಪದ ಸಾಹಿತ್ಯ ರೂಪಗಳು : ರಾಗೌ

೧೪. ಜಾನಪದ ಪ್ರವೇಶ : ಚಂದ್ರು ಕಾಳೇನಹಳ್ಳಿ

೧೫. ಜಾನಪದ ಸಮಾವೇಶ :(ಸಂ) ಜೀ.ಶಂ. ಪರಮಶಿವಯ್ಯ

೧೬. ಜಾನಪದ ವಾಹಿನಿ : ದೇ. ಜವರೇಗೌಡ

೧೭. ದಕ್ಷಿಣ ಕರ್ನಾಟಕದ ಜನಪದ ಪ್ರಕಾರಗಳು : ಜೀ.ಶಂ. ಪರಮಶಿವಯ್ಯ

೧೮. ಜಾನಪದ ಸಮೀಕ್ಷೆ : ಅಂಬಳಿಕೆ ಹಿರಿಯಣ್ಣ

೧೯. ಕರ್ನಾಟಕ ಜಾನಪದ : (ಸಂ)ಜಿ.ಎಸ್.ಶಿವರುದ್ರಪ್ಪ

೨೦. ಜಾನಪದ ಮೂಲಭೂತ ತತ್ತ್ವಗಳು : ದೇವೇಂದ್ರಕುಮಾರ ಹಕಾರಿ

೨೧. ಕನ್ನಡ ಜಾನಪದ: ಕೆಲವು ಮುಖಗಳು : ಟಿ.ಎಸ್. ಸತ್ಯನಾಥ

೨೨. ಜಾನಪದ: ವೈಜ್ಞಾನಿಕ ಕ್ಷೇತ್ರಕಾರ್ಯ : ಸಿ.ಸಿ.ಎ.ಪೈ

೨೩. ದ್ರಾವಿಡ ಜಾನಪದ : (ಸಂ)ಎಚ್.ಜೆ. ಲಕ್ಕಪ್ಪ ಗೌಡ

೨೪. ಮಲೆನಾಡು ಜಾನಪದ : (ಸಂ)ಎಚ್.ಜೆ. ಲಕ್ಕಪ್ಪ ಗೌಡ

೨೫. ಜಾನಪದ ಸಾಹಿತ್ಯ ದರ್ಶನ ಸಂಪುಟಗಳು : ಕರ್ನಾಟಕ ವಿಶ್ವವಿದ್ಯಾಲಯ, ಧಾರವಾಡ

೨೬. ಜಾನಪದದ ವಿವಿಧ ಮುಖಗಳು : (ಸಂ) ಪ್ರೊ. ಶ್ರೀಕಂಠಕೂಡಿಗೆ

೨೭. ಸೈದ್ಧಾಂತಿಕ ಜಾನಪದ : ಅಂಬಳಿಕೆ ಹಿರಿಯಣ್ಣ

೨೮. Folklore and Folk life : Ed. Richard M Dorson

೨೯. The study of Folklore : Ed: Alan Dundes

೩೯. Folklore Genres : Dass Ben Amos

೩೦. The Folktale : Stith Thompson

೩೧. Current Trends in Folklore : Jawaharlal Handoo

೩೨. Story Performance and Event : Richard Bauman

KNA 210: ಪತ್ರಿಕೆ ೫.೩ ಚಾರಿತ್ರಿಕ ಅಧ್ಯಯನ: ಕರ್ನಾಟಕ ಸಾಂಸ್ಕೃತಿಕ ಚರಿತ್ರೆ

೧. ಸಂಸ್ಕೃತಿ ಎಂದರೇನು? ಕರ್ನಾಟಕ ಸಾಂಸ್ಕೃತಿಕ ಚರಿತ್ರೆಯ ಅಧ್ಯಯನದ ಮೂಲ ಸಾಮಗ್ರಿಗಳು; ಕರ್ನಾಟಕದ ಪ್ರಾಚೀನತೆ – ದೊರೆಯುವ ಆಕರಗಳು ಮತ್ತು ಅವುಗಳ ಸ್ವರೂಪ

೨. ಕದಂಬರು : ಮಯೂರವರ್ಮ, ಕಾಕುತ್ಸವರ್ಮ ; ಗಂಗರು: ದುರ್ವಿನೀತ, ಶ್ರೀಪುರುಷ

ಬಾದಾಮಿಯ ಚಾಲುಕ್ಯರು: ಇಮ್ಮಡಿ ಪುಲಿಕೇಶಿ, ಇಮ್ಮಡಿ ವಿಕ್ರಮಾದಿತ್ಯ

೩. ರಾಷ್ಟ್ರಕೂಟರು: ಮುಮ್ಮಡಿ ಗೋವಿಂದ, ಅಮೋಘವರ್ಷ ನೃಪತುಂಗ, ಮುಮ್ಮಡಿ ಕೃಷ್ಣ

ಕಲ್ಯಾಣದ ಚಾಲುಕ್ಯರು:ಇಮ್ಮಡಿ ತೈಲಪ, ಇಮ್ಮಡಿ ಜಯಸಿಂಹ, ಆರನೆಯ ವಿಕ್ರಮಾದಿತ್ಯ

ಹೊಯ್ಸಳರು: ವಿಷ್ಣುವರ್ಧನ, ಇಮ್ಮಡಿ ಬಲ್ಲಾಳ

೪. ವಿಜಯನಗರ: ಇಮ್ಮಡಿ ದೇವರಾಯ, ಕೃಷ್ಣದೇವರಾಯ; ಮೈಸೂರು ಒಡೆಯರು, ಚಿಕ್ಕದೇವರಾಯ, ಮುಮ್ಮಡಿ ಕೃಷ್ಣರಾಜ

೨, ೩ ಮತ್ತು ೪ನೇ ಘಟಕಗಳಲ್ಲಿ ಆಯಾ ರಾಜರ ಕಾಲದ ರಾಜಕೀಯ, ಧಾರ್ಮಿಕ ಸಾಮಾಜಿಕ, ಸಾಂಸ್ಕೃತಿಕ ಸ್ಥಿತಿಗತಿಗಳನ್ನು ಅಭ್ಯಾಸ ಮಾಡತಕ್ಕದ್ದು, ರಾಜಕೀಯ ಎಂದರೆ ಚಾರಿತ್ರಿಕ ವಿವರಗಳು ; ಧಾರ್ಮಿಕ ಎಂದರೆ ಬೌದ್ಧ, ಜೈನ, ವೈದಿಕ, ವೀರಶೈವ ಧರ್ಮಗಳ ವಿವರಗಳು; ಸಾಮಾಜಿಕ ಸಾಂಸ್ಕೃತಿಕ ಶಿಕ್ಷಣ, ಆಡಳಿತ, ಜನಜೀವನ, ಆತ್ಮಬಲಿದಾನ ಪದ್ಧತಿಗಳು; ದೇವಸ್ಥಾನಗಳ ವಾಸ್ತುಶಿಲ್ಪ

ಪರಾಮರ್ಶನ ಕೃತಿಗಳು:

೧.ಕನ್ನಡ ಸಾಹಿತ್ಯ ಚರಿತ್ರೆ ೧,೨,೩,೪,೫,	: ಕುವೆಂಪು ಕನ್ನಡ ಅಧ್ಯಯನ ಸಂಸ್ಥೆ, ಮೈಸೂರು
೨. ಕರ್ನಾಟಕ ಸಂಸ್ಕೃತಿ ಸಮೀಕ್ಷೆ	: ಎಚ್. ತಿಪ್ಪೇರುದ್ರಸ್ವಾಮಿ
೩. ಕನ್ನಡ ಶಾಸನಗಳ ಸಾಂಸ್ಕೃತಿಕ ಅಧ್ಯಯನ	: ಎಂ.. ಚಿದಾನಂದಮೂರ್ತಿ
೪. ಮಾರ್ಗ ೧,೨,೩	: ಎಂ.ಎಂ. ಕಲಬುರ್ಗಿ
೫. ಕರ್ನಾಟಕದ ಅರಸು ಮನೆತನಗಳು	: ಎನ್. ಲಕ್ಷ್ಮೀನಾರಾಯಣರಾವ್ ಮತ್ತು ಆರ್.ಎಸ್., ಪಂಚಮುಖಿ
೬. ಕರ್ನಾಟಕ ಇತಿಹಾಸ	: ಎಂ.ವಿ. ಕೃಷ್ಣರಾವ್ ಮತ್ತು ಕೇಶವಭಟ್ಟ
೭. ಕರ್ನಾಟಕ ಪರಂಪರೆ ೧,೨	: ಕನ್ನಡ ಮತ್ತು ಸಂಸ್ಕೃತಿ ಇಲಾಖೆ

೮. ಕರ್ನಾಟಕ ಚರಿತ್ರೆ : ಕನ್ನಡ ವಿಶ್ವವಿದ್ಯಾಲಯ, ಹಂಪಿ

೯. ವಿಷಯ ವಿಶ್ವಕೋಶ : ಕರ್ನಾಟಕ : ಕುವೆಂಪು ಕನ್ನಡ ಅಧ್ಯಯನ ಸಂಸ್ಥೆ

೧೦. Karnataka Darshana : R.R. Diwakar

೧೧. The Heritage of Karnataka : R.S. Mugali

೧೨. A History of south India : K.A. Nilakntha Shastry

೧೩. Early History of Deccan I & II : Yazdani

೧೪. Administration and Social Life Under Vijaynagar : T.V. Mahlingam

ಮೊದಲನೆಯ ವರ್ಷ ಎಂ. ಎ. ಕನ್ನಡ

ಎರಡನೆಯ ಚತುರ್ಮಾಸ (ಜನವರಿ–ಮೇ ೨೦೨೦)

ಪ್ರಧಾನ ವಿಷಯಗಳು (Hard core)

KNB 010 : ಪತ್ರಿಕೆ:೧ ಮಧ್ಯಕಾಲೀನ ಕನ್ನಡ ಸಾಹಿತ್ಯ:ವಚನ ಸಾಹಿತ್ಯ

(೩:೧=೪ ಕ್ರೆಡಿಟ್)

ಹಿನ್ನೆಲೆ, ಅಂದಿನ ಸಾಮಾಜಿಕ ಸಾಂಸ್ಕೃತಿಕ ಜೀವನ ವಚನಾಂದೋಲನದ ಸ್ವರೂಪ, ಜೇಡರ ದಾಸಿಮಯ್ಯ, ಬಸವಣ್ಣ, ಅಕ್ಕಮಹಾದೇವಿ, ಅಂಬಿಗರ ಚೌಡಯ್ಯ–ಈ ನಾಲ್ಕು ಮಂದಿ ವಚನಕಾರರ ಹಿನ್ನೆಲೆ ಮತ್ತು ಇತಿವೃತ್ತ.

೧. ಜೇಡರ ದಾಸಿಮಯ್ಯನ ವಚನಗಳು (ಆಯ್ದ ಇಪ್ಪತ್ತೈದು ವಚನಗಳು)

೭೨೧, ೭೨೨, ೭೪೨, ೭೪೪, ೭೬೪, ೭೬೫, ೭೬೮, ೭೭೪, ೭೮೫, ೭೯೩, ೭೯೯, ೮೦೧, ೮೦೮, ೮೧೦, ೮೧೮, ೮೩೧, ೮೩೮, ೮೪೧, ೮೫೩, ೮೬೨, ೮೬೬, ೮೭೮, ೮೮೦, ೮೮೪, ೮೯೩

೨.ಬಸವಣ್ಣನ ವಚನಗಳು (ಆಯ್ದ ಇಪ್ಪತ್ತೈದು ವಚನಗಳು)

೨೬, ೨೯, ೩೪, ೫೯, ೬೨, ೮೩, ೯೨, ೯೩, ೯೭, ೧೧೫, ೧೨೯, ೧೩೦, ೧೫೫, ೧೬೧, ೧೮೩, ೨೦೮, ೨೧೨, ೨೨೩, ೨೩೫, ೨೪೧, ೨೯೧, ೪೩೬, ೪೩೮, ೪೪೭, ೫೫೭,

೩..ಅಕ್ಕಮಹಾದೇವಿಯ ವಚನಗಳು (ಆಯ್ದ ಇಪ್ಪತ್ತೈದು ವಚನಗಳು)

೨೮, ೩೩, ೫೨, ೯೫, ೧೨೫, ೧೪೩, ೧೬೩, ೧೯೬, ೨೬೮, ೨೯೦, ೩೦೩, ೩೦೭, ೩೨೧, ೩೩೦, ೩೪೦, ೩೬೪, ೩೬೫, ೩೯೮, ೪೧೧, ೪೧೨, ೪೧೩, ೪೧೯, ೪೨೬, ೪೨೯, ೪೩೨

೪.ಅಂಬಿಗರ ಚೌಡಯ್ಯನ ವಚನಗಳು (ಆಯ್ದ ಇಪ್ಪತ್ತೈದು ವಚನಗಳು)

೬, ೭, ೯, ೧೭, ೨೫, ೨೭, ೩೫, ೫೩, ೫೪, ೭೯, ೮೮, ೧೦೬, ೧೧೦, ೧೩೯, ೧೫೭, ೧೫೮, ೧೬೯, ೧೮೭, ೧೮೯, ೨೪೨, ೨೪೩, ೨೪೪, ೨೪೫, ೨೪೭, ೨೫೨

ಪಠ್ಯ ಮೂಲ :

೧, ಸಂಕೀರ್ಣ ವಚನ ಸಂಪುಟ ೨ : (ಸಂ) ಎಸ್. ವಿದ್ಯಾಶಂಕರ, ಕನ್ನಡ ಮತ್ತು ಸಂಸ್ಕೃತಿ ಇಲಾಖೆ, ಬೆಂಗಳೂರು

೨. ಬಸವಣ್ಣನವರ ವಚನ ಸಂಪುಟ: (ಸಂ) ಎಂ.ಎಂ. ಕಲಬುರ್ಗಿ, ಕನ್ನಡ ಮತ್ತು ಸಂಸ್ಕೃತಿ ಇಲಾಖೆ, ಬೆಂಗಳೂರು

೩. ಶಿವಶರಣೆಯರ ವಚನ ಸಂಪುಟ: (ಸಂ) ವೀರಣ್ಣ ರಾಜೂರ, ಕನ್ನಡ ಪುಸ್ತಕ ಪ್ರಾಧಿಕಾರ, ಬೆಂಗಳೂರು

೪, ಸಂಕೀರ್ಣ ವಚನ ಸಂಪುಟ ೧: (ಸಂ) ಎಂ.ಎಂ. ಕಲಬುರ್ಗಿ, ಕನ್ನಡ ಮತ್ತು ಸಂಸ್ಕೃತಿ ಇಲಾಖೆ, ಬೆಂಗಳೂರು

ಪರಾಮರ್ಶನ ಕೃತಿಗಳು:

೧.ವಚನಧರ್ಮಸಾರ : ಎಂ.ಆರ್.. ಶ್ರೀನಿವಾಸಮೂರ್ತಿ
೨.ವಚನಶಾಸ್ತ್ರ ರಹಸ್ಯ : ರಂ.ರಾ. ದಿವಾಕರ
೩.ಬಸವಣ್ಣನವರ ಷಟ್‌ಸ್ಥಲದ ವಚನಗಳು : ಎಲ್.ಬಸವರಾಜು
೪.ಬಸವಣ್ಣನವರ ವಚನಾಮೃತ ಭಾಗ ೧ ಮತ್ತು ೨ : ಎಲ್. ಬಸವರಾಜು
೫.ಬಸವಣ್ಣನವರ ವಚನಗಳು : ಫ.ಗು.ಹಳಕಟ್ಟಿ
೬.ಭಕ್ತಿ ಭಂಡಾರಿ ಬಸವಣ್ಣನವರು : ಎಂ.ಆರ್.ಶ್ರೀನಿವಾಸಮೂರ್ತಿ
೭.ಶರಣರ ಅನುಭಾವ ಸಾಹಿತ್ಯ : ಎಚ್. ತಿಪ್ಪೇರುದ್ರಸ್ವಾಮಿ
೮.ಬಸವೇಶ್ವರ ವಚನ ದೀಪಿಕೆ : ಎಚ್. ತಿಪ್ಪೇರುದ್ರಸ್ವಾಮಿ
೯.ಅಕ್ಕನ ವಚನ ಚಿಂತನ : ಅನ್ನದಾನೀಶ್ವರ ಸ್ವಾಮಿಗಳು
೧೦. Sri Basaveswara and His contemporaries : A R Jayaram
೧೧. The thoughts of Basava : N K Sanakalmath
೧೨. Hand book of Veerashavism : S C Nadimath
೧೩. Speaking of Siva : A.K. Ramanujan

KNB 020 : ಪತ್ರಿಕೆ: ೨ ಮಧ್ಯಕಾಲೀನ ಕನ್ನಡ ಸಾಹಿತ್ಯದ ಹಿನ್ನೆಲೆ

(೨:೧=೩ ಕ್ರೆಡಿಟ್)

೧.ರಾಜಕೀಯ ಹಿನ್ನೆಲೆ :ಕಲ್ಯಾಣ ಚಾಲುಕ್ಯರು ನೀಡಿದ ಸಾಹಿತ್ಯ ಪ್ರೇರಣೆ-ಪೋಷಣೆ, ಹೊಯ್ಸಳರು ನೀಡಿದ ಜೈನ – ವೈಷ್ಣವ ಸಾಹಿತ್ಯ ಪೋಷಣೆ, ಕಲಚುರಿಗಳ ವಚನಾಂದೋಲನ ಎದುರಿಸಿದ ಪ್ರಭುತ್ವ ವಿರೋಧಿ ನಿಲುವುಗಳು – ಪ್ರತಿಭಟನೆ, ಸಮಾನತೆ ಘೋಷಣೆ; ವಿಜಯನಗರ ಅರಸರ ಕಾಲದ ವೈದಿಕ – ವೀರಶೈವ ಧರ್ಮ ಪುನರುತ್ಥಾನ

೨.ಧಾರ್ಮಿಕ ಹಿನ್ನೆಲೆ : ಶೈವ, ವೀರಶೈವ, ವೈಷ್ಣವ, ಜೈನ ಧರ್ಮ: ಸ್ವರೂಪ, ಸ್ಥಿತಿಗತಿ, ಸ್ಪರ್ಧೆ, ಜೈನ ಧರ್ಮ ಎದುರಿಸಿದ ಆತಂಕಗಳು : ವೈದಿಕ ಧರ್ಮದ ಪುನರುಜ್ಜೀವನ

೩.ವಚನ-ರಗಳೆ ಸಾಹಿತ್ಯಗಳ ನವೀನತೆ, ಸಾಮಾಜಿಕ ನಿಲುವುಗಳು : ರಗಳೆ-ಷಟ್ಪದಿ ಕೃತಿಗಳಲ್ಲಿ ಬಂದ ಕರ್ನಾಟಕದ ಧಾರ್ಮಿಕ ಪುರುಷರ ಚರಿತ್ರೆ : ಭಾಗವತ – ಭಕ್ತಿ ಸಾಹಿತ್ಯದ ಪುನರುತ್ಥಾನ, ಕೀರ್ತನ ಸಾಹಿತ್ಯದ ಸಾಮಾಜಿಕ ನೆಲೆಗಳು

೪.ಕನ್ನಡ ಭಾಷೆ-ಸಾಹಿತ್ಯದ ಮೇಲೆ ತಮಿಳು, ತೆಲುಗು, ಸಂಸ್ಕೃತ ಭಾಷೆ–ಸಾಹಿತ್ಯಗಳು ಬೀರಿದ ಪ್ರಭಾವ, ಪರಸ್ಪರ ಸಂಬಂಧ

ಪರಾಮರ್ಶನ ಕೃತಿಗಳು:

೧.ಕನ್ನಡ ಅಧ್ಯಯನ ಸಂಸ್ಥೆಯ ಕನ್ನಡ ಚರಿತ್ರೆಯ ಸಂಪುಟಗಳು ೧, ೨ ಮತ್ತು ೩

೨ ಸಮಗ್ರ ಕನ್ನಡ ಸಾಹಿತ್ಯ ಚರಿತ್ರೆಯ ಸಂಪುಟಗಳು, ಬೆಂಗಳೂರು ವಿಶ್ವವಿದ್ಯಾಲಯ

೩.ಕನ್ನಡ ನಾಡಿನ ಧರ್ಮಗಳು : ಶಿ.ಚೆ. ನಂದೀಮಠ

೪.ಕರ್ನಾಟಕ ಸಂಸ್ಕೃತಿ ಸಮೀಕ್ಷೆ : ಎಚ್. ತಿಪ್ಪೇರುದ್ರಸ್ವಾಮಿ

೫.ಕನ್ನಡ ಶಾಸನಗಳ ಸಾಂಸ್ಕೃತಿಕ ಅಧ್ಯಯನ : ಎಂ..ಚಿದಾನಂದಮೂರ್ತಿ

೬.ಜೈನಧರ್ಮ : ಮಿರ್ಜಿ ಅಣ್ಣರಾಯ

೭.ಭಾರತೀಯ ಸಂಸ್ಕೃತಿ : (ಸಂ) ಅ.ನ.ಕೃಷ್ಣರಾಯ

೮.ಕರ್ನಾಟಕ ಪರಂಪರೆ : ಭಾಗ ೧ ಮತ್ತು ೨

೯.ಚಂಪೂ ಸಾಹಿತ್ಯ : ಪಿ.ವಿ ನಾರಾಯಣ

೧೦.ಕರ್ನಾಟಕ ಸಾಹಿತ್ಯ ಅಕಾಡೆಮಿಯ ಕನ್ನಡ ಸಾಹಿತ್ಯ ಪುನರ್ ಮೌಲೀಕರಣ ಮಾಲೆಯ ಸಂಪುಟಗಳು

೧೧.ಹರಿದಾಸ ಸಾಹಿತ್ಯ : ಆರ್.ಎಸ್. ಪಂಚಮುಖಿ

೧೨ ವಚನಧರ್ಮಸಾರ : ಎಂ.ಆರ್.ಶ್ರೀನಿವಾಸಮೂರ್ತಿ

KNB 030: ಪತ್ರಿಕೆ: ೩ ದ್ರಾವಿಡ ಭಾಷಾವಿಜ್ಞಾನ (೨:೧=೩ ಕ್ರೆಡಿಟ್)

೧ ದ್ರಾವಿಡ ಪದದ ನಿಷ್ಪತ್ತಿ – ದ್ರಾವಿಡ ಭಾಷೆಗಳ ಸಂಖ್ಯೆ, ಸ್ವರೂಪ ಮತ್ತು ವರ್ಗೀಕರಣ

೨ ದ್ರಾವಿಡ ಭಾಷಾವಿಜ್ಞಾನದ ಇತಿಹಾಸ–ಸ್ವರವ್ಯತ್ಯಯ ವಿಚಾರ–ದ್ರಾವಿಡ ಧ್ವನಿಮಾಗಳ ಚರಿತ್ರೆ –ಕ್, ಚ್, ಟ್, ಪ್. ಜ್, ಲ್

೩ ಆಕೃತಿಮಾ ಅಧ್ಯಯನ : ಸರ್ವನಾಮ, ಲಿಂಗ, ವಚನ, ವಿಭಕ್ತಿ, ಸಂಖ್ಯಾವಾಚಕಗಳ ಸ್ಥೂಲಪರಿಚಯ, ಚರಿತ್ರೆ, ಕ್ರಿಯಾಪದ ಮತ್ತು ಕರ್ಮಣಿ ಪ್ರಯೋಗ

೪ ಭಾಷಾವಿಜ್ಞಾನದ ದೃಷ್ಟಿಯಿಂದ ಮುಖ್ಯವೆನಿಸಿದ ಕೆಲವು ಪದಗಳ ಇತಿಹಾಸ

ಪರಾಮರ್ಶನ ಕೃತಿಗಳು:

೧ ಭಾಷಾವಿಜ್ಞಾನದ ಮೂಲತತ್ವಗಳು : ಎಂ.ಚಿದಾನಂದಮೂರ್ತಿ

೨ ದ್ರಾವಿಡ ಭಾಷಾವಿಜ್ಞಾನ : ಹಂಪ ನಾಗರಾಜಯ್ಯ

೩ ದ್ರಾವಿಡ ಸಂಖ್ಯಾ ವಾಚಕಗಳು : ಹಂಪ ನಾಗರಾಜಯ್ಯ

೪ ದ್ರಾವಿಡ ಭಾಷಾವ್ಯಾಸಂಗ : ಸಂಗಮೇಶ ಸವದತ್ತಿಮಠ

೫ ದ್ರಾವಿಡ ಭಾಷೆಗಳು : ಸಂಗಮೇಶ ಸವದತ್ತಿಮಠ

೬ ಕನ್ನಡ ಭಾಷಾವ್ಯಾಸಂಗ : ಸಂಗಮೇಶ ಸವದತ್ತಿಮಠ

೭ ಆಲೋಕ : ಎಚ್.ಎಸ್. ಬಿಳಿಗಿರಿ

೮ ಕನ್ನಡ ಭಾಷೆಯ ರೂಪರೇಷೆಗಳು : ವಿಲಿಯಂ ಮಾಡ್ತಾ

೯ ಕನ್ನಡ ಭಾಷೆಯ ಸಂಕ್ಷಿಪ್ತ ಚರಿತ್ರೆ : ಡಿ.ಎನ್.ಶಂಕರ ಭಟ್ಟ

೧೦ ಕನ್ನಡ ಭಾಷೆಯ ಚರಿತ್ರೆ : ಪ್ರ.ಗೋ. ಕುಲಕರ್ಣಿ

೧೧ ಕನ್ನಡ ಭಾಷೆಯ ಸ್ವರೂಪ : ಕೆ.ಎಂ.ಕೃಷ್ಣರಾವ್

೧೨ ಐತಿಹಾಸಿಕ ಭಾಷಾವಿಜ್ಞಾನ : ಜೆ.ಎಸ್.ಕುಳ್ಳಿ

೧೩ ವರ್ಣನಾತ್ಮಕ ಭಾಷಾವಿಜ್ಞಾನ : ಜೆ.ಎಸ್.ಕುಳ್ಳಿ

೧೪ ದ್ರಾವಿಡ ಭಾಷೆಗಳ ತೌಲನಿಕ ಅಧ್ಯಯನ : ಟಿ.ಮಣಿಯನ್

೧೫ ತಮಿಳು ಭಾಷಾಚರಿತ್ರೆ : ಟಿ.ಮಣಿಯನ್

೧೬ ತೌಲನಿಕ ದ್ರಾವಿಡ ಭಾಷಾವಿಜ್ಞಾನ ಪರಿಚಯ : ಕೆ.ಕೆಂಪೇಗೌಡ

೧೭ ಸಂಕ್ಷಿಪ್ತ ಕನ್ನಡ ಭಾಷಾ ಚರಿತ್ರೆ : .ಎಂ.ಎಚ್.ಕೃಷ್ಣಯ್ಯ

೧೮ A Comparative Grammar of the Dravidian Languages : R. Caldwell

೧೯ History of Kannada Language : R Narasimahacharaya

೨೦ Collected Papers on Dravidian Lingusistics : T. Burrow

೨೧ Dravidian Comparative Phonology – A sketch : M.B. Emeneau

೨೨ Dravidian Nouns : S.V. Shanmugam

೨೩ Dravidian Verb Morphology : P.S. Subramanyam

KNB 040: ಪತ್ರಿಕೆ: ೪ ಕನ್ನಡ ವಿಮರ್ಶೆ – ಪಠ್ಯ : ಆಯ್ದ ಲೇಖನಗಳು

(೩:೧=೪ ಕ್ರೆಡಿಟ್)

ಆಧುನಿಕ ಕನ್ನಡ ವಿಮರ್ಶೆಯ ಸ್ವರೂಪ, ಬೆಳವಣಿಗೆ, ವಿವಿಧ ಪಂಥಗಳು–ಧೋರಣೆಗಳು

೧ ಮುಳಿಯ ತಿಮ್ಮಪ್ಪಯ್ಯ : ಕಾವ್ಯಧರ್ಮವೂ ಧರ್ಮವೂ

೨ ಕುವೆಂಪು : ಹೊಸ ಸಾಹಿತ್ಯ ಮತ್ತು ಹೊಸ ದೃಷ್ಟಿ

೩ ನಿರಂಜನ : ಪ್ರಗತಿಶೀಲ ಸಾಹಿತ್ಯ ಗೊತ್ತು ಗುರಿಗಳು

೪ ಶಂಕರ ಮೊಕಾಶಿ ಪುಣೇಕರ :ಸ್ವಾತಂತ್ರ್ಯ ಪೂರ್ವ ಹೊಸಗನ್ನಡ ಸಾಹಿತ್ಯ

೫ ಚಂದ್ರಶೇಖರ ಕಂಬಾರ : ಮೌಖಿಕ ಪರಂಪರೆ ಮತ್ತು ಭಾರತೀಯ ಸಾಹಿತ್ಯ

೬ ನಾಗರಾಜ ಡಿ.ಆರ್. : ಕುವೆಂಪು ಕಾವ್ಯದ ಪ್ರಕೃತಿ ದರ್ಶನ ಮತ್ತು ಭೂಮಿ

೭ ಬರಗೂರು ರಾಮಚಂದ್ರಪ್ಪ: ಬಂಡಾಯ ಸಾಹಿತ್ಯಮೀಮಾಂಸೆ

೮ ದೇವಯ್ಯ ಹರವೆ : ದಲಿತ ಸಾಹಿತ್ಯ : ಕೆಲವು ತಾತ್ವಿಕ ಚಿಂತನೆಗಳು

೯ ವಿಜಯಾ ದಬ್ಬೆ: ಹೊನ್ನಮ್ಮನ ಕಿವಿಮಾತಿಗೆ ಒಂದು ಪ್ರತಿಕ್ರಿಯೆ

೧೦ ಅರವಿಂದ ಮಾಲಗತ್ತಿ : ಸ್ತ್ರೀವಾದ ದಲಿತವಾದದಿಂದ – ದಲಿತ ಸ್ತ್ರೀವಾದದೆಡೆಗೆ

ಪರಾಮರ್ಶನ ಸಾಹಿತ್ಯ

೧ ಗಿರಡ್ಡಿ ಗೋವಿಂದರಾಜ : ಪ್ರಮಾಣು, ಕವಿವಿ ಹಂಪಿ, ೨೦೦೩

೨ ಬಿ.ದಾಮೋದರರಾವ್ :ಆಯಾಮಗಳು, ಪರಿಸರ ಸಾಹಿತ್ಯ ಪ್ರ. ಶಿವಮೊಗ್ಗ, ೧೯೯೨

೩ ರಹಮತ್ ತರೀಕೆರೆ ಸಂ) : ಕನ್ನಡ ಸಾಹಿತ್ಯ ಮೀಮಾಂಸೆ, ಕವಿವಿ, ಹಂಪಿ, ೨೦೦೧

೪ ರಹಮತ್ ತರೀಕೆರೆ (ಸಂ) : ಮಾತು ತಲೆ ಎತ್ತುವ ಬಗೆ, ಕವಿವಿ, ಹಂಪಿ, ೨೦೦೫

೫ ಲಕ್ಷ್ಮಣ ಕೊಡಸೆ (ಸಂ) : ಕನ್ನಡ ವಿಮರ್ಶಾ ವಿವೇಕ, ಸುಮುಖ ಪ್ರ. ಬೆಂ, ೨೦೦೮

೬ ಕೀರ್ತಿನಾಥ ಕುರ್ತಕೋಟಿ : ಯುಗಧರ್ಮ ಮತ್ತು ಸಾಹಿತ್ಯ ದರ್ಶನ

೭ ಅರವಿಂದ ಮಾಲಗತ್ತಿ (ಸಂ) : ಸೀಮಾತೀತ ಕನ್ನಡ ಸಾಹಿತ್ಯ ಚರಿತ್ರೆ ಸಂಪುಟಗಳು

ಉಪ ಪ್ರಧಾನ ವಿಷಯಗಳು (Soft Core)

KNB 210: ಪತ್ರಿಕೆ: ೫.೧

ಭಾಷಾವಿಜ್ಞಾನ ಅಧ್ಯಯನ: ಕನ್ನಡ ವ್ಯಾಕರಣಗಳ ತೌಲನಿಕ ಸಮೀಕ್ಷೆ

(೩:೧=೪ ಕ್ರೆಡಿಟ್)

ಈ ಕೆಳಗಿನ ಪಠ್ಯ ವಿವರಗಳನ್ನು ಮಾತ್ರ ಪ್ರಧಾನವಾಗಿ ಶಬ್ದಮಣಿದರ್ಪಣದ ತತ್ಸಂಬಧಿತ ಸೂತ್ರಗಳನ್ನು ಆಧರಿಸಿ ಅಭ್ಯಾಸ ಮಾಡಬೇಕು. ಇತರ ವ್ಯಾಕರಣಗಳ ಸೂತ್ರಗಳನ್ನು ಅನುಷಂಗಿಕವಾಗಿ ಪ್ರಸ್ತಾಪಿಸಬೇಕು.

೧. ಹಳಗನ್ನಡ ವ್ಯಾಕರಣಗಳು : ಕರ್ತೃ, ಕಾಲ, ಸ್ವರೂಪ, ಸ್ಥಾನ, ವೈಶಿಷ್ಟ್ಯ, ಕನ್ನಡ ವರ್ಣಸಮಾಮ್ನಯ– ಮಹಾಪ್ರಾಣಗಳು –ಱ–ಕುಳ–ಕ್ಷಳ ವಿಚಾರ, ಶಿಥಿಲದ್ವಿತ್ವ

೨. ಸ್ವರಸಂಧಿ – ವ್ಯಂಜನಸಂಧಿ ; ಲಿಂಗ: ಲಕ್ಷಣ, ಸ್ವರೂಪ; ವಚನ : ಲಕ್ಷಣ, ಸ್ವರೂಪ, ಪ್ರತ್ಯಯಗಳು; ವಿಭಕ್ತಿ : ಲಕ್ಷಣ, ಸ್ವರೂಪ, ಪ್ರತ್ಯಯಗಳು.

೩. ಸಮಾಸ : ಲಕ್ಷಣ, ಸ್ವರೂಪ–ತತ್ಪುರುಷ, ಕರ್ಮಧಾರೆಯ, ದ್ವಿಗು, ಅಂಶಿ, ಬಹುವ್ರೀಹಿ, ದ್ವಂದ್ವ, ಗಮಕ ಮತ್ತು ಕ್ರಿಯಾ ಸಮಾಸ

೪. ಆಖ್ಯಾತ ಪ್ರತ್ಯಯ, ಪುರುಷತ್ರಯ, ಕಾಲತ್ರಯ – ತದ್ಧಿತ – ಸಮಸಂಸ್ಕೃತ – ಅಪಭ್ರಂಶ, ತತ್ಸಮ

ಪರಾಮರ್ಶನ ಕೃತಿಗಳು:

೧ ಪೀಠಿಕೆಗಳು, ಲೇಖನಗಳು : ಡಿ.ಎಲ್. ನರಸಿಂಹಾಚಾರ್

೨ ಆಲೋಕ : ಎಚ್.ಎಸ್. ಬಿಳಿಗಿರಿ

೩ ಪ್ರಾಚೀನ ಕನ್ನಡ ವ್ಯಾಕರಣಗಳು : ಎಂ.ವಿ. ಸೀತಾರಾಮಯ್ಯ

೪ ವ್ಯಾಕರಣಗಳು : ವಿ. ಸೀತಾರಾಮಯ್ಯ

೫ ಕನ್ನಡ ವ್ಯಾಕರಣ ಪರಂಪರೆಯ ಮೇಲೆ ಸಂಸ್ಕೃತದ ಪ್ರಭಾವ : ಪಿ. ಶ್ರೀಕೃಷ್ಣಭಟ್

೬ ಕನ್ನಡ ಭಾಷಾವಲೋಕನ : ಕೆ. ಕುಶಾಲಪ್ಪಗೌಡ

೭ ಕನ್ನಡ ಭಾಷೆ ಮತ್ತು ವ್ಯಾಕರಣಗಳ ಅಧ್ಯಯನ : ಕೆ. ಕುಶಾಲಪ್ಪಗೌಡ

೮ ಶಬ್ದಮಣಿದರ್ಪಣದಲ್ಲಿ ಗ್ರಾಂಥಿಕ ವ್ಯಾವಹಾರಿಕ ಶೈಲಿಗಳು : ವಿ. ಶಿವಾನಂದ

೯ ಶಬ್ದಮಣಿದರ್ಪಣಂ : (ಸಂ) ಟಿ.ವಿ. ವೆಂಕಟಾಚಲಶಾಸ್ತ್ರೀ

೧೦ ಕರ್ನಾಟಕ ಶಬ್ದಾನುಶಾಸನ ವಿವೇಚನೆ : ಉಪ್ಪಂಗಳ ರಾಮಭಟ್ಟ
೧೧ ಕನ್ನಡ ವ್ಯಾಕರಣಗಳ ತೌಲನಿಕ ವಿಶ್ಲೇಷಣೆ : ದೊಡ್ಡಸ್ವಾಮಿ
೧೨ ಶೋಧನಲೋಕ : ಎನ್.ಎಸ್. ತಾರಾನಾಥ
೧೩ ಕನ್ನಡ ವಾಗ್ಪ್ರಯೋಗಗಳು : ಡಿ.ಎನ್. ಶಂಕರಭಟ್ಟ
೧೪ ಭಾಷೆಯ ಸುತ್ತಮುತ್ತ : ಕೆ.ವಿ. ನಾರಾಯಣ
೧೫ ಕನ್ನಡ ಭಾಷಾ ಕೈಪಿಡಿ : ಸವದತ್ತಿಮಠ
೧೬ ಭಾಷೆ : ಸಂ : ಕೆ.ವಿ. ನಾರಾಯಣ
೧೭ ಕನ್ನಡ ಕೈಪಿಡಿ : ಬಿಎಂಶ್ರೀ

KNB 210:<u>ಪತ್ರಿಕೆ: ೫.೨</u>

<u>ಜಾನಪದ ಅಧ್ಯಯನ: ಜನಪದ ಸಂಸ್ಕೃತಿಯ ತಾತ್ವಿಕ ಅಧ್ಯಯನ</u>

(೩:೧=೪ ಕ್ರೆಡಿಟ್)

೧. ಸಂಸ್ಕೃತಿ ಎಂದರೇನು? ಸ್ವರೂಪ, ಕಾರ್ಯಗಳು, ನಾಗರಿಕತೆ ಮತ್ತು ಸಂಸ್ಕೃತಿ, ಜನಪದ ಸಂಸ್ಕೃತಿ ಮತ್ತು ಸಂಸ್ಕೃತೀಕರಣ, ಜನಪದ ಧರ್ಮ

೨. ಜಾನಪದರ ಆರಾಧನೆಯ ಪರಿಕಲ್ಪನೆ, ಸ್ವರೂಪ, ಮಹತ್ವ, ಜನಪದ ದೇವತೆಗಳು, ಭೂತಾರಾಧನೆ, ಜಾತ್ರೆ ಮತ್ತು ಹಬ್ಬಗಳು, ನಂಬಿಕೆ, ಸಂಪ್ರದಾಯ, ಆಚರಣೆ, ಮಂತ್ರ–ಮಾಟ

೩. (ಅ) ಕರ್ನಾಟಕ ಜನಪದ ಕಲೆಗಳು : ಹಿನ್ನೆಲೆ, ಸ್ವರೂಪ, ಮಹತ್ವದ ಪ್ರಕಾರಗಳು : ವೇಷಗಾರರು, ನೀಲಗಾರರು, ತೊಗಲುಗೊಂಬೆ, ಚೌಡಿಕೆಯವರು, ಡೊಳ್ಳುಕುಣಿತ, ಕಂಸಾಳೆ

(ಆ) ಕರ್ನಾಟಕ ಜನಪದ ರಂಗಭೂಮಿ – ಹಿನ್ನೆಲೆ, ಸ್ವರೂಪ, ಮಹತ್ವ, ಯಕ್ಷಗಾನ, ಬಯಲಾಟ, ದೊಡ್ಡಾಟ, ಸಣ್ಣಾಟ

೪. ಭೌತಿಕ ಜಾನಪದ, ಜನಪದ ಆಯಗಾರರು–ಕೈಕಸುಬುದಾರರು, ಜನಪದ ಆಟಗಳು, ಜನಪದ ವೈದ್ಯ, ಆಕಾಶ ಜಾನಪದ

ಪರಾಮರ್ಶನ ಕೃತಿಗಳು:

೧. ಕರ್ನಾಟಕ ಜಾನಪದ : ಕರ್ನಾಟಕ ಜಾನಪದ ಯಕ್ಷಗಾನ ಅಕಾಡೆಮಿ
೨. ಕರ್ನಾಟಕ ಜನಪದ ಕಲೆಗಳು : ಗೊ.ರು. ಚನ್ನಬಸಪ್ಪ

೩. ಕರ್ನಾಟಕ ಕಲೆಗಳು ೩ನೆಯ ಸಂಪುಟ ಕರಕುಶಲ ಕಲೆಗಳು : ಕನ್ನಡ ಸಾಹಿತ್ಯ ಪರಿಷತ್ತು, ಬೆಂಗಳೂರು

೪. ಸುವರ್ಣ ಜಾನಪದ ಭಾಗ – ೧, ೨ : ಕರ್ನಾಟಕ ಜಾನಪದ ಯಕ್ಷಗಾನ ಅಕಾಡೆಮಿ

೫. ನಮ್ಮ ಸುತ್ತಿನ ನಂಬಿಕೆಗಳು : ಡಿ.ಕೆ. ರಾಜೇಂದ್ರ

೬. ಕರ್ನಾಟಕದ ಜಾತ್ರೆಗಳು : ಸಿ.ಎಸ್. ಶಿವಕುಮಾರಸ್ವಾಮಿ

೭. ಜಾನಪದ ಸಾಹಿತ್ಯ ದರ್ಶನ ಸಂಪುಟಗಳು : ಕರ್ನಾಟಕ ವಿಶ್ವವಿದ್ಯಾಲಯ ಧಾರವಾಡ

೮. ಜಾನಪದ ಸಂಶೋಧನೆ : ರಾಗೌ

KNB 210: <u>ಪತ್ರಿಕೆ: ೫.೩</u>

<u>ಚಾರಿತ್ರಿಕ ಅಧ್ಯಯನ: ಕನ್ನಡ ಸಾಹಿತ್ಯ ಚರಿತ್ರೆ(೧೩ ನೆಯ ಶತಮಾನ)</u>

(೩:೧=೪ ಕ್ರೆಡಿಟ್)

ಪ್ರವೃತ್ತಿಗಳು ಮತ್ತು ಕವಿಗಳು

೧. ಪ್ರವೃತ್ತಿಗಳು : ಸ್ವತಂತ್ರ ಮನೋಧರ್ಮ, ಭಕ್ತಿ, ಮತನಿಷ್ಠೆ, ಧಾರ್ಮಿಕ ಶಾಸ್ತ್ರ ಒಲವು, ಪ್ರಸಾರಾಕಾಂಕ್ಷೆ, ಲೌಕಿಕಶಾಸ್ತ್ರ ಒಲವು, ಉಪಯುಕ್ತತೆ

೨. ಪ್ರಕಾರ : ಚಂಪೂ, ಷಟ್ಪದಿ, ರಗಳೆ ಇತ್ಯಾದಿ ನೆಲೆಯಲ್ಲಿ: ಜನ್ನ, ಕವಿಕಾಮ, ದೇವಕವಿ, ಹರಿಹರ, ಕೆರೆಯ ಪದ್ಮರಸ, ತ್ರಿಭುವನತಾತ, ಎರಡನೇ ಗುಣವರ್ಮ, ರಾಘವಾಂಕ

೩. ಕವಿಗಳು : ಆಂಡಯ್ಯ, ಮಲ್ಲಿಕಾರ್ಜುನ, ಮಹಾಬಲ, ಕೇಶಿರಾಜ, ಪುಲಿಗೆರೆಯ ಸೋಮ, ರಟ್ಟಕವಿ, ಚೌಂಡರಸ, ಪಾಲ್ಕುರಿಕೆ ಸೋಮನಾಥ

೪. ಹೆಚ್ಚು ಮಾಹಿತಿ ದೊರಕದ ಕವಿಗಳು : ಕೇಶಿಯಣ್ಣ, ಮುನಿಚಂದ್ರ, ನಯವರ್ಮ, ಅಮೃತನಂದಿ

ಪರಾಮರ್ಶನ ಕೃತಿಗಳು:

೧. ಕನ್ನಡ ಅಧ್ಯಯನ ಸಂಸ್ಥೆಯ ಕನ್ನಡ ಸಾಹಿತ್ಯ ಚರಿತ್ರೆ ಸಂಪುಟ ೪, ಭಾಗ ೨ : ಮೈ.ವಿ.ವಿ,

೨. ಸಮಗ್ರ ಕನ್ನಡ ಸಾಹಿತ್ಯ ಚರಿತ್ರೆ ಸಂಪುಟಗಳು ಸಂಪುಟ ೪ : ಬೆಂಗಳೂರು ವಿ.ವಿ

೩. ಕನ್ನಡ ಸಾಹಿತ್ಯ ಚರಿತ್ರೆ : ರಂ.ಶ್ರೀ.ಮುಗಳಿ

೪. ಚಂಪೂ ಕವಿಗಳು (ಸಾಮಾನ್ಯನಿಗೆ ಸಾಹಿತ್ಯ ಚರಿತ್ರೆ ಸಂ.೨) : ಬೆಂಗಳೂರು ವಿ.ವಿ

೫. ಷಟ್ಪದಿ ಸಾಹಿತ್ಯ (ಸಾಮಾನ್ಯನಿಗೆ ಸಾಹಿತ್ಯ ಚರಿತ್ರೆ ಸಂ. ೫) : ಬೆಂಗಳೂರು ವಿ.ವಿ

೬. ಶಾಸ್ತ್ರ ಸಾಹಿತ್ಯ (ಸಾಮಾನ್ಯನಿಗೆ ಸಾಹಿತ್ಯ ಚರಿತ್ರೆ ಸಂ.೩) : ಬೆಂಗಳೂರು ವಿ.ವಿ

೭. ವೀರಶೈವ ಧರ್ಮದರ್ಶನ ಭಾಗ ೨ ಮತ್ತು ೩ : ಜೆಎಸ್ಎಸ್ ಗ್ರಂಥಮಾಲೆ

೮. ಪೀಠಿಕೆಗಳು, ಲೇಖನಗಳು : ಡಿ.ಎಲ್. ನರಸಿಂಹಾಚಾರ್

೯.ಹರಿಹರದೇವ : ಕರ್ನಾಟಕ ಸಂಘ, ರಾಜಾರಾಮ ಕಾಲೇಜು, ಕೊಲ್ಲಾಪುರ

೧೦. ಋಷಿಕವಿ ರಾಘವಾಂಕ :ಎಚ್. ತಿಪ್ಪೇರುದ್ರಸ್ವಾಮಿ

೧೧. ಸಾಹಿತ್ಯಾಲೋಕ : ಎಂ.ಆರ್.ಶ್ರೀನಿವಾಸಮೂರ್ತಿ

೧೨. ಲಿಂಗಾಯತ ಅಧ್ಯಯನಗಳು : ಎಂ. ಚಿದಾನಂದಮೂರ್ತಿ

ವಿಶೇಷ ಉಪ ಪ್ರಧಾನ ವಿಷಯಗಳು(Special Soft core)

KNB 220:ಪತ್ರಿಕೆ : ೬.೧. ಕನ್ನಡ ಸಂಸ್ಕೃತಿ ಚಿಂತನೆ (ಆಯ್ದ ಲೇಖನಗಳು)

(೩:೧=೪ ಕ್ರೆಡಿಟ್)

೧. ಸಂಸ್ಕೃತಿ ಎಂದರೇನು? – ದೇವುಡು ನರಸಿಂಹಶಾಸ್ತ್ರಿ

೨. ಸಂಸ್ಕೃತಿ ಮತ್ತು ನಾಗರೀಕತೆ – ಡಾ. ಎನ್. ಶ್ರೀಕಂಠಶಾಸ್ತ್ರಿ

೩. ಸಂಸ್ಕೃತಿ ಮತ್ತು ಸಾಹಿತ್ಯ –ಎ.ಎನ್. ಮೂರ್ತಿರಾವ್

೪. ಕರ್ನಾಟಕ ಸಂಸ್ಕೃತಿ –ಎಚ್. ತಿಪ್ಪೇರುದ್ರಸ್ವಾಮಿ

೫. ವಿಚಾರ ಕ್ರಾಂತಿಗೆ ಆಹ್ವಾನ – ಕುವೆಂಪು

೬. ಕನ್ನಡ ಮಾತು ತಲೆಯೆತ್ತುವ ಬಗೆ – ಬಿ.ಎಂ.ಶ್ರೀ

೭. ಹೊಸ ದಿಗಂತದೆಡೆಗೆ ಮತ್ತು ಮಣ್ಣಿನ ವಾಸನೆ, ಸಮಕಾಲೀನ ಪ್ರಜ್ಞೆ, ಇತ್ಯಾದಿ – ಪೂಚಂತೇ

೮. ಜನಪದರು ಮತ್ತು ಇತಿಹಾಸ – ಕೃಷ್ಣಮೂರ್ತಿ ಹನೂರು

೯. ಆಧುನಿಕ ಸಾಹಿತ್ಯ ಮತ್ತು ಸಾಮಾನ್ಯ ಮನುಷ್ಯ – ಡಿ.ಆರ್. ನಾಗರಾಜ್

೧೦ ಧರ್ಮ ಮತ್ತು ಮಹಿಳೆ – ಸಾ.ರಾ. ಅಬೂಬಕರ್

ಪಠ್ಯ ಮೂಲ:

೧. ಸಂಸ್ಕೃತಿ, ಕನ್ನಡ ಮತ್ತು ಸಂಸ್ಕೃತಿ ಇಲಾಖೆ, ಕನ್ನಡ ಭವನ, ಜೆ.ಸಿ. ರಸ್ತೆ, ಬೆಂಗಳೂರು ೨೦೦೭,

೨. ಭಾರತೀಯ ಸಂಸ್ಕೃತಿ , ಡಾ. ಎಸ್. ಶ್ರೀಕಂಠಶಾಸ್ತ್ರಿ, ಪ್ರಸಾರಾಂಗ, ಮೈಸೂರು. ವಿ.ವಿ. ಮೈಸೂರು, ೧೯೬೯

೩. ಗದ್ಯ ವಿಹಾರ–೨, ಕನ್ನಡ ಅಧ್ಯಯನ ಸಂಸ್ಥೆ, ಮೈಸೂರು. ವಿ.ವಿ ಮೈಸೂರು ೧೯೮೩

೪. ಕರ್ನಾಟಕ ಸಂಸ್ಕೃತಿ ಸಮೀಕ್ಷೆ – ಎಚ್. ತಿಪ್ಪೇರುದ್ರಸ್ವಾಮಿ೨೦೧೧, ಡಿ.ವಿ.ಕೆ. ಮೂರ್ತಿ ಪ್ರಕಾಶನ, ಮೈಸೂರು

೫. ಕುವೆಂಪು ಸಮಗ್ರ ಗದ್ಯ, ಸಂಪುಟ–೨, ೨೦೧೩, ರಾಷ್ಟ್ರಕವಿ ಕುವೆಂಪು ಪ್ರತಿಷ್ಠಾನ, ಕುಪ್ಪಳ್ಳಿ, ಶಿವಮೊಗ್ಗ

೬. ಮಾತು ತಲೆಯೆತ್ತುವ ಬಗೆ (ಕನ್ನಡ ಸಾಹಿತ್ಯ ಮೀಮಾಂಸೆ) – ಸಂ: ರಹಮತ್ ತರೀಕೆರೆ; ಕವಿವಿ, ಹಂಪಿ ೨೦೧೧,

೭. ವಿಮರ್ಶೆಯ ವಿಮರ್ಶೆ –ಕೆ.ಪಿ. ಪೂರ್ಣಚಂದ್ರ ತೇಜಸ್ವಿ, ಪುಸ್ತಕ ಪ್ರಕಾಶನ, ಮೈಸೂರು–೨೦೦೯

೮. ಹೊನ್ನಾರು, ಪ್ರೊ ಎಚ್.ಜೆ. ಲಕ್ಕಪ್ಪಗೌಡರ ಅಭಿನಂದನ ಗ್ರಂಥ, ೨೦೦೪, ತಳುಕಿನ ವೆಂಕಣ್ಣಯ್ಯ ಸ್ಮಾರಕ ಗ್ರಂಥಮಾಲೆ, ಮೈಸೂರು

೯. ಅಮೃತ ಮತ್ತು ಗರುಡ, ಡಿ.ಆರ್. ನಾಗರಾಜ್, ೨೦೦೯, ಅಕ್ಷರ ಪ್ರಕಾಶನ, ಹೆಗ್ಗೋಡು, ಸಾಗರ, ಕರ್ನಾಟಕ

೧೦. ಮಹಿಳೆ ಮತ್ತು ಕನ್ನಡ ಸಾಹಿತ್ಯ, ಸಂ: ಜಿ.ಎಸ್. ಶಿವರುದ್ರಪ್ಪ, ೧೯೭೯, ಪ್ರಸಾರಾಂಗ, ಬೆಂಗಳೂರು ವಿವಿ, ಬೆಂಗಳೂರು

ಪರಾಮರ್ಶನ ಗ್ರಂಥಗಳು:

೧. ಕರ್ನಾಟಕ ಸಂಸ್ಕೃತಿ ಸಮೀಕ್ಷೆ	: ಎಚ್. ತಿಪ್ಪೇರುದ್ರಸ್ವಾಮಿ
೨. ಶಕ್ತಿ ಶಾರದೆಯ ಮೇಳ	: ಡಿ.ಆರ್. ನಾಗರಾಜ್
೩. ಸಾಂಸ್ಕೃತಿಕ ಅಧ್ಯಯನ	: ರಹಮತ್ ತರಿಕೆರೆ
೪. ಶ್ರೀ ಸಾಹಿತ್ಯ	: ಬಿ.ಎಂ.ಶ್ರೀ
೫. ಸಂಸ್ಕೃತಿ	: ಡಿ.ವಿ.ಜಿ
೬. ಜೀವನ ಸೌಂದರ್ಯ ಮತ್ತು ಸಾಹಿತ್ಯ	: ಡಿ.ವಿ.ಜಿ
೭. ಸಂಸ್ಕೃತಿ ಕಥನ	: ಡಿ.ಆರ್. ನಾಗರಾಜ್
೮. ಭಾರತೀಯ ಸಂಸ್ಕೃತಿ	: (ಸಂ) ಅ.ನ.ಕೃಷ್ಣರಾಯ

KNB 220: ಪತ್ರಿಕೆ ೬.೨ ಮಹಿಳೆ : ಸಮಾಜ–ಸಾಹಿತ್ಯ(ಆಯ್ದ ಲೇಖನಗಳು)

೧. ಮಹಿಳಾವಾದ ಮತ್ತು ಮಹಿಳಾ ಸಾಹಿತ್ಯ	- ವಿಜಯಾದಬ್ಬೆ
೨. ಹೆಣ್ಣು ಮತ್ತು ಭಾಷೆ : ಅಭಿವ್ಯಕ್ತಿ	– ಎಚ್.ಎಸ್.ರಾಘವೇಂದ್ರರಾವ್
೩. ಭಾರತೀಯ ಸ್ತ್ರೀವಾದ (ಪೀಠಿಕಾ ಭಾಗ-ಮೊದಲಭಾಗ)	- ಮನು ಚಕ್ರವರ್ತಿ
೪. ಕಪ್ಪು ಸ್ತ್ರೀವಾದಿ ವಿಮರ್ಶೆ	– ವಿಜಯಾದಬ್ಬೆ
೫. ಪಾಡ್ದನಗಳಲ್ಲಿ ಸ್ತ್ರೀತ್ವದ ಪ್ರತಿನಿಧೀಕರಣ	– ಗಾಯತ್ರಿ ನಾವಡ

೬. ಜನ್ನನ ಕಾವ್ಯಗಳು : ಹೆಣ್ಣನ್ನು ಪಳಗಿಸುವ ವ್ಯವಸ್ಥೆಯ ಕನ್ನಡಿ – ಸಬಿಹಾ ಭೂಮಿಗೌಡ

೭. ಚಕ್ರಾಧಿಪತ್ಯ, ರಾಷ್ಟ್ರ ಮತ್ತು ಸಾಹಿತ್ಯಕ ಪಠ್ಯ – ಸೂಸಿ ಥಾರು ಮತ್ತು ಕೆ. ಲಲಿತ
ಅನು: ಎಚ್.ಎಸ್. ರಾಘವೇಂದ್ರರಾವ್

೮.ಮುಸ್ಲಿಂ ಮಹಿಳಾ ಸಂವೇದನೆ ಮತ್ತು ಪ್ರತಿಭಟನಾ ನೆಲೆಗಳು – ಕೆ. ಷರೀಫಾ

೯. ದಲಿತ ಸಾಹಿತ್ಯದಲ್ಲಿ ಮಹಿಳೆ – ಧರಣಿದೇವಿ ಮಾಲಗತ್ತಿ

೧೦.ವಾಸ್ತವತೆ, ಸಾಹಿತ್ಯ ಮತ್ತು ಲೇಖಕಿ – ಅನುಪಮಾ ನಿರಂಜನ

ಪಠ್ಯ ಮೂಲ:

೧. **ನಾರಿ: ದಾರಿ-ದಿಗಂತ**-ವಿಜಯಾದಬ್ಬೆ ೧೯೯೭, ರಚನಾ ಪ್ರಕಾಶನ, ಮೈಸೂರು

೨. **ಭಾರತೀಯ ಸ್ತ್ರೀವಾದ – ಅಕ್ಷರ ಪ್ರಕಾಶನ**, ೧೯೯೩, ಹೆಗ್ಗೋಡು, ಸಾಗರ

೩. **ಹೆಣ್ಣು ಮತ್ತು ಭಾಷೆ-** ಸಂ: **ಎಚ್.ಎಸ್.ಶ್ರೀಮತಿ**, **ಶಿವಾನಂದ ಎಸ್. ವಿರಕ್ತಮಠ**, ೨೦೦೭, ಮಹಿಳಾ ಅಧ್ಯಯನ ಕೇಂದ್ರ ಕನ್ನಡ ವಿಶ್ವವಿದ್ಯಾಲಯ, ಹಂಪಿ

೪. **ಸ್ತ್ರೀವಾದಿ ಪ್ರವೇಶಿಕೆ-** ಸಂ: ಬಿ.ಎನ್. ಸುಮಿತ್ರಾಬಾಯಿ, ಎನ್.ಗಾಯತ್ರಿ, ೧೯೯೫, ಕರ್ನಾಟಕ ಲೇಖಕಿಯರ ಸಂಘ, ಚಾಮರಾಜಪೇಟೆ, ಬೆಂಗಳೂರು

೫. **ವಿರಚನೆ-** ಗಾಯತ್ರಿ ನಾವಡ, ೧೯೯೭, ಎನ್.ಆರ್.ಎ.ಎಂ.ಎಚ್. ಪ್ರಕಾಶನ, ಕೋಟೇಶ್ವರ, ದಕ್ಷಿಣ ಕನ್ನಡ

೬. **ಬಗೆ** – ಸಬಿಹಾ ಭೂಮಿಗೌಡ, ೨೦೦೧, ಲೋಹಿಯಾ ಪ್ರಕಾಶನ, ಬಳ್ಳಾರಿ

೭. **ಸ್ತ್ರೀವಾದಿ ಸಾಹಿತ್ಯ ವಿಮರ್ಶೆ**– (ಸಂ) ತೇಜಸ್ವಿನಿ ನಿರಂಜನ, ೧೯೯೪, ಕನ್ನಡ ಸಂಘ, ಕ್ರೈಸ್ಟ್ ಕಾಲೇಜ್, ಬೆಂಗಳೂರು

೮. **ಮುಸ್ಲಿಂ ಮಹಿಳಾ ಸಂವೇದನೆ**–ಕೆ.ಷರೀಫಾ, ೨೦೧೧, ಅಂಕಿತ ಪುಸ್ತಕ, ಬೆಂಗಳೂರು

೯. **ಸ್ತ್ರೀವಾದ ಮತ್ತು ಭಾರತೀಯತೆ- ಧರಣೀದೇವಿ ಮಾಲಗತ್ತಿ**, ೧೯೯೮, ಚೇತನ ಬುಕ್ ಹೌಸ್, ಮೈಸೂರು

೧೦. **ಸಾಹಿತ್ಯ ಮತ್ತು ಪ್ರಗತಿ-** ಅನುಪಮಾ ನಿರಂಜನ, ೨೦೦೮, ಡಿ.ವಿ.ಕೆ. ಮೂರ್ತಿ, ಮೈಸೂರು

ಪರಾಮರ್ಶನ ಗ್ರಂಥಗಳು

೧. ಮಹಿಳಾ ಸಾಹಿತ್ಯ ಚರಿತ್ರೆ	: (ಸಂ) ಎಚ್.ಎಸ್. ಶ್ರೀಮತಿ
೨. ಹೆಣ್ಣು ಮತ್ತು ಭಾಷೆ	: (ಸಂ) ಎಚ್ ಎಸ್. ಶ್ರೀಮತಿ, ಶಿವಾನಂದ ಎಸ್. ವಿರಕ್ತಮಠ
೩. ಸ್ತ್ರೀವಾದಿ ಪ್ರವೇಶಿಕೆ	: (ಸಂ) ಬಿ.ಎನ್. ಸುಮಿತ್ರಾಬಾಯಿ, ಎನ್. ಗಾಯತ್ರಿ
೪. ವಿರಚನೆ	: ಗಾಯತ್ರಿ ನಾವಡ
೫. ವಿಜಯಾನ್ವೇಷಣಂ	: (ಸಂ) ಎಸ್.ಡಿ. ಶಶಿಕಲಾ

ಮೂರನೆಯ ಚತುರ್ಮಾಸ (ಆಗಸ್ಟ್–ಡಿಸೆಂಬರ್ ೨೦೨೦)

ಪ್ರಧಾನ ವಿಷಯಗಳು (**Hard core)**

KNC 050: ಪತ್ರಿಕೆ: ೧

ತೌಲನಿಕ ಸಾಹಿತ್ಯ : ಪಠ್ಯ : ಮಹಾಕಾವ್ಯ ಮತ್ತು ನಾಟಕ (೨:೧=೩ ಕ್ರೆಡಿಟ್)

೧. ತೌಲನಿಕ ಸಾಹಿತ್ಯದ ಸೂತ್ರ ಸ್ವರೂಪ - ರಾಷ್ಟ್ರೀಯ ಸಾಹಿತ್ಯ, ಜಾಗತಿಕ ಸಾಹಿತ್ಯ ಮತ್ತು ಸಾಮಾನ್ಯ ಸಾಹಿತ್ಯ - ತೌಲನಿಕ ಸಾಹಿತ್ಯದ ಪಂಥಗಳು, ಸ್ವೀಕಾರ ಮತ್ತು ಪ್ರಭಾವ

೨. **ತುಘಲಕ್-** ಕಾರ್ನಾಡ್, **ಕ್ಯಾಲಿಗುಲ**- ಆಲ್ಬರ್ಟ್ ಕಮು (ಅನು-ಡಿ.ಎ. ಶಂಕರ್)

೩. **ಹ್ಯಾಮ್ಲೆಟ್**– ಕೆ.ಎಸ್. ಭಗವಾನ್, **ರಕ್ತಾಕ್ಷಿ**- ಕುವೆಂಪು

೪. (ಅ) Illiad – Homer Prescribed Books 1,7

(ಆ) Aeneid – Virgil Prescribed Books 5, 6

ಪರಾಮರ್ಶನ ಕೃತಿಗಳು:

೧. ಪಾಶ್ಚಾತ್ಯ ಮಹಾಕಾವ್ಯಗಳು	: ಶ್ರೀಕಂಠಕೂಡಿಗೆ (ಸಂ) ಪ್ರ,ಮೈವಿವಿ
೨. ಮಹಾಕಾವ್ಯ ಸ್ವರೂಪ	: ಜಿ.ಎಸ್. ಶಿವರುದ್ರಪ್ಪ
೩. ಮಹಾಕಾವ್ಯ ಲಕ್ಷಣ	: ಟಿ.ವಿ. ವೆಂಕಟಾಚಲಶಾಸ್ತ್ರಿ
೪. Comparative Literary studies	: S.S. Pawar
೫. Comparative Literary and Literary Theory	: Ulrich Weisstein
೬. Comparative Literature Method & perspective	: (Ed) Newton P Stalknecht
೭. Method and perspective Discriminations (First two Essays on Comparative Literature)	: Horst Frenz

---

KNC 020:ಪತ್ರಿಕೆ: ೨ ಆಧುನಿಕ ಕನ್ನಡ ಸಾಹಿತ್ಯದ ಹಿನ್ನೆಲೆ (೨:೧=೩ ಕ್ರೆಡಿಟ್)

೧. ನವೋದಯ ಸಾಹಿತ್ಯ : ಪ್ರಭಾವ, ಪ್ರೇರಣೆ, ರೋಮ್ಯಾಂಟಿಸಿಸಂ, ರಾಷ್ಟ್ರೀಯತೆ, ಸುಧಾರಣಾವಾದ, ದೇಶೀಯತೆ, ನಾಡು-ನುಡಿ

೨. ಪ್ರಗತಿಶೀಲ ಸಾಹಿತ್ಯ : ಪ್ರಭಾವ, ಪ್ರೇರಣೆ, ಮಾರ್ಕ್ಸ್ ವಾದ, ವಾಸ್ತವವಾದ

೩. ನವ್ಯ ಸಾಹಿತ್ಯ : ಪ್ರಭಾವ, ಪ್ರೇರಣೆ, ಅಸ್ತಿತ್ವವಾದ, ಅಸಂಗತವಾದ

೪. ದಲಿತ ಬಂಡಾಯ : ಪ್ರಭಾವ, ಪ್ರೇರಣೆ, ಮಾರ್ಕ್ಸ್ ವಾದ, ಅಂಬೇಡ್ಕರ್ ವಾದ, ಲೋಹಿಯಾವಾದ, ಸ್ತ್ರೀವಾದ

ಪರಾಮರ್ಶನ ಕೃತಿಗಳು :

೧. ಹೊಸಗನ್ನಡದ ಅರುಣೋದಯ	: ಶ್ರೀನಿವಾಸ ಹಾವನೂರ
೨.ಹೊಸಗನ್ನಡದ ಕವಿತೆಯ ಮೇಲೆ ಇಂಗ್ಲಿಷ್ ಕಾವ್ಯದ ಪ್ರಭಾವ	: ಎಸ್. ಅನಂತನಾರಾಯಣ
೩ ಯುಗಧರ್ಮ ಹಾಗೂ ಸಾಹಿತ್ಯ ದರ್ಶನ	: ಕೀರ್ತಿನಾಥ ಕುರ್ತಕೋಟಿ
೪ ಪ್ರಗತಿಶೀಲ ಸಾಹಿತ್ಯ	: ಅನಕೃ (ಸಂ)
೫ ಭಾರತೀಯ ಪತ್ರಿಕೋದ್ಯಮ	: ನಾಡಿಗ ಕೃಷ್ಣಮೂರ್ತಿ
೬ ಹೊಸಗನ್ನಡ ಸಾಹಿತ್ಯ	: ಎಲ್. ಎಸ್.ಶೇಷಗಿರಿರಾವ್
೭ ೨೦ನೆಯ ಶತಮಾನದ ಕನ್ನಡ ಸಾಹಿತ್ಯ :	: ಡಾ. ಬಸವರಾಜ ಸಾದರ
೮ ಕರ್ನಾಟಕ ಸಂಗಾತಿ	: ಕನ್ನಡ ಅಭಿವೃದ್ಧಿ ಪ್ರಾಧಿಕಾರ ಪ್ರಕಟಣೆ
೯ Impact of Marxism on Indian life and Literature	: H.M. Nayak (Ed)
೧೦ Heritage of Karnataka	: R.S. Mugali

KNC 030:<u>ಪತ್ರಿಕೆ: ೩ ಭಾರತೀಯ ಕಾವ್ಯಮೀಮಾಂಸೆ</u> (೨:೦=೩ ಕ್ರೆಡಿಟ್)

೧. ಸಂಸ್ಕೃತ ಕಾವ್ಯಮೀಮಾಂಸೆ : ಕವಿ-ಕಾವ್ಯ-ಸಹೃದಯ, ಕವಿತೆಯ ಆಕರ-ಪ್ರತಿಭೆ, ಪರಿಕರ-ವ್ಯುತ್ಪತ್ತಿ, ಪ್ರಮುಖ ಸಿದ್ಧಾಂತಗಳು : ರಸ-ಧ್ವನಿ, ಔಚಿತ್ಯ

೨. ಕನ್ನಡ ಕಾವ್ಯಮೀಮಾಂಸೆ : ಕವಿರಾಜಮಾರ್ಗ ಮತ್ತು ಇತರ ಪ್ರಾಚೀನ ಲಕ್ಷಣ ಗ್ರಂಥಗಳು, ಆಧುನಿಕ ಕನ್ನಡ ಕಾವ್ಯಮೀಮಾಂಸೆಯ ವಿವಿಧ ಚಿಂತನೆಗಳು: ನವೋದಯ, ನವ್ಯ, ಪ್ರಗತಿಶೀಲ, ದಲಿತ ಬಂಡಾಯ, ಸ್ತ್ರೀವಾದ

೩. ಕನ್ನಡ ಕವಿಗಳ ಕಾವ್ಯ ಕಲ್ಪನೆ-ಪ್ರಾಚೀನ, ಆಧುನಿಕ

೪. ತಮಿಳು ಕಾವ್ಯಮೀಮಾಂಸೆ ಮತ್ತು ಕನ್ನಡ ಜಾನಪದ ಕಾವ್ಯಮೀಮಾಂಸೆ

ಪರಾಮರ್ಶನ ಕೃತಿಗಳು:

೧ ಭಾರತೀಯ ಕಾವ್ಯಮೀಮಾಂಸೆ	:ತೀನಂಶ್ರೀ
೨ ತೌಲನಿಕ ಕಾವ್ಯಮೀಮಾಂಸೆ	: ಎಚ್. ತಿಪ್ಪೇರುದ್ರಸ್ವಾಮಿ
೩ ಕಾವ್ಯಾರ್ಥ ಚಿಂತನ	: ಜಿ.ಎಸ್.ಶಿವರುದ್ರಪ್ಪ
೪ ಕನ್ನಡ ಕವಿಗಳ ಕಾವ್ಯಕಲ್ಪನೆ	: ಜಿ.ಎಸ್. ಶಿವರುದ್ರಪ್ಪ

೫ ಕನ್ನಡದಲ್ಲಿ ಸರಸ್ವತೀ ತತ್ತ್ವ : ಜಿ.ಎಸ್. ಶಿವರುದ್ರಪ್ಪ
೬ ಕಾವ್ಯಾರ್ಥ ಪದಕೋಶ : ಜಿ.ಎಸ್ ಶಿವರುದ್ರಪ್ಪ
೭ ವಿಮರ್ಶೆಯ ಪರಿಭಾಷೆ : ಓ.ಎಲ್. ನಾಗಾಭೂಷಣಸ್ವಾಮಿ
೮ ಕನ್ನಡ ಧ್ವನ್ಯಾಲೋಕ ಲೋಚನಸಾರ : ಕೆ.ಕೃಷ್ಣಮೂರ್ತಿ
೯ ಔಚಿತ್ಯ ವಿಚಾರ ಚರ್ಚೆ : ಕೆ.ಕೃಷ್ಣಮೂರ್ತಿ
೧೦ ತಮಿಳು ಕಾವ್ಯ ಮೀಮಾಂಸೆ : ಡಾ.ಕಾರ್ಲೂಸ್

KNC 040: ಪತ್ರಿಕೆ: ೪

ಸಂಶೋಧನ ವಿಧಾನ ಮತ್ತು ಗಣಕ ಜ್ಞಾನ (೨:೦=೩ ಕ್ರೆಡಿಟ್)

ಸಂಶೋಧನ ವಿಧಾನ

೧. ಸಂಶೋಧನೆ, ಅರ್ಥವ್ಯಾಪ್ತಿ, ಪ್ರಕಾರಗಳು, ಸಂಶೋಧಕನ/ಳ ಅರ್ಹತೆ ಹಾಗೂ ಮನೋಧರ್ಮ, ಸಂಶೋಧನ ಲೇಖನ (Research Paper), ನಿಬಂಧ (Dissertation), ಮಹಾಪ್ರಬಂಧ (Thesis)- ಇವುಗಳ ಸ್ವರೂಪ ಮತ್ತು ವ್ಯಾತ್ಯಾಸ, ಸಂಶೋಧನ ಸಾರಲೇಖ (Synopsis)

೨. **ಸಂಶೋಧನೆಯ ಭಾಷೆ ಮತ್ತು ಶೈಲಿ, ಉದ್ಧರಣೆ, ಅಡಿಟಿಪ್ಪಣಿ, ಅನುಬಂಧ, ಗ್ರಂಥಸೂಚಿ, ಕ್ಷೇತ್ರಕಾರ್ಯದ ಸ್ವರೂಪ ಹಾಗೂ ವಿಧಾನ**

ಗಣಕ ಜ್ಞಾನ

೩. **ಕನ್ನಡದಲ್ಲಿ ಗಣಕ ಬಳಕೆ:** ಎಂ.ಎಸ್. ಆಫೀಸ್, ಓಪನ್ ಆಫೀಸ್-ವರ್ಡ್-ರೈಟ್, ಪವರ್ ಪಾಯಿಂಟ್, ಸಾಮಾಜಿಕ ಜಾಲ ತಾಣಗಳು, ಅವುಗಳ ಉಪಯೋಗ ಮತ್ತು ಸಾಹಿತ್ಯ ಸಂಬಂಧ

೪. ಅಂತರ್‌ಜಾಲ ತಾಣಗಳು: ಕನ್ನಡ ತಾಣಗಳು, ವಿ-ಅಂಚೆ, ವಿ-ಸಂದರ್ಶನ, ವಿ-ಪುಸ್ತಕಗಳು, ಕನ್ನಡ ಸಂಶೋಧನೆಯಲ್ಲಿ ಗಣಕ ಮತ್ತು ಅಂತರ್ಜಾಲದ ಬಳಕೆ

ಪರಾಮರ್ಶನ ಕೃತಿಗಳಳು:

೧ ಸಂಶೋಧನೆ : ಎಂ.ಚಿದಾನಂದಮೂರ್ತಿ
೨ ಕನ್ನಡ ಸಂಶೋಧನ : ಎಂ.ಎಂ.ಕಲಬುರ್ಗಿ
೩ ಸಂಶೋಧನ ಸ್ವರೂಪ : ಬಿ.ವಿ.ಶಿರೂರ
೪ ಸಂಶೋಧನ ಪ್ರಜ್ಞೆ :(ಸಂ) ಹೇರಂಜೆ ಕೃಷ್ಣಭಟ್ಟ
೫ ಸಂಶೋಧನೆ ತಾತ್ತ್ವಿಕ ವಿಚಾರ : ರಹಮತ್ ತರೀಕೆರೆ

೬ ಅಧ್ಯಯನದ ವಿಧಿವಿಧಾನಗಳು : ಕೆ.ರವೀಂದ್ರನಾಥ
೭ ಮಹಾಮಾರ್ಗ : ಎಂ.ಎಂ.ಕಲಬುರ್ಗಿ
೮ ಅದ್ಭುತ ಯಂತ್ರ ಗಣಕ : ಜಿ.ವಿ.ನಿರ್ಮಲ, ಎಸ್.ಕ್ಷಮಾ
೯ ಮಾನವಮಿತ್ರ ಗಣಕ : ಜಿ.ವಿ.ನಿರ್ಮಲ, ಎಸ್.ಕ್ಷಮಾ
೧೦ ಕ್ರಾಂತಿಕಾರಿ ಗಣಕ ಯಂತ್ರ : ಜಿ.ವಿ.ನಿರ್ಮಲ, ಎಸ್.ಕ್ಷಮಾ
೧೧ ಕಂಪ್ಯುಟರ್ : ಪ್ರಕಾಶ

ಉಪ ಪ್ರಧಾನ ವಿಷಯಗಳು(Soft core)

KNC 210: ಪತ್ರಿಕೆ: ೫.೧ ಭಾಷಾವಿಜ್ಞಾನ ಅಧ್ಯಯನ : ಉಪಭಾಷಾವಿಜ್ಞಾನ (ಕನ್ನಡ) (೩:೧=೪ ಕ್ರೆಡಿಟ್)

೧.ಉಪಭಾಷಾವಿಜ್ಞಾನ : ಸ್ವರೂಪ ಮತ್ತು ವ್ಯಾಪ್ತಿ, ಭಾಷಾಭೂಗೋಳ, ಉಪಭಾಷಾಭೂಗೋಳ ಮತ್ತು ಭಾಷಾ ಭೂಪಟ- ಈ ಶಬ್ದಗಳ ಅರ್ಥ ಮತ್ತು ವ್ಯಾಪ್ತಿ: ಕನ್ನಡದ ಸಾಮಾಜಿಕ ಉಪಭಾಷೆಗಳು ಮತ್ತು ಪ್ರಾದೇಶಿಕ ಉಪಭಾಷೆಗಳು

೨.ಉಪಭಾಷಾವಿಜ್ಞಾನದ ಸಂಕ್ಷಿಪ್ತ ಇತಿಹಾಸ : ಭಾರತ, ಫ್ರಾನ್ಸ್, ಅಮೆರಿಕಾ, ಇಂಗ್ಲೆಂಡ್ ಮತ್ತು ಜರ್ಮನಿ ದೇಶಗಳಲ್ಲಿ ಉಪಭಾಷಾ ಅಧ್ಯಯನಗಳು, 'ಲಿಂಗ್ವಿಸ್ಟಿಕ್ ಸರ್ವೆ ಆಫ್ ಇಂಡಿಯಾ'ದ ಮಹತ್ವ

೩.ಅ) ಭಾಷೆ, ಉಪಭಾಷೆ, ವ್ಯಕ್ತಿಭಾಷೆ, ಪ್ರಮಾಣ ಭಾಷೆ, ಭಾಷಾಗುಂಪು, ಪರಸ್ಪರ ಅರಿವು, ಸಾಮಾನ್ಯ ತಿರುಳು

ಆ) ಉಪಭಾಷಾವಿಜ್ಞಾನದ ವಿಧಾನಗಳು :ಏಕಕಾಲಿಕ, ದ್ವಿಕಾಲಿಕ

೪. ಭಾಷಾವಿಜ್ಞಾನದಲ್ಲಿ ಕ್ಷೇತ್ರಕಾರ್ಯದ ಸ್ವರೂಪ ಮತ್ತು ಪ್ರಯೋಜನ, ವಕ್ತೃ, ಪ್ರತಿವಕ್ತೃ-ಅರ್ಹತೆ ಕಾರ್ಯನಿರ್ವಹಣೆ, ದತ್ತಸಂಗ್ರಹ, ಸ್ವರೂಪ, ಉದ್ದೇಶ, ಪರಿಶೀಲನ ರೀತಿ ಮತ್ತು ಸಂಗ್ರಹದ ವಿವಿಧ ಹಂತಗಳು, ದತ್ತಸಂಗ್ರಹ, ಸ್ವರೂಪ, ಉದ್ದೇಶ, ಪರಿಶೀಲನ ರೀತಿ ಮತ್ತು ಸಂಗ್ರಹದ ವಿವಿಧ ಹಂತಗಳು, ಸಂಗ್ರಹ ಕಾರ್ಯದಲ್ಲಿ ಪ್ರಶ್ನಾವಳಿಗಳು ಮತ್ತು ಇತರ ಉಪಕರಣಗಳು

ಪರಾಮರ್ಶನ ಕೃತಿಗಳು

೧. ಉಪಭಾಷೆ : ಕೃಷ್ಣ ಪರಮೇಶ್ವರ ಭಟ್ಟ

೨. ಉಪಭಾಷಾ ಅಧ್ಯಯನ : ಶಾಲಿನಿ ರಘುನಾಥ

೩. ಭಾಷಾಕ್ಷೇತ್ರಕಾರ್ಯ : ಎಸ್.ಎಸ್.ಅಂಗಡಿ

೪. ಕ್ಷೇತ್ರಕಾರ್ಯದ ಹಾದಿಯಲ್ಲಿ : ಕ್ಯಾತನಹಳ್ಳಿ ರಾಮಾಣ್ಣ

೫. ಹಾದಿಯೊಳಗಣ ಜ್ಯೋತಿ : ಹನೂರು ಕೃಷ್ಣಮೂರ್ತಿ

೬. ಸಾಮಾಜಿಕ ಉಪಭಾಷೆ : ಮಹಾದೇವಯ್ಯ

೭. ಸುವರ್ಣ ಸಂಚಯ : (ಸಂ) ದೇ ಜವರೇಗೌಡ

೮. ಕರ್ನಾಟಕ ಭಾರತಿ : (ಸಂ) ಸುಂಕಾಪುರ ಎಂ.ಎಸ್

೯, Field Linguistics : William J Samarien

೧೦,The Structure of Karnataka : R.C. Hiremath

೧೧. An Outline of Colloquial Kannada : William Bright

೧೨, Kannada –Literary and colloquial : H.M. Nayak

೧೩. Field Study : Sen Gupta

೧೪. World Geography of the Eastern United States : H Kurath

೧೫. Handbook of the Linguistic Geography of New England : H Kurath

೧೬. Reading in American Dialectology : Allen and Underwood

೧೭, The Study of dialect : K.M. Petyt

೧೮, A course in Modern Linguistics : Charles F Hockett

KNC 210: <u>ಪತ್ರಿಕೆ: ೫.೨</u>

<u>ಜಾನಪದ ಅಧ್ಯಯನ: ಕರ್ನಾಟಕ ಜನಪದ ಕಲೆಗಳು (೩:೧=೪ ಕ್ರೆಡಿಟ್)</u>

೧.ತಾತ್ತ್ವಿಕತೆ : ಜನಪದ ಕಲೆಗಳ ಉಗಮ, ಸ್ವರೂಪ, ವ್ಯಾಪ್ತಿ, ಬುಡಕಟ್ಟು ಕಲೆಗಳು, ಗ್ರಾಮಾಂತರ ಜನಪದ ಕಲೆಗಳು, ಶಿಷ್ಟಕಲಾ ಪ್ರಕಾರಗಳು, ಜನಪದಕಲೆ, ಕಲಾವಿದರು ಮತ್ತು ಆಧುನಿಕತೆಯ ಮುಖಾಮುಖಿ

೨.ಪ್ರದರ್ಶನಾತ್ಮಕ ಕಲೆಗಳು : ವಾದ್ಯಪ್ರಧಾನ : ವೀರಗಾಸೆ, ಕರಪಾಲ, ತಮಟೆವಾದನ, ನೀಲಗಾರರು, ಮುಖವೀಣೆ

೩.ಆರಾಧನಾ ಪ್ರಧಾನ ಕಲೆಗಳು : ಮೊಹರಂ, ಆಟಿಕಳಂಜ, ವೀರಭದ್ರನ ಕುಣಿತ, ಗೊರವರ ಕುಣಿತ, ಗೊಂದಲಿಗರು, ಹಾಲಕ್ಕಿ ಕುಣಿತ, ಆಸಾದಿ ಹಾಡುಗಳು, ಭೂತಾರಾಧನೆ

೪.ರಂಗಭೂಮಿ : ಹಗರಣ, ಜಾಲಾಟ, ಬಹುರೂಪಿ, ಕೇಳಿಕೆ, ತಾಳಮದ್ದಳೆ, ಸೂತ್ರದಬೊಂಬೆಯಾಟ, ತೊಗಲುಬೊಂಬೆಯಾಟ, ಕೋಲಾಟ, ಮೂಡಲಪಾಯ, ಪಡುವಲಪಾಯ ಯಕ್ಷಗಾನ (ತೆಂಕುತಿಟ್ಟು, ಬಡಗುತಿಟ್ಟು)

ಪರಾಮರ್ಶನ ಕೃತಿಗಳು:

೧. ಉತ್ತರ ಕರ್ನಾಟಕದ ಜನಪದ ರಂಗಭೂಮಿ : ಚಂದ್ರಶೇಖರ ಕಂಬಾರ
೨. ದಕ್ಷಿಣ ಕರ್ನಾಟಕದ ಜನಪದ ರಂಗಭೂಮಿ : ಡಿ.ಕೆ. ರಾಜೇಂದ್ರ
೩. ಕರಪಾಲ ಮೇಳ : ಡಿ.ಕೆ. ರಾಜೇಂದ್ರ
೪. ಕರ್ನಾಟಕ ಜನಪದ ಕಲೆಗಳ ಕೋಶ : (ಸಂ) ಹಿ.ಚಿ. ಬೋರಲಿಂಗಯ್ಯ
೫. ಕರ್ನಾಟಕ ಜನಪದ ಕಲೆಗಳು : ಗೊ.ರು. ಚನ್ನಬಸಪ್ಪ
೬. ಹೊನ್ನಬಿತ್ತೇವು ಹೊಲಕೆಲ್ಲ : ಗೊ.ರು. ಚನ್ನಬಸಪ್ಪ
೭. ಕನ್ನಡ ಜಾನಪದ ವಿಶ್ವಕೋಶ : (ಸಂ) ಚಂದ್ರಶೇಖರ ಕಂಬಾರ
೮. ಭೂತಾರಾಧನೆ : ಕೆ.ಚಿನ್ನಪ್ಪಗೌಡ
೯. ಮೌಖಿಕ ಕಥನ : ಜಿ.ಆರ್. ತಿಪ್ಪೇಸ್ವಾಮಿ
೧೦.ಜಾನಪದ ಪರಿಭಾವನೆ : ಜಿ.ಆರ್. ತಿಪ್ಪೇಸ್ವಾಮಿ
೧೧.ದಕ್ಷಿಣ ಕರ್ಣಾಟಕ ಜನಪದ ಕಾವ್ಯಪ್ರಕಾರಗಳು : ಜೀ.ಶಂ.ಪರಮಶಿವಯ್ಯ
೧೨.ಯಕ್ಷಗಾನ : ಕೆ.ಶಿವರಾಮಕಾರಂತ
೧೩.ಕನ್ನಡ ಜಾನಪದ ಕಲಾ ಪ್ರವೇಶ : ಚಕ್ಕರೆ ಶಿವಶಂಕರ
೧೪.The Encyclopedia of folk culture of Karnataka : Krishna Murthy Hanur

---

KNC 210: ಪತ್ರಿಕೆ: ೫.೩ ಚಾರಿತ್ರಿಕ ಅಧ್ಯಯನ : ಶಾಸನಶಾಸ್ತ್ರ

(ಆಯ್ದ ಪಠ್ಯಗಳೊಡನೆ ೩:೧=೪ ಕ್ರೆಡಿಟ್)

೧ ಶಾಸನ ಎಂದರೇನು? ಕರ್ನಾಟಕದಲ್ಲಿ ಶಾಸನ ಅಧ್ಯಯನದ ಇತಿಹಾಸ-ಶಾಸನಗಳ ಪ್ರಾಮುಖ್ಯ, ಶಾಸನಗಳ ವರ್ಗೀಕರಣ

೨ ಶಾಸನಕವಿ, ಲಿಪಿಕಾರ, ರೂವಾಲಿ-ಶಾಸನಗಳ ವಿಷಯಾನುಪೂರ್ವಿ - ದಾನಶಾಸನ, ಕೂಟಶಾಸನ-ವೀರಗಲ್ಲು, ಮಾಸ್ತಿಗಲ್ಲು, ನಿಸಿದಿಗಲ್ಲು

೩ ಹಲ್ಮಿಡಿ ಶಾಸನ - ಬಾದಾಮಿಯ ಕಪ್ಪೆ ಅರಭಟ್ಟನ ಶಾಸನ - ಕುರ್ಯಾಲದ ಜಿನವಲ್ಲಭನ ಶಾಸನ ಶಾಸನ

೪ ಲಕ್ಕುಂಡಿಯ ಅತ್ತಿಮಬ್ಬೆಯ ಶಾಸನ - ಬಳ್ಳಿಗಾವಿಯ ಕೋಡಿಮಠದ ಶಾಸನ-
ಶ್ರವಣಬೆಳಗೊಳದ ಬುಕ್ಕರಾಯನ ಶಾಸನ

ಪರಾಮರ್ಶನ ಕೃತಿಗಳು :

೧ ಶಾಸನ ವ್ಯಾಸಂಗ ೧,೨ : ಎಂ.ಎಂ. ಕಲಬುರ್ಗಿ
೨ ಕನ್ನಡ ಶಾಸನಗಳ ಸಾಂಸ್ಕೃತಿಕ ಅಧ್ಯಯನ : ಎಂ. ಚಿದಾನಂದಮೂರ್ತಿ
೩ ಕರ್ನಾಟಕ ಶಾಸನ ಸಮೀಕ್ಷೆ : ಕೆ.ವಿ. ರಮೇಶ
೪ ಕನ್ನಡ ಲಿಪಿಯ ಉಗಮ ಮತ್ತು ವಿಕಾಸ : ಎ.ವಿ. ನರಸಿಂಹಮೂರ್ತಿ
೫ ಕನ್ನಡ ಶಾಸನ ಸಂಗ್ರಹ : ಕನ್ನಡ ಸಾಹಿತ್ಯ ಪರಿಷತ್ತು
೬ ಶಾಸನಶಾಸ್ತ್ರ ಪ್ರವೇಶ :ಸಿಪಿಕೆ
೭ ಭಾರತೀಯ ಶಾಸನಶಾಸ್ತ್ರ ಪರಿಚಯ : (ಅನು) ಸಿಪಿಕೆ
೮ ಶಾಸನ ಪದ್ಯಮಂಜರಿ (ಪ್ರಸ್ತಾಪನೆ) : (ಸಂ) ಎಂ. ಚಿದಾನಂದಮೂರ್ತಿ
೯ Indian Epigraphy : D.C. Sircar
೧೦ Indian Epigraphy and South Indian Scripts : C. Shivaramamurthy
೧೧ Indian Paleography : Ahmed Hussain Dani
೧೨ The Alphabet : David Diringer

ಮುಕ್ತ ಐಚ್ಛಿಕ (Open Elective)

KNC 530: ಪತ್ರಿಕೆ: ೬.೧

ಕನ್ನಡ ಭಾಷೆ ಮತ್ತು ಸಾಹಿತ್ಯ (ಪ್ರಾಚೀನ, ಮಧ್ಯಕಾಲೀನ, ಆಧುನಿಕ)

(೩:೧=೪ ಕ್ರೆಡಿಟ್)

೧. ಪ್ರಾಚೀನ ಸಾಹಿತ್ಯ :

(ಅ) ಕವಿರಾಜಮಾರ್ಗ – ನಾಡು ನುಡಿಯ ವರ್ಣನೆ: ಪ್ರಥಮ ಪರಿಚ್ಛೇದದಲ್ಲಿ ಪದ್ಯ ಸಂಖ್ಯೆ:
೩೬,೩೭,೩೮,೩೯,೪೦. ಮೂರನೆಯ ಪರಿಚ್ಛೇದದಲ್ಲಿ: ೧೭೪, ೧೭೬, ೧೭೭,
೧೭೯ನೇ ಪದ್ಯ, (ಸಂ): ಎಂ.ವಿ.ಸೀತಾರಾಮಯ್ಯ

(ಆ) ವಡ್ಡಾರಾಧನೆ:'ಕಾರ್ತೀಕ ರಿಸಿಯ ಕತೆ' (ಸಂ) ಡಿ.ಎಲ್.ನರಸಿಂಹಾಚಾರ್

(ಇ) **ಪಂಪಭಾರತ**: ಭೀಷ್ಮರ ಪಟ್ಟಾಭಿಷೇಕ ಪ್ರಸಂಗ - ವಿಕ್ರಮಾರ್ಜುನ ವಿಜಯ; (ಸಂ) ಟಿ.ವಿ. ವೆಂಕಟಾಚಲಶಾಸ್ತ್ರೀ.; ದಶಮಾಶ್ವಾಸಂ ಭಾಗದಲ್ಲಿ ಪದ್ಯ ಸಂಖ್ಯೆ ೧೫ ರಿಂದ ೨೫ರವರೆಗೆ

೨. ಮಧ್ಯಕಾಲೀನ ಸಾಹಿತ್ಯ –೧ :

(ಅ) ಬಸವಣ್ಣನವರ ವಚನ ಸಂಪುಟ (ಸಂ) ಎಂ.ಎಂ.ಕಲಬುರ್ಗಿ

ವಚನಗಳ ಸಂಖ್ಯೆ: ೧೦೫, ೧೫೮, ೧೯೪, ೨೩೫, ೨೪೧, ೩೪೫, ೪೪೭, ೬೩೮,೮೨೧, ೫೮೦

(ಆ) ಅಕ್ಕಮಹಾದೇವಿ:ಶಿವಶರಣೆಯರ ವಚನ ಸಂಪುಟ (ಸಂ) ವೀರಣ್ಣ ರಾಜೂರ

ವಚನಗಳ ಸಂಖ್ಯೆ: ೭೮, ೧೪೩, ೧೯೬, ೧೯೭, ೨೦೬, ೨೧೧, ೨೬೮, ೩೬೪, ೩೬೫, ೪೧೩

೩. ಮಧ್ಯಕಾಲೀನ ಸಾಹಿತ್ಯ –೨ :

(ಅ) ಸರ್ವಜ್ಞ: ಸರ್ವಜ್ಞನ ವಚನಗಳು-(ಸಂ) ಉತ್ತಂಗಿ ಚೆನ್ನಪ್ಪ

ವಚನಗಳ ಸಂಖ್ಯೆ: : ೫೩೧, ೫೩೪, ೫೪೫, ೫೬೩, ೮೯೩, ೧೨೩೯, ೧೧೪೫, ೧೧೪೮, ೧೧೫೫, ೧೨೭೫

(ಅ) ಕೀರ್ತನೆಗಳು :

ಪುರಂದರದಾಸ: ಧರ್ಮವೇ ಜಯವೆಂಬ ದಿವ್ಯಮಂತ್ರ
ಕನಕದಾಸ: ಕುಲಕುಲ ಕುಲವೆಂದು ಹೊಡೆದಾಡದಿರಿ

೪. ಆಧುನಿಕ ಸಾಹಿತ್ಯ :

(ಅ) **ಕಾವ್ಯಗಳು** : ಕುವೆಂಪು – ಅಖಂಡ ಕರ್ನಾಟಕ

ಜಿ.ಎಸ್. ಶಿವರುದ್ರಪ್ಪ – ಮಬ್ಬಿನಿಂದ ಮಬ್ಬಿಗೆ

(ಆ) **ಆಧುನಿಕ ಕತೆಗಳು :** ಕುಂ.ವೀರಭದ್ರಪ್ಪ – ದೇವರ ಹೆಣ

ಸಾ.ರಾ ಅಬೂಬಕ್ಕರ್ – ಚಪ್ಪಲಿಗಳು

ಪರಾಮರ್ಶನ ಕೃತಿಗಳು :

೧. ಕನ್ನಡ ಸಾಹಿತ್ಯ ಚರಿತ್ರೆ : ರಂ.ಶ್ರೀ. ಮುಗಳಿ

೨. ಮೈಸೂರು ವಿಶ್ವವಿದ್ಯಾನಿಲಯದ ಸಾಹಿತ್ಯ ಚರಿತ್ರೆಯ ಸಂಪುಟಗಳು

೩. ಸಾಮಾನ್ಯನಿಗೆ ಸಾಹಿತ್ಯ ಚರಿತ್ರೆಯ ಸಂಪುಟಗಳು : ಬೆಂಗಳೂರು ವಿ.ವಿ

೪. ಕನ್ನಡ ಸಾಹಿತ್ಯ ಚರಿತ್ರೆ : ಕೆ.ವೆಂಕಟರಾಮಪ್ಪ

೫. ಕನ್ನಡ ಸಾಹಿತ್ಯ ಚರಿತ್ರೆ : ತ.ಸು. ಶಾಮರಾಯ

೬. ಕನ್ನಡ ಸಾಹಿತ್ಯ ಇತಿಹಾಸ : ರಂ.ಶ್ರೀ. ಮುಗಳಿ

ನಾಲ್ಕನೆಯ ಚತುರ್ಮಾಸ (ಜನವರಿ-ಮೇ ೨೦೨೧)

ಪ್ರಧಾನ ವಿಷಯಗಳು (Hard core)

KND 050: ಪತ್ರಿಕೆ: ೧

ಆಧುನಿಕ ಕನ್ನಡ ಸಾಹಿತ್ಯ : ಪಠ್ಯ : ಕಾವ್ಯ, ಕಾದಂಬರಿ, ಪ್ರಬಂಧ (೨:೧=೩ ಕ್ರೆಡಿಟ್)

ಕಾವ್ಯ: ೧೨ ನಿಗದಿತ ಕವನಗಳು

೧. ಶಿಶುನಾಳ ಶರೀಫ : ಬಿದ್ದಿಯಬ್ಬೇ ಮುದುಕಿ
೨. ದ.ರಾ.ಬೇಂದ್ರೆ : ನರಬಲಿ
೩. ಕುವೆಂಪು : ಹೋಗುವೆನು ನಾ
೪. ಬೆಳಗೆರೆ ಜಾನಕಮ್ಮ : ಚಂಡ ಶಾಸನ
೫. ಕೆಎಸ್ಎನ್ : ಭೂಮಿಗೀತ
೬. ಗೋಪಾಲಕೃಷ್ಣ ಅಡಿಗ : ಭೂತ
೭. ಜಿಎಸ್ಎಸ್ : ಸಂಜೆದಾರಿ
೮. ರಂಜಾನ್ ದರ್ಗಾ : ಪ್ರಣಾಳಿಕೆ
೯. ಸಿದ್ದಲಿಂಗಯ್ಯ : ಸಾವಿರಾರು ನದಿಗಳು
೧೦. ಮೊಗಳ್ಳಿ ಗಣೇಶ್ : ಅನಾದಿಯ ಏಕಾಂತ ಗೀತೆ
೧೧. ಶಶಿಕಲಾ ವಸ್ತ್ರದ : ಗುಬ್ಬೀಮನಿ
೧೨. ಉಷಾ : ಹವಳ ಹಾರಿದ ಹೊತ್ತು

ಕಾದಂಬರಿ

ಪಠ್ಯ : ಕರ್ವಾಲೊ : ಕೆ.ಪಿ. ಪೂರ್ಣಚಂದ್ರ ತೇಜಸ್ವಿ

ಪಠ್ಯ ಮೂಲ : (ಕವಿತೆಗಳು)

೧. ಶಿಶುನಾಳ ಶರೀಫರ ಗೀತೆಗಳು :ಸಂ.ಡಾ. ಶಿವಾನಂದ ಗುಬ್ಬಣ್ಣನವರ, ಕನ್ನಡ ಮತ್ತು ಸಂಸ್ಕೃತಿ ನಿರ್ದೇಶನಾಲಯ, ಬೆಂ:೧೯೮೫

೨. ಶತಮಾನಗಳ ಬಾಯಾರಿಕೆ : ಸಂ.ಚೆ.ಶ್ರೀನಿವಾಸರಾಜು ಇತರರು, ನವಕರ್ನಾಟಕ ಪ್ರಕಾಶನ ಬೆಂ:೧೯೮೬

೩. ಕುವೆಂಪು ಸಮಗ್ರ ಕಾವ್ಯ ಸಂಪುಟ-೧ : ರಾಷ್ಟ್ರಕವಿ ಕುವೆಂಪು ಪ್ರತಿಷ್ಠಾನ (ರಿ), ಕುಪ್ಪಳ್ಳಿ,೨೦೧೩

೪. ಬೆಳೆಗೆರೆ ಜಾನಕಮ್ಮ ಬದುಕು-ಬರಹ : ಸಂ.ನೇಮಿಚಂದ್ರ, ಕರ್ನಾಟಕ ಲೇಖಕಿಯರ ಸಂಘ, ಬೆಂಗಳೂರು :೧೯೮೮

೫. ಮಲ್ಲಿಗೆಯ ಮಾಲೆ :

೬. ಹೊಸಗನ್ನಡ ಕವಿತೆ : ಸಂ.ಜಿ.ಎಚ್.ನಾಯಕ, ಕನ್ನಡ ಸಾಹಿತ್ಯ ಪರಿಷತ್ತು, ಬೆಂಗಳೂರು : ೧೯೮೫

೭. ಅದೇ

೮. ಸುವರ್ಣ ಕಾವ್ಯ :ಸಂ ಬಿ.ಎ. ಸನದಿ, ಕನ್ನಡ ಸಂಸ್ಕೃತಿ ಇಲಾಖೆ, ಬೆಂ:೨೦೦೬

೯. ಬಂಡಾಯ ಕಾವ್ಯ : ಸಂ.ಬರಗೂರು ರಾಮಚಂದ್ರಪ್ಪ, ಕನ್ನಡ ಮತ್ತು ಸಂಸ್ಕೃತಿ ನಿರ್ದೇಶನಾಲಯ, ಬೆಂ :೧೯೯೦

೧೦. ಸುವರ್ಣ ಕಾವ್ಯ :ಸಂ ಬಿ.ಎ. ಸನದಿ, ಕನ್ನಡ ಸಂಸ್ಕೃತಿ ಇಲಾಖೆ, ಬೆಂ:೨೦೦೬

೧೧. ಹೊಸಗನ್ನಡ ಕವಿತೆ : ಸಂ.ಜಿ.ಎಚ್.ನಾಯಕ, ಕನ್ನಡ ಸಾಹಿತ್ಯ ಪರಿಷತ್ತು, ಬೆಂಗಳೂರು:೧೯೮೫

೧೨. ಬಿಡುಗಡೆಯ ಬೆಳಕು :ಸಂ.ಚೆ.ಶ್ರೀನಿವಾಸರಾಜು ಇತರರು, ಸಾಹಿತ್ಯ ಅಕಾಡೆಮಿ, ಬೆಂ.೨೦೧೨

ಪರಾಮರ್ಶನ ಕೃತಿಗಳು:

೧. ೨೦ನೇ ಶತಮಾನದ ಕನ್ನಡ ಸಾಹಿತ್ಯ ಘಟ್ಟಗಳು : ಡಾ. ಬಸವರಾಜ ಸಾದರ

೨. ಕರ್ನಾಟಕ ಸಾಹಿತ್ಯ ಅಕಾಡೆಮಿಯ ಕನ್ನಡ ಸಾಹಿತ್ಯ ಪುನರ್ ಮೌಲ್ಯೀಕರಣ ಮಾಲೆಯ ಸಂಪುಟಗಳು

೩. ಹಾಡೇ ಹಾದಿಯ ತೋರಿತು : ಎಚ್.ಎಸ್.ರಾಘವೇಂದ್ರರಾವ್

೪. ಇಹದ ಪರಿಮಳದ ಹಾದಿ : ನರಹಳ್ಳಿ ಬಾಲಸುಬ್ರಹ್ಮಣ್ಯಂ

೫. ಗಂಗೋತ್ರಿ : ಕುವೆಂಪು ಅಭಿನಂದನ ಗ್ರಂಥ

೬. ಶ್ರೀ ಕುವೆಂಪು : ಸಂ: ಜಿ.ಎಸ್.ಶಿವರುದ್ರಪ್ಪ

೭. ಕುವೆಂಪು ಕೃತಿ ವಿಮರ್ಶೆ : ಸಂ:ಅರವಿಂದ ಮಾಲಗತ್ತಿ, ಕುವೆಂಪು ಕನ್ನಡ ಅಧ್ಯಯನ ಸಂಸ್ಥೆ, ಮೈಸೂರು

೮. ಸಾಹಿತ್ಯ ಮತ್ತು ಯುಗಧರ್ಮ : ಕೀರ್ತಿನಾಥ ಕುರ್ತಕೋಟಿ

೯. ಹೊಸಗನ್ನಡ ಕಾವ್ಯದ ಎರಡು ಮಾರ್ಗಗಳು :ಸಂ.ಜಿ.ಎಸ್.ಶಿವರುದ್ರಪ್ಪ

(KND 020) <u>ಪತ್ರಿಕೆ: ೨ ಪಾಶ್ಚಾತ್ಯ ಕಾವ್ಯಮೀಮಾಂಸೆ</u> (೨:೦=೩ ಕ್ರೆಡಿಟ್)

೧. ಅರಿಸ್ಟಾಟಲ್, ಹೊರೇಸ್, ಲಾಂಜಿನಸ್

೨. ಬುಲ್ಲೋ : ಮಾನಸಿಕ ದೂರ

೩. (ಅ) ಟಿ.ಎಸ್. ಎಲಿಯಟ್ : ಪರಂಪರೆ ಮತ್ತು ವ್ಯಕ್ತಿ ಪ್ರತಿಭೆ

(ಆ) ಐ.ಎ. ರಿಚರ್ಡ್ಸ್ : ಮೌಲ್ಯ ಸಿದ್ಧಾಂತ ಮತ್ತು ಸಂವಹನ ಸಿದ್ಧಾಂತ

೪. ಜೊನಾಥನ್ ಕಲರ್ : ರಚನಾವಾದ ಮತ್ತು ಕಾವ್ಯ ಮೀಮಾಂಸೆ

ಪರಾಮರ್ಶನ ಕೃತಿಗಳು:

೧. ಅರಿಸ್ಟಾಟಲನ ಕಾವ್ಯಮೀಮಾಂಸೆ : ಎನ್. ಬಾಲಸುಬ್ರಮಣ್ಯ

೨. ಹೊರೇಸನ ಸಾಹಿತ್ಯ ವಿಮರ್ಶೆ : ಎನ್. ಬಾಲಸುಬ್ರಮಣ್ಯ

೩. ಔನ್ನತ್ಯ ವಿಚಾರ ಚರ್ಚೆ : ಎನ್.ಬಾಲಸುಬ್ರಮಣ್ಯ

೪. ತೌಲನಿಕ ಕಾವ್ಯಮೀಮಾಂಸೆ : ಎಚ್.ತಿಪ್ಪೇರುದ್ರಸ್ವಾಮಿ

೫. ಪಾಶ್ಚಾತ್ಯ ಕಾವ್ಯಮೀಮಾಂಸೆ : ವಿ.ಎಂ.ಇನಾಂದಾರ್

೬. ಇಂಗ್ಲಿಷ್ ಭಾಷೆಯಲ್ಲಿ ಆಧುನಿಕ ಸಾಹಿತ್ಯ ವಿಮರ್ಶೆ : ಎಲ್.ಎಸ್.ಶೇಷಗಿರಿರಾವ್

೭. ಕಾವ್ಯಾರ್ಥ ಚಿಂತನೆ : ಜಿ.ಎಸ್.ಶಿವರುದ್ರಪ್ಪ

೮. ಸಾಹಿತ್ಯ ವಿಮರ್ಶೆ : ಸಿ.ಎನ್.ರಾಮಚಂದ್ರನ್

೯. ಟಿ.ಎಸ್. ಎಲಿಯಟ್ ಕವಿಯ ವಿಮರ್ಶೆಯ ವಿಚಾರಗಳು : ಎಚ್.ಬಿ. ಮಿಣಜಗಿ

೧೦. Structuralist Poetics : Jonathan Culler

೧೧. On Deconstruction : Jonathan Culler

೧೨. The Pursuit of Signs : Jonathan Culler

೧೩. Linguistics and Poetics : Roman Jacobson

೧೪. Principles of litatray Critisism : I A Richards

KND 040: ಪತ್ರಿಕೆ : ೩ ಸಮೂಹ ಮಾಧ್ಯಮ (೨:೦=೩ ಕ್ರೆಡಿಟ್)

೧. **ಸಮೂಹ ಮಾಧ್ಯಮದ ಪರಿಕಲ್ಪನೆ :** ವ್ಯಾಖ್ಯಾನಗಳು, ಸ್ವರೂಪ, ಮಹತ್ವ, ಪ್ರಕಾರಗಳು : ಜಾನಪದ ಮತ್ತು ಆಧುನಿಕ ಪ್ರಕಾರಗಳು; ಕಾರ್ಯಗಳು, ಅಭಿವೃದ್ಧಿ ಮತ್ತು ಸಂವಹನ ಹಾಗೂ ಸಾಮಾಜಿಕ ಬದಲಾವಣೆ, ಲಿಂಗತ್ವ ಸೂಕ್ಷ್ಮತೆ

೨. **ಪತ್ರಿಕೆ ಹಾಗೂ ಪುಸ್ತಕ ಮಾಧ್ಯಮ :** ಪತ್ರಿಕೆಗಳ ಮತ್ತು ಪುಸ್ತಕಗಳ ಸ್ವರೂಪ, ಮಹತ್ವ, ಪ್ರಕಾರಗಳು, ಕಾರ್ಯಗಳು, ಸಂಹಿತೆಗಳು, ಹುಟ್ಟು ಮತ್ತು ಬೆಳವಣಿಗೆ; ಪತ್ರಿಕೆ ಮತ್ತು ಪುಸ್ತಕ ಕ್ಷೇತ್ರದ ಕಾರ್ಯಕರ್ತರು-ಗುಣಗಳು ಮತ್ತು ಇತಿಮಿತಿ, ಬರಹ, ಭಾಷೆ, ಸಾಹಿತ್ಯ, ವಿಮರ್ಶೆ, ವರದಿ, ಸುದ್ದಿ, ಲೇಖನ, ಸಂಪಾದಕೀಯ, ಅವಲೋಕನ, ಅಂಕಣ, ಪುರವಣಿಗಳು, ಜಾಹಿರಾತು; ಮುದ್ರಣದ ಹಿನ್ನೆಲೆ ಮತ್ತು ವಿಕಾಸ-ಪ್ರಸಾರ ಹಾಗೂ ಮಾರಾಟ

೩. **ಆಕಾಶವಾಣಿ- ದೂರದರ್ಶನ – ಚಲನಚಿತ್ರ** : ಸ್ವರೂಪ, ಮಹತ್ವ, ಸಂಹಿತೆ, ಹುಟ್ಟು ಮತ್ತು ಬೆಳವಣಿಗೆ, ಇತಿಮಿತಿಗಳು, ಕ್ಷೇತ್ರದ ಕಾರ್ಯಕರ್ತಗರು, ಆಡಳಿತ ವ್ಯವಸ್ಥೆ, ಬರಹ, ಭಾಷೆ,

ಸಾಹಿತ್ಯ, ವಿಮರ್ಶೆ (ಸಂಭಾಷಣೆ, ನಿರೂಪಣೆ, ವಾರ್ತೆ, ವರದಿ, ಕಾರ್ಯಕ್ರಮಗಳು) ಧ್ವನಿ, ಉಚ್ಚಾರಣೆ, ಸ್ಪಷ್ಟತೆ, ಉಡುಪು, ವಿನ್ಯಾಸ, ನಿರ್ಮಾಣದ ಕಲೆ, ಸಂಗೀತ, ಸಂಪಾದನೆ, ಕಲೆಗಳು

೪. ಸಂವಹನ ಮಾಧ್ಯಮಗಳು ಮತ್ತು ಭಾಷಾಂತರ : ಭಾಷಾಂತರದ ಮಹತ್ವ, ವಿವಿಧ ಕ್ಷೇತ್ರಗಳಲ್ಲಿ ಅದರ ಅಗತ್ಯತೆ ಮತ್ತು ಪ್ರಯೋಜನ ಹಾಗೂ ಸಮಸ್ಯೆಗಳು (ಟ್ಯುಟೋರಿಯಲ್‌ನಲ್ಲಿ ಪ್ರಾಯೋಗಿಕ ಮಾದರಿಗಳ ಅಭ್ಯಾಸ ಮಾಡಿಸಬೇಕು)

ಪರಾಮರ್ಶನ ಕೃತಿಗಳು

೧. ಪತ್ರಿಕೆ/ ಸಾಹಿತ್ಯ : ಸರಜೂ ಕಾಟ್ಕರ್, ಅನ್ವೇಷಣೆ ಪ್ರಕಾಶನ, ಬೆಂಗಳೂರು

೨. ಭಾರತೀಯ ಪತ್ರಿಕೋದ್ಯಮ : ನಾಡಿಗ ಕೃಷ್ಣಮೂರ್ತಿ, ಪ್ರಸಾರಾಂಗ, ಬೆಂಗಳೂರು

ಆಧುನಿಕ ಭಾರತದಲ್ಲಿ ಪತ್ರಿಕೋದ್ಯಮ : ರೋಲೆಂಟ್ ಇ ಉಲ್‌ಸ್ಲೀ (ಮೂಲ) ಶ್ರೀಕರ ಎಲ್. ಭಂಡಾರ್‌ಕರ್ (ಅನು) ಪ್ರಸಾರಾಂಗ. ಮೈಸೂರು ವಿ.ವಿ

೩. ಭಾರತದಲ್ಲಿ ಪುಸ್ತಕಗಳ ಬೆಳವಣಿಗೆ : ಅಬ್ದುಲ್ ಹಸನ್ (ಮೂಲ) ಜಿ.ಪಿ. ಶಿವರಾಂ (ಅನು), ಮೈ.ವಿ.ವಿ

೪. ಪ್ರಾಯೋಗಿಕ ಪತ್ರಿಕೋದ್ಯಮ : (ಸಂ) ಬಿ.ವಿ. ವೈಕುಂಠರಾಜು, ಬೆಂಗಳೂರು ವಿ.ವಿ

೫. ಸಮೂಹ ಮಾಧ್ಯಮಗಳು : ಡಿ.ಬಿ. ನಾಯಕ, ಗುಲಬರ್ಗಾ ವಿ.ವಿ

೬. ಬ್ರಿಟಿಷ್ ಪತ್ರಿಕೋದ್ಯಮ : ನಾಡಿಗ ಕೃಷ್ಣಮೂರ್ತಿ, ಮೈವಿವಿ

೭. ಫ್ರೀಲಾನ್ಸ್ ಪತ್ರಿಕೋದ್ಯಮ : ನಿರಂಜನ ವಾನಳ್ಳಿ, ಮೈವಿವಿ

೮. ಸಮೂಹ ಮಾಧ್ಯಮಗಳು ಮತ್ತು ರಾಷ್ಟ್ರೀಯ ಅಭಿವೃದ್ಧಿ : ಎ.ಎಸ್. ಬಾಲಸುಬ್ರಹ್ಮಣ್ಯ, ಕರ್ನಾಟಕ ವಿವಿ

೯. ಪತ್ರಿಕೋದ್ಯಮ : ಎಂ.ಚಲಪತಿರಾವ್ (ಮೂಲ) ನಾಡಿಗ ಕೃಷ್ಣಮೂರ್ತಿ (ಅನು)

೧೦. ಗ್ರಂಥೋದ್ಯಮ : ಸಂ.ಅರವಿಂದ ಮಾಲಗತ್ತಿ, ಪ್ರಸಾರಾಂಗ, ಮೈವಿವಿ

೧೧. ಕನ್ನಡ ಪತ್ರಿಕಾಸೂಚಿ : ಸಂ.ಶ್ರೀನಿವಾಸ ಹಾವನೂರ, ಪ್ರಸಾರಾಂಗ ಮೈವಿವಿ

೧೨. ಜಾನಪದ ಮತ್ತು ಸಮೂಹ ಮಾಧ್ಯಮ : ಕರ್ನಾಟಕ ಜಾನಪದ ಯಕ್ಷಗಾನ ಅಕಾಡೆಮಿ, ಬೆಂಗಳೂರು

೧೩. ಸಂವಹನ ಮಾಧ್ಯಮ : ಎಸ್.ಎಂ.ಹಿರೇಮಠ ಮತ್ತು ಡಿ.ಬಿ. ನಾಯಕ

೧೪. ಕರ್ನಾಟಕ ಸಂಗಾತಿ : ಕನ್ನಡ ಅಬಿವೃದ್ಧಿ ಪ್ರಾಧಿಕಾರ ಪ್ರಕಟಣೆ

KND 040: ಪತ್ರಿಕೆ:೪ ಅವಧಿಕ ಕಾರ್ಯ/ಮೈನರ್ ಪ್ರಾಜೆಕ್ಟ್ (೧:೨=೩ ಕ್ರೆಡಿಟ್)

ಕ್ಷೇತ್ರಕಾರ್ಯ, ಮಾಹಿತಿ ಸಂಗ್ರಹ ಮತ್ತು ವರದಿ

ಘಟಕ ೧: ಅ) ಅವಧಿಕ ಪ್ರಗತಿ ಮತ್ತು ವರದಿ

ಆ) ವಿಚಾರಗೋಷ್ಠಿ / ಚರ್ಚೆ/ ಪ್ರದರ್ಶನ

ಘಟಕ ೨ ಅ) ಕರಡು ವರದಿ

ಆ) ಫಲಿತಾಂಶಗಳು ಹಾಗೂ ಅಂತಿಮ ವರದಿ

ಘಟಕ ೩: ಸೆಮಿಸ್ಟರ್ ಅಂತ್ಯದಲ್ಲಿ ವರದಿಯ ಮೌಲ್ಯಮಾಪನ ಮತ್ತು ಮೌಖಿಕ ಪರೀಕ್ಷೆಯನ್ನು ಒಬ್ಬ ಆಂತರಿಕ ಹಾಗೂ ಒಬ್ಬ ಬಾಹ್ಯ ಪರೀಕ್ಷಕರನ್ನೊಳಗೊಂಡಂತೆ ಸಮಿತಿ ನಡೆಸುತ್ತದೆ – ೭೦ ಅಂಕಗಳಿಗೆ

ಉಪಪ್ರಧಾನ ವಿಷಯಗಳು (**Soft core**)

KND 210: ಪತ್ರಿಕೆ: ೫.೧

ಭಾಷಾವಿಜ್ಞಾನ ಅಧ್ಯಯನ : ಕನ್ನಡ ಭಾಷಾಸ್ವರೂಪ : ಆಯ್ದ ಪಠ್ಯಗಳು

(೩:೧=೪ ಕ್ರೆಡಿಟ್)

೧. ಶಂ.ಬಾ.ಜೋಷಿ	: ಕಂನುಡಿಯ ಒಳ್ಗುಂಪು
೨. ಎ.ಆರ್.ಕೃಷ್ಣಶಾಸ್ತ್ರಿ	: ಇಂದಿನ ಜನಜೀವನದಲ್ಲಿ ಕನ್ನಡ
೩. ಡಿ.ಎಲ್.ಎನ್	: ಪದಗಳ ಹುಟ್ಟು ಸಾವು
೪. ಕುವೆಂಪು	: ಸಂಸ್ಕೃತಿ ಕರ್ನಾಟಕ
೫. ಜಿ.ಎಸ್.ಎಸ್.ಶಿವರುದ್ರಪ್ಪ	: ಕನ್ನಡ ಸಾಹಿತಿ ಮತ್ತು ಕನ್ನಡ
೬. ಜಿ. ವೆಂಕಟಸುಬ್ಬಯ್ಯ	: ಇಗೋ ಕನ್ನಡ
೭. ಯು.ಆರ್.ಅನಂತಮೂರ್ತಿ	: ಕನ್ನಡದ ಮೂರು ಹಸಿವುಗಳು
೮. ಕೆ.ವಿ.ನಾರಾಯಣ	: ತಂತ್ರಜ್ಞಾನ ಮತ್ತು ಕನ್ನಡ
೯. ತಿರುಮಲೇಶ್	: ಕನ್ನಡತನ ನನ್ನ ದೃಷ್ಟಿಯಲ್ಲಿ
೧೦.ಬರಗೂರು ರಾಮಚಂದ್ರಪ್ಪ	: ಕನ್ನಡಾಭಿಮಾನ

ಪಠ್ಯ ಮೂಲ :

೧. ಶಂ.ಬಾ.ಜೋಷಿ : ಕಂನುಡಿಯ ಹುಟ್ಟು, ಸಮಾಜ ಪುಸ್ತಕಾಲಯ, ಧಾರವಾಡ :೧೯೪೫

೨. ಎ.ಎರ್.ಕೃಷ್ಣಶಾಸ್ತ್ರಿ : ಭಾಷಣಗಳು ಲೇಖನಗಳು, ಶಾರದಾ ಮಂದಿರ, ಮೈಸೂರು

೩. ಡಿಎಲ್ಎನ್ : ಪೀಠಿಕೆಗಳು ಲೇಖನಗಳು

೪. (ಸಂ) ಶಿವಾರೆಡ್ಡಿ : ಕುವೆಂಪು ಸಮಗ್ರ ಗದ್ಯ, ಕನ್ನಡ ವಿಶ್ವವಿದ್ಯಾಲಯ, ಹಂಪಿ

೫. ಸಂ.ರಹಮತ್ ತರೀಕೆರೆ : ಮಾತು ತಲೆಯೆತ್ತುವ ಬಗೆ, ಸಂಪುಟಗಳು ೧, ಕವಿವಿ, ಹಂಪಿ ೨೦೧೧

೬. ಸಂ. ಎನ್.ಎಸ್. ತಾರಾನಾಥ : ಶತಮಾನದ ಸಂಶೋಧನೆ, ಕರ್ನಾಟಕ ಸಾಹಿತ್ಯ ಅಕಾಡೆಮಿ, ಬೆಂ

೭. ಯು.ಆರ್. ಅನಂತಮೂರ್ತಿ : ವಾಲ್ಮೀಕಿಯ ನೆಪದಲ್ಲಿ

೮. ಕೆ.ವಿ. ನಾರಾಯಣ : ಕನ್ನಡ ಜಗತ್ತು :ಅರ್ಧಶತಮಾನ, ಕನ್ನಡ ವಿವಿ

೯. ಕೆ.ವಿ. ತಿರುಮಲೇಶ್ : ನಮ್ಮ ಕನ್ನಡ

೧೦. ಹಚ್.ಎಸ್.ಬಿಳಿಗಿರಿ : ಮೂರು ದತ್ತಿ ಉಪನ್ಯಾಸಗಳು

KND 210:ಪತ್ರಿಕೆ: ಪತ್ರಿಕೆ:೫.೨

ಜಾನಪದ ಅಧ್ಯಯನ : ಕನ್ನಡದ ಜನಪದ ಸಾಹಿತ್ಯ (ಆಯ್ದ ಪಠ್ಯಗಳು)

(೩:೧=೪ ಕ್ರೆಡಿಟ್)

೧. ತಾತ್ವಿಕ : ಜಾನಪದ ಸಾಹಿತ್ಯ ಪ್ರಕಾರಗಳ ಕುರಿತು ಈವರೆಗೆ ನಡೆದ ಅಧ್ಯಯನದ ಸ್ವರೂಪ, ಪ್ರತಿಯೊಂದು ಸಾಹಿತ್ಯ ಪ್ರಕಾರದಲ್ಲಿ ಅದ್ಯಯನ ಮಾಡಿದ ಪ್ರಮುಕ ವಿದ್ವಾಂಸರ ಪರಿಚಯ

ಪಠ್ಯಗಳು:

೨. ಅ) ಕನ್ನಡ ಜನಪದ ಕತೆಗಳು : ಜೀ.ಶಂ.. ಪರಮಶಿವಯ್ಯ (ಪ್ರತಿ ಗುಂಪಿನ ಮೊದಲ ಎರಡು ಕತೆಗಳು)

ಆ) ಗರತಿಯ ಹಾಡು : ಹಲಸಂಗಿ ಗೆಳೆಯರು

೩. ಅ) ಗರಿಗೆದರಿದ ನವಿಲು : (ಸಂ) ಕಾಳೇಗೌಡ ನಾಗವಾರ – ಜಿ,ವಿ. ಆನಂದಮೂರ್ತಿ

ನಿಗದಿತ ಭಾಗ ಪುಟ ೧ ರಿಂದ ೧೦೬ ಮತ್ತು ೨೫೧ ರಿಂದ ೩೦೦ ರವರೆಗೆ)

೪. ಅ) ನಮ್ಮ ಸುತ್ತಿನ ಗಾದೆಗಳು : ಸುಧಾಕರ

ಆ) ಸಾವಿರದ ಒಗಟುಗಳು : ಸೋಮಶೇಖರ ಇಮ್ರಾಪುರ

KND 210:ಪತ್ರಿಕೆ:೫.೩

ಚಾರಿತ್ರಿಕ ಅಧ್ಯಯನ: ಕರ್ನಾಟಕ ಸಂಸ್ಕೃತಿ: ಆಯ್ದ ಪಠ್ಯಗಳು

೧. ಕವಿರಾಜಮಾರ್ಗಂ : ನಾಡು-ನುಡಿ ವರ್ಣನೆ

(ಆಶ್ವಾಸ–೧, ಪದ್ಯಗಳು ೧ ರಿಂದ ೪೩, ಆಶ್ವಾಸ –೨೨ ಪದ್ಯ ೨೮)

೨. ವಡ್ಡಾರಾಧನೆ : ಭದ್ರಬಾಹು ಭಟಾರರ ಕಥೆ

೩. ಅಜಿತಪುರಾಣ : ಅತ್ತಿಮಬ್ಬೆ ವೃತ್ತಾಂತ

(ಆಸ್ವಾಸ–೧, ಪದ್ಯಗಳು ೨೦ ರಿಂದ ೭೫)

೪. ಬಸವಣ್ಣನವರ ನಿಗದಿತ ೧೨ ವಚನಗಳು

೧. ಸಗಣಿಯ ಬೆನಕನ ಮಾಡಿ

೨. ಲೋಕದ ಡೊಂಕ ನೀವೇಕೆ

೩. ಹಬ್ಬಕ್ಕೆ ತಂದ ಹರಕೆಯ ಕುರಿ

೪. ಹಾವು ತಿಂದವರ ನುಡಿಸಬಹುದು

೫. ದೇವಲೋಕ ಮರ್ತ್ಯಲೋಕವೆಂಬುದು

೬. ಮರ್ತ್ಯಲೋಕವೆಂಬುದು ಕರ್ತಾರನ ಕಮ್ಮಟವಯ್ಯ

೭. ವ್ಯಾಧನೊಂದು ಮೊಲನ ತಂದರೆ

೮. ಕಲ್ಲನಾಗರ

೯. ವೇದಕ್ಕೆ ಒರೆಯನಿಕ್ಕುವೆ

೧೦. ಅಪ್ಪನು ಡೋಹರ ಕಕ್ಕಯ್ಯ

೧೧. ಉತ್ತಮ ಕುಲದಲಿ ಹುಟ್ಟಿದನೆಂಬ

೧೨.ಅರಸರ ಮನೆಯಲ್ಲಿ ಅರಸಿಯಾಗಿಪ್ಪುದರಿಂದ

೧. ಕೇಶಿರಾಜ ದಣ್ಣಾಯಕರ ರಗಳೆ (ಹರಿಹರ)

೨. ಸಿದ್ಧರಾಮ ಚಾರಿತ್ರ್ಯ : ನಾಲ್ಕನೆಯ ಸಂಧಿ

೩. ಬಸವಪುರಾಣ : ಸುಗ್ಗಲದೇವಿ ಹಾಗೂ ದಾಸಿಮಯ್ಯನ ಕತೆ (ಸಂಧಿ ೫೧)

೪ ರಾಮಧಾನ್ಯ ಚರಿತೆ : ಕನಕದಾಸ

೫. ರಾಮನಾಥ ಚರಿತೆ : ಶೂಲದಹಬ್ಬ (ಆಶ್ವಾಸ ೬, ಸಂಧಿ ೨, ಪದ್ಯ ೧ ರಿಂದ ೧೦೪)

೪. ರಾಜಾವಳಿ ಕಥಾಸಾರ : ನವಮಾಧಿಕಾರ

೭. ಪ್ಲೀಟರು ಸಂಗ್ರಹಿಸಿದ ಐದು ಐತಿಹಾಸಿಕ ಲಾವಣಿಗಳು : ಹಲಗಲಿಯ ಬೇಡರು

೮. ಕೈಫಿಯತ್ತು : ಉಪ್ಪಲಿ ಬಣಜಿಗರ ಕೈಫಿಯತ್ತು

ಆಂತರಿಕ ಮೌಲ್ಯಮಾಪನ: (೩೦ ಅಂಕಗಳು)

ಪ್ರತಿ ಚತುರ್ಮಾಸ ವಿದ್ಯಾರ್ಥಿಗಳ ಇಡೀ ತಂಡಕ್ಕೆ ಒಂದೇ ರೀತಿಯ ಮೌಲ್ಯಮಾಪನ ಚಟುವಟಿಕೆಗಳು ಮತ್ತು ಮಾನದಂಡಗಳನ್ನು ಅನುಸರಿಸಬೇಕು

ಟೆಸ್ಟ್	ಅವಧಿ	ಅಂಕಗಳು
ಟೆಸ್ಟ್–1	ಪ್ರತಿ ಚತುರ್ಮಾಸ 2ನೆ ತಿಂಗಳ ಅಂತ್ಯದಲ್ಲಿ (ಒಂದು ಗಂಟೆ)	**10**
ಟೆಸ್ಟ್–2	ಪ್ರತಿ ಚತುರ್ಮಾಸ 4ನೆ ತಿಂಗಳ ಅಂತ್ಯದಲ್ಲಿ (ಒಂದು ಗಂಟೆ)	**10**
	ಪ್ರತಿ ಚತುರ್ಮಾಸ ಆರಂಭದ ಎರಡು ತಿಂಗಳ ಅವಿರತ ಮೌಲ್ಯಮಾಪನ (ಟ್ಯುಟೋರಿಯಲ್)	**05**
	ಪ್ರತಿ ಚತುರ್ಮಾಸ ಅಂತಿಮ ಎರಡು ತಿಂಗಳ ಅವಿರತ ಮೌಲ್ಯಮಾಪನ (ಟ್ಯುಟೋರಿಯಲ್)	**05**
	ಒಟ್ಟು	**30**

3 ವಿಚಾರಗೋಷ್ಠಿ / ಚರ್ಚಾಗೋಷ್ಠಿ / ಪ್ರದರ್ಶನ - ಇಂತಹ ಸದೃಶ ಚಟುವಟಿಕೆಗೆಗಳು ವಿಷಯ ಸಂಗ್ರಹಣೆ, ಪ್ರಬಂಧ ರಚನೆ, ಮಂಡನೆ ಮತ್ತು ಚರ್ಚೆಯಲ್ಲಿ ಭಾಗವಹಿಸುವಿಕೆ - ಗರಿಷ್ಠ 5 ಅಂಕಗಳು

1. ಮೌಲ್ಯಮಾಪನ ಘಟಕ : 3 : ವಿಶ್ವವಿದ್ಯಾನಿಲಯ ಚತುರ್ಮಾಸ ಅಂತ್ಯದಲ್ಲಿ ಮೂರು ಗಂಟೆ ಅವದಿಯ ಗರಿಷ್ಠ 70 ಅಂಕಗಳ ಪರೀಕ್ಷೆ ನಡೆಸುತ್ತದೆ.
2. ಅ) ಅವಧಿಕ ಕಾರ್ಯ / ಮೈನರ್ ಪ್ರಾಜೆಕ್ಟ್ (4 ಕ್ರೆಡಿಟ್ಗಳು) ಮೌಲ್ಯಮಾಪನ ಕ್ಷೇತ್ರಕಾರ್ಯ, ಮಾಹಿತಿ ಸಂಗ್ರಹಣೆ ಮತ್ತು ವರದಿ

ಘಟಕ 1: **ಅ) ಅವಧಿಕ ಪ್ರಗತಿ ಮತ್ತು ವರದಿ** – 7.5 ಅಂಕಗಳು
ಆ) ವಿಚಾರಗೋಷ್ಠಿ / ಚರ್ಚೆ / ಪ್ರದರ್ಶನ – 7.5 ಅಂಕಗಳು

ಘಟಕ 2: **ಅ) ಕರಡು ವರದಿ** – 7.5 ಅಂಕಗಳು

ಆ) ಫಲಿತಾಂಶಗಳು ಹಾಗೂ ಅಂತಿಮ ವರದಿ – 7.5 ಅಂಕಗಳು

ಘಟಕ 3: ಚತುರ್ಮಾಸ ಅಂತ್ಯದಲ್ಲಿ ವರದಿಯ ಮೌಲ್ಯಮಾಪನ ಮತ್ತು ಮೌಖಿಕ ಪರೀಕ್ಷೆಯನ್ನು ಒಬ್ಬ ಆಂತರಿಕ ಹಾಗೂ ಒಬ್ಬ ಬಾಹ್ಯ ಪರೀಕ್ಷಕರನ್ನೊಳಗೊಂಡಂತೆ ಸಮಿತಿ ನಡೆಸುತ್ತದೆ-70 ಅಂಕಗಳಿಗೆ

ಘಟಕ 4: ವಿದ್ಯಾರ್ಥಿಯು ಮೂರನೆಯ ಚತುರ್ಮಾಸದಲ್ಲಿ ಚತುರ್ಮಾಸದಲ್ಲಿ ವಿಭಾಗದ ಅಧ್ಯಾಪಕರೊಂದಿಗೆ ಚರ್ಚಿಸಿ ವಿಷಯ ಆಯ್ಕೆ ಮಾಡಿಕೊಂಡು ನಾಲ್ಕನೆಯ ಚತುರ್ಮಾಸ ಅಂತ್ಯದಲ್ಲಿ ವಿಭಾಗಕ್ಕೆ ಸಲ್ಲಿಸಬೇಕು. ಎ-4 ಅಳತೆಯ ಕಾಗದದಲ್ಲಿ 12 ಪಾಯಿಂಟ್ ಅಕ್ಷರಗಳಲ್ಲಿ 50 ಪುಟಗಳಿಗೆ ಕಡಿಮೆ ಇಲ್ಲದಂತೆ ಮತ್ತು 80 ಪುಟಗಳಿಗೆ ಮೀರದಂತೆ ಅವಧಿಕ ಕಾರ್ಯವಿರಬೇಕು

ಘಟಕ 5: ಚತುರ್ಮಾಸ ಅಂತ್ಯದಲ್ಲಿ ವರದಿಯ ಮೌಲ್ಯಮಾಪನ ಮತ್ತು ಮೌಖಿಕ ಪರೀಕ್ಷೆಯನ್ನು ಅಧ್ಯಯನ ಮಂಡಳಿ / ಅಧ್ಯಯನ ವಿಭಾಗ / ಪರೀಕ್ಷಾ ಮಂಡಳಿ ಅಧ್ಯಕ್ಷರು ಅಥವಾ ಅವರ ನಾಮಾಂಕಿತರು ಮೇಲ್ವಿಚಾರಕರು ಹಾಗೂ ಇತರ ವಿಶ್ವವಿದ್ಯಾಲಯ / ಉದ್ಯಮ / ಸಮಾಜ / ಸಮುದಾಯದಿಂದ ಆಹ್ವಾನಿತರಾದ ಒಬ್ಬ ಬಾಹ್ಯ ಪರೀಕ್ಷಕರನ್ನೊಳಗೊಂಡ ಸಮಿತಿ ನಡೆಸುತ್ತದೆ.– 10 ಅಂಕಗಳು (60+10=70)

4ನೇ ಚತುರ್ಮಾಸದ ವಿಚಯವಾದ 'ಅವಧಿಕ ಕಾರ್ಯ' ಬರಹದ ಮೌಲ್ಯಮಾಪನವನ್ನು 60 ಅಂಕಗಳಿಗೆ ನಡೆಸಲಾಗುವುದು. 10 ಅಂಕಗಳಿಗೆ ಮೌಖಿಕ ಪರೀಕ್ಷೆಯನ್ನು ನಡೆಸಲಾಗುವುದು.

****

ಮಾದರಿ ಪ್ರಶ್ನೆ ಪತ್ರಿಕೆ

2020–21ನೇ ಸಾಲಿನ ಸ್ನಾತಕೋತ್ತರ ಎಂ.ಎ ಕನ್ನಡ ಚತುರ್ಮಾಸ ಪರೀಕ್ಷೆಗಳು

(ಸಿಬಿಸಿಎಸ್-ಸಿಎಜಿಪಿ ಮಾದರಿ)

ಪತ್ರಿಕೆಯ ಶೀರ್ಷಿಕೆ:

ಸಮಯ: 3 ಗಂಟೆಗಳು **ಅಂಕಗಳು:** 70

ಸೂಚನೆ : ಎಲ್ಲಾ ಪ್ರಧಾನ ಪ್ರಶ್ನೆಗಳು ಕಡ್ಡಾಯ

(ಎ) ಅಥವಾ (ಬಿ) **ಅಂಕಗಳು** : 14

(ಸಿ) ಅಥವಾ (ಡಿ) **ಅಂಕಗಳು** : 14

(ಇ) ಅಥವಾ (ಎಫ್) **ಅಂಕಗಳು:** 14

(ಜಿ) ಅಥವಾ (ಎಚ್) **ಅಂಕಗಳು** : 14

ಯಾವುದಾದರೂ ಏಳು ಪ್ರಶ್ನೆಗಳಿಗೆ ಉತ್ತರಿಸಿ **ಅಂಕಗಳು :7X2=14**

(ಐ) (ಒ)

(ಜೆ) (ಪಿ)

(ಕ) (ಕ್ಯೂ)

(ಎಲ್) (ಆರ್)

(ಎಮ್) (ಎಸ್)

(ಎನ್) (ಟಿ)

ಪ್ರಶ್ನೆಗಳನ್ನು ಪಠ್ಯಕ್ರಮದ ಎಲ್ಲಾ ಘಟಕಗಳನ್ನು ಒಳಗೊಂಡಂತೆ ತಯಾರಿಸುವುದು.

Choice Based Credit System & Continuous Assessment Grading Pattern

SYLLABUS FOR

MASTER OF ARTS IN ENGLISH

Programme Code: ENG

2021-24

JSS COLLEGE OF ARTS, COMMERCE & SCIENCE

(An Autonomous College of University of Mysore; Re-Accredited by NAAC with 'A' Grade)

POSTGRADUATE DEPARTMENT OF STUDIES & RESEARCH IN ENGLISH

OOTY ROAD, MYSURU-570 025, KARNATAKA

POSTGRADUATE DEPARTMENT OF STUDIES & RESEARCH IN ENGLISH

COURSES OFFERED

I SEMESTER

Course I – (Hard Core-I) English Literature from Chaucer to Milton	**ENA 010**
Course II – (Hard Core-II) Elizabethan Age	**ENA 020**
Course III – (Hard Core-III) 17th and 18thCentury English Literature	**ENA 030**
Course IV – (Hard Core-IV) 19th Century English Literature	**ENA 040**
Course V – *(Soft Core-I) Realism and Fiction	**ENA 250**
***(Soft Core-II) Contemporary Indian Novels in English**	**ENA 220**

II SEMESTER

Course I - (Hard Core – I) The Modern Age-I	**ENB 040**
Course II - (Hard Core-II) Literary Criticism-I	**ENB 020**
Course III – (Hard Core-III) Indian Writing in English – I	**ENB 030**
Course IV – (Hard Core-IV) 20th Century Women's Writing: Theory & Practice	**ENB 050**
Course V – *(Soft Core-I) Dalit Literature	**ENB 230**
***(Soft Core-II) English Essayists**	**ENB 220**

Note: * Soft Core Elective Courses

III SEMESTER

Course I – (Hard Core-I) The Modern Age-II	**ENC 010**
Course II – (Hard Core-II) Indian Writing in English-II	**ENC 020**
Course III – (Hard Core-III) New Literatures in English	**ENC 030**
Course IV (Open Electives) A Course in Written and Spoken English	**OE**
Course V –* (Soft Core-I) Indian English Poetry After Independence	**ENC 230**
***(Soft Core-II) Feminism**	**ENC 220**

IV SEMESTER

Course I – (Hard Core-I) Literary Criticism-II	**END 010**
Course II – (Hard Core-II) American Literature	**END 020**
Course III – (Hard Core) Major Project Work leading to a Dissertation	**END 030**
Course IV – *(Soft Core I) Indian Diaspora Fiction	**END 240**
***(Soft Core II) African Fiction**	**END 220**

Note: * Soft Core Elective Courses

POSTGRADUATE DEPARTMENT OF STUDIES & RESEARCH IN ENGLISH

Choice Based Credit System & Continuous Assessment Grading Pattern Syllabus

MA PROGRAMME IN ENGLISH

2021-24

Semester	Type of Course		Course Title	L	T	P	Credits	Credits required
First Semester	Hard Core	1.	English Literature from Chaucer to Milton	3	1	0	4	16
		2.	Elizabethan Age	3	1	0	4	
		3.	17th and 18thCentury English Literature	3	1	0	4	
		4.	19th Century English Literature	3	1	0	4	
	Soft Core Electives	1.	Realism and Fiction	3	1	0	4	4
		2.	Contemporary Indian Novels in English	3	1	0	4	
							Total Credits	**20**
Second Semester	Hard Core	1.	The Modern Age-I	3	1	0	4	16
		2.	Literary Criticism-I	3	1	0	4	
		3.	Indian Writing in English – I	3	1	0	4	
		4.	20th Century Women's Writing: Theory & Practice	3	1	0	4	
	Soft Core Electives	1.	Dalit Literature	3	1	0	4	4
		2.	English Essayists	3	1	0	4	
							Total Credits	**20**

Semester	Type of Course		Course Title	L	T	P	Credits	Credits required
Third Semester	Hard Core	1.	The Modern Age-II	3	1	0	4	**12**
		2.	Indian Writing in English-II	3	1	0	4	
		3.	New Literatures in English	3	1	0	4	
	Soft Core Electives	1.	Indian English Poetry After Independence	3	1	0	4	4
		2.	Feminism	3	1	0	4	
	Open Elective	1.	A Course in Written and Spoken English	3	1	0	4	4
							Total Credits	**20**
Fourth Semester	Hard Core	1.	Literary Criticism-II	3	1	0	4	12
		2.	American Literature	3	1	0	4	
		3.	Major Project Work leading to Dissertation	0	0	4	4	
	Soft Core Electives	1.	Indian Diaspora Fiction	3	1	0	4	4
		2.	African Fiction	3	1	0	4	
							Total Credits	**16**
							Total Credits at the end of the Course	**76**

Programme Outcomes

On graduating from this programme student is able to

PO1: Learn to write logically relating the real-life scenario with the issues depicted in literary texts.
PO2: Demonstrate critical reading, writing, and thinking skills in writing analytical essays.
PO3: Recognise and understand figurative language in literary works of various literatures.
PO4: Equips the students to understand theoretical developments in literary studies.
PO5: Acquire skills of criticism in reading literary works of different periods of various genres.
PO6: Write focused, organised, well-developed text-based essays.

Programme Specific Outcomes

On completion, the graduate of this programme is able to

PSO1: Acquire the competence to work as English Language teacher at Primary, Secondary, Higher secondary and Pre-University level.
PSO2: Gain basic knowledge needed to enroll for M Phil or PhD programmes.
PSO3: Demonstrate good communication skills.
PSO4: Draft literary essays demonstrating the skills of critical thinking and creative writing.
PSO5: Participate in discussions and debates demonstrating good communication skills.
PSO6: Learn the skills to work as English language trainer.

Course I – (HC-I) ENGLISH LITERATURE FROM CHAUCER TO MILTON

Course Code: ENA 010 **Credits: 4**
Teaching Hours: 60 (4 Hours/Week)

Course Outcomes

At the end of the Course, student able to

CO1: Recognize and understand figurative language, such as allegory and metaphor, and literary techniques, such as irony, rhyme, and allusion.
CO2: Identify the unique qualities of the authors studied, and compare and contrast them.
CO3: Develop a well-written argument about one or more literary texts or authors, and accurately cite literary and other sources.
CO4: Develop ability to read, summarize and critically analyse poems and sonnets of various themes.

UNIT –I

1. Background – 14th Century – 1658
2. Renaissance, Reformation, Puritan Upsurge
3. Jacobean, Metaphysical School

UNIT – II

1. Chaucer -- Prologue to the Canterbury Tales
2. John Milton – Paradise Lost: Book-I
3. Book of Job

UNIT – III

1. Sidney: Sonnets I, V &VI (Astrophel and Stella)
2. Spenser: Prothalamion, Epithalamion
3. Surrey: 1. Love that liveth and reigneth in my thought
   2. Set me whereas the sun doth parch the green
4. Wyatt: 1. Who so list to hunt 2. They flee from me

UNIT – IV

1. John Donne – The Goodmorrow, Song: Go and Catch a Falling Star, Death be Not Proud, At the Round Earth's Imagined Corner, Sunne Rising, Resurrection
2. George Herbert – The Pulley, The Collar, Virtue, Discipline
3. Andrew Marvell – To His Coy Mistress, Thoughts in a Garden
4. Robert Herrick- To the Virgins, To Find God.

Books for Reference and Further Reading:

1. David Daiches –*A Critical History of English Literature*- Four volumes.
2. Boris Ford (Ed) - *Pelican Guide to English Literature*- Eight volumes.
3. Herbert Grierson - *Metaphysical Poets.*
4. Abrams M H et al. *The Norton Anthology of English Literature*. New York: Norton, 2006.
5. Al Poplaski: *English Literature in Context.*

Course II – (HARD CORE-II) ELIZABETHAN AGE

Course Code: ENA-020 **Credits: 4**
Teaching Hours: 60 (4 Hours/Week)

Course Outcomes

At the end of the Course, student able to

CO1: Understand the origin and growth of English Theatres and Renaissance plays.
CO2: Demonstrate knowledge of Elizabethan culture, society and politics.
CO3: Analyse Shakespearean Tragedies and Comedies in terms of language, character and Themes.
CO4: Develop ability to read, summarize and critically analyse Shakespearean sonnets on various themes.

UNIT –I
Background – Elizabethan Age

Elizabethan theatre and audience Shakespeare- Tragedy and Comedy

UNIT – II
Marlowe: *Dr. Faustus*

Ben Jonson: *Volpone*

Thomas Nashe: *Dido: Queen of Carthage*

UNIT – III
William Shakespeare: 1) *King Lear*
2) *Julius Caesar*
3) *As you Like It*
4) *Tempest*

UNIT – IV
Shakespeare's Sonnets: **18, 19, 29, 30, 33, 55, 60, 71, 73, 114, 116, 130, 131, 133**

Books for Reference and Further Reading:

1. A.C. Bradley – *Shakespearean Tragedy*
2. F R Leavis – *The Common Pursuit*
3. Wilson Knight – *The Wheel of Fire*
4. Stewart Justman – *Shakespeare: The Drama of Generations*
5. S. Vishwanathan - *Exploring Shakespeare*
6. Cleanth Brooks - *Understanding Drama*
7. Toropov - Shakespeare for Beginners

Course III – (HARD CORE-III) 17th and 18th CENTURY ENGLISH LITERATURE

Course Code: ENA 030 **Credits: 4**
Teaching Hours: 60 (4 Hours/Week)

Course Outcomes

At the end of the Course, student able to

CO1: Apply knowledge of the historical and cultural contexts of the literature of this period to comprehend the works of major authors.
CO2: Recognize and understand figurative language, such as allegory and metaphor, and literary techniques - irony, rhyme, and allusion.
CO3: Reflect and write analytically about the literary texts and their contexts.
CO4: Develop skills of literary critical analysis reading the prescribed plays, novels and essays.

UNIT –I

Background – Restoration, Neo-Classical, Augustan Satire, Comedy of Manners Spectator Essays

UNIT – II

Dryden – *Absalom and Achitophel*

Alexander Pope – *The Rape of the Lock*

Bunyan – *Pilgrim's Progress Book-1*

UNIT – III

William Congreve - *The Way of the World*

Sheridan – *The School for Scandal*

Aphra Behn- *Oroonoko (Royal Author)*

UNIT – IV

Daniel Defoe: *Robinson Crusoe*

Jonathan Swift – *Gulliver's Travels – Book IV* (Voyage to the Land of Houyhnhnms)

Addison & Steele: Spectator Essays

Addison: (1) Sir Roger at Church, (2) Sir Roger at Assizes

Steele: (1) The Gentleman 2) The Spectator Club

Books for Reference and Further Reading:

1. M.H. Abrams (Ed) *The Norton Anthology of English Literature* (Vol.1 & 2)
2. David Daiches – *A Critical History of English Literature* –Four volumes
3. Arnold Kettle- *The English Novel*- Two volumes
4. Ian Jack – *The Augustan Satire: Intention and Idiom in English poetry 1660-1750*
5. Pramod Nayyar (ed) – *English Poetry 1660-1780: An Anthology*

Course IV (Hard Core – IV) – 19th CENTURY ENGLISH LITERATURE

Course Code: ENA 40 **Credits: 4**
Teaching Hours: 60 (4 Hours/Week)

Course Outcomes
At the end of the Course, student able to
CO1: Understand the impact of French Revolution on Romantic and Victorian age.
CO2: Learn the issues related to Woman's Question during the period and contributions of Mary Wollstonecraft and J S Mill to this movement.
CO3: Recognize and understand the use of allegory, metaphor, irony, rhyme, rhythm, allusion in Romantic and Victorian poetry
CO4: Reflect analytical skill of understanding literary essays of Victorian philosophers. .
CO5: Develop ability to read, summarize and critically analyse the novels of Jane Austen, Emily Bronte, Charles Dickens and Thomas Hardy.

Unit I: Background:
1. French Revolution;
2. The Romantic Movement in Literature with special reference to leading Romantic poets; Influence of German Philosophy on Romanticism (Schiller and Kant)
3. Introduction to 19th Century Prose and Victorian Poetry
4. Women Question with reference to J S Mill and Mary Wollstonecraft

Unit II: Poetry
1. William Blake: 1) Tyger; 2) London 3) The Chimney Sweeper
2. William Wordsworth: Tintern Abbey, Ode to Immortality, Lucy Poems: A Slumber Did My Spirit Seal, She Dwelt Among Untrodden Ways.
3. S T Coleridge: The Rime of the Ancient Mariner
4. P B Shelley: Ode to the West Wind; To A Skylark
5. John Keats: Ode on the Grecian Urn, Ode to Autumn
6. Robert Browning: My Last Duchess

4 Tennyson: Ulysses, Lotus Eaters

Unit III: Fiction
1. Jane Austen: Emma
2. Emily Bronte: Wuthering Heights
3. Charles Dickens: Hard Times
4. Thomas Hardy: Jude the Obscure

Unit IV: Prose
1. J. Ruskin: *Unto the Last* (Chs.1 and 2)
2. J.S. Mill: "On Liberty"
3. Mathew Arnold: Culture and Anarchy
   (Ch 1: Sweetness & Light , Ch 2: Hellenism & Hebraism)

Books for Reference and Further Reading:
1. Russell Noyes (Ed.): *English Romantic Poetry and Prose*.
2. Harold Bloom and Lionel Trilling: *Romantic Poetry and Prose*.
3. M. Bowra: *The Romantic Imagination*.
4. William D. Templeman and Charles F. Harrold: *English Prose of the Victorian Era*.

Any one of the soft cores to be chosen for earning 4 credits

PAPER- V – (SOFT CORE-I) REALISM AND FICTION

Course Code: ENA-250 **Credits: 4**
Teaching Hours: 60 (4 Hours/Week)

Course Outcomes:
At the end of the Course, student able to
CO1: Understand Realism as a literary movement and types of Realism.
CO2: Learn the narrative techniques employed by the realistic novelists.
CO3: Critically analyse the use of symbolisms in the prescribed novels.
CO4: Understand and analyse the realistic novels of British, American, and Indian writers.
CO5: Read, summarize and critically analyse the novels of Charlotte Bronte, George Eliot, William Makepeace, Hawthorne, Henry James, Steinbeck, Premchand, Tagore and Kamal Markandaya.

Unit I:

Realism as a literary movement, Types: Social Realism, Regionalism, Kitchen Sink Realism, Naturalism and Realism, Narrative techniques, Realistic novelists

Unit II:

Charlotte Bronte: *Jane Eyre*
George Eliot: *Mill on the Floss*
William Makepeace Thackeray: *Vanity Fair*

Unit III:

Nathaniel Hawthorne: *The Scarlet Letter*
Henry James: *The Portrait of a Lady*
John Steinbeck: *The Grapes of Wrath*

Unit IV:

Premchand: *Nirmala*, translated into English by Alok Rai
Tagore: *The Home and the World*
Kamala Markandaya: *Nectar in a Sieve*

Books/Texts for Reference and Further Reading:

1. Henry James, *The Art of the Novel*, ed. R P Blackmore, 1934.
2. Percy Lubbock, *The Craft of Fiction*, 1921.
3. E M Forster, *Aspects of the Novel*, 1927.
4. Wayne C. Booth, *The Rhetoric of Fiction*, 1961.
5. Sandra Gilbert and Susan Gubar, *The Madwoman in the Attic: the Woman Writer and the Nineteenth-Century Literary Imagination*, 1979.

SOFT CORE II: Contemporary Indian Novels in English

Course Code: ENA-240 **Credits: 4**
Teaching Hours: 60 (4 Hours/Week)

Course Outcomes

At the end of the Course, student able to

CO1. Learn to explore the thematic paradigm shift in the contemporary Indian writings.
CO2. Appreciate the postmodern literary devices employed by the writers.
CO3. Read and critically analyse the Indian novels published in 2000 and after.
CO4. Develop ability to read, summarize and critically analyse various themes in the works of Anurag Mathur, Anita Desai, Vikram Seth, Shashi Deshpande, Amit Chaudhuri, Anita Nair, Upamanyu Chatterjee and Manju Kapur.

Unit I:

1. Anurag Mathur: The Inscrutable Americans (1991)
2. Anita Desai: Fasting, Feasting (1999)

Unit II:

1. Vikram Seth: A Suitable Boy (1993)
2. Shashi Deshpande: *A Matter of Time* (2000)

Unit III:

1. Amit Chaudhuri: *A New World (2000*)
2. Anita Nair: Ladies Coupe (2001)

Unit IV:

1.Upamanyu Chatterjee: Way to Go (2010)
2. Manju Kapur: Custody (2011)

***Note: Two lecture to introduce new themes and techniques of Contemporary Indian writing**

Books for Reference and Further Reading:

1. K.R. Srinivasa Iyengar: *Indian Writing in English,* 1994.
2. Mukherjee, Meenakshi, C. Vijayshree and Vijay Kumar, eds. *The Nation Across the World: Postcolonial Literary Representations*. New York: OUP, 2008.
3. P K Dhawan and Veena Noble Das, ed. Fiction of the Nineties. 1990.
4. Shukla, Sheo Bhushan and Anu Shukla, ed. The Novels of Amit Chaudhuri: An Exploration in the Alternative Tradition, Sarup and Sons, 2012.

II SEMESTER

Course I – (HARD CORE-I) THE MODERN AGE- I

Course Code: ENB 040 **Credits: 4**

Teaching Hours: 60 (4 Hours/Week)

Course Outcomes

At the end of the Course, student able to

CO1: Understand the social, political and cultural milieu of the age.

CO2: Learn the impact of World War I and II on 20th Century poetry.

CO3: Identify and analyse literary elements like rhyme, rhythm, tone, style, imagery and, symbols, etc.

CO4: Reflect the analytical skills of understanding war poetry.

UNIT – I

World Wars – I & II, Imagism, Surrealism, Symbolism, Free Verse, Existentialism, and Phenomenology

UNIT – II

G.M. Hopkins: The Wreck of Deutschland, Windhover

W.B Yeats: Sailing to Byzantium, Byzantium, Second Coming, Easter 1916

Thomas Hardy: The Darkling Thrush, The Man He Killed

Wilfred Owen: Strange Meeting, Insensibility

UNIT – III

T.S. Eliot – The Wasteland, The Journey of the Magi

W H Auden – In Memory of W. B. Yeats, Muse des Beaux Arts

Sylvia Plath: The Arrival of the Bee Box: Lady Lazarus

UNIT – IV

Dylan Thomas: After the Funeral, Fern Hill

Seamus Heaney: Tollund Man, Digging, Casuality

Philip Larkin: Church Going, Next Please

Ted Hughes: Thought Fox, Hawk Roosting

Books for Reference and Further Reading:

1. F. R. Leavis. *New Bearings in English Poetry*
2. Faber Book of Modern Verse
3. Norton Anthology of English Literature

Course II (Hard Core-II) - LITERARY CRITICISM-I

Course Code: ENB 020 **Credits: 4**

Course Outcomes

At the end of the Course, student able to

CO1: Learn the meaning, elements and characteristics of classical literary criticism.

CO2: Understand the basics of literary/ critical theories.

CO3: Learn the technique of early literary criticism.

CO4: Acquire the skills to interpret literary works using literary theories.

Unit I:
Origin, growth, and development of Literary Criticism, Various Posits and Literary Contexts

Principles of Literary and Practical Criticism

Unit II:
1. Longinus: *On the Sublime*

2. Plato on Mimesis in *A Short History of English Literary Criticism* by Wimsatt& Brooks

3. Aristotle: *Poetics*

Unit III:
1. Sidney: *Apology for Poetry*

2. Samuel Johnson: *Preface to Shakespeare*

3. Dryden: *On Dramatic Poesy*

Unit IV:
1. W. Wordsworth: *Preface to Lyrical Ballads*

2. Coleridge: *Biographia Literaria* (Chapters 13, 14, 17)

3. Arnold: *The Function of Criticism at the Present Time*

Books for Reference and Further Reading:

1. I.A. Richards. Principles of Literary Criticism
2. C.T. Indira et al. English Literary Criticism
3. M.S. Nagarajan. English Literary Criticism and Theory
4. Vernon Hall. A short history of literary criticism

Course III – (HC-II) INDIAN WRITING IN ENGLISH – I

Course Code: ENB 030 **Credits: 4**

Teaching Hours: 60 (4 Hours/Week)

Course Outcomes

At the end of the Course, student able to

CO1: Understand the Origin and Growth of Indian English Writing.
CO2: Study different phases of Indian writing and understand their features.
CO3: Understand the social, political and cultural milieu of Pre-independent India explored in literary works.
CO4: Explore different issues in Indian Writing in English depicted in poetry, plays, novels, and essays.

Unit I

Anglicists and Orientalists Debates, *Macaulay's Minute*, Rajaram Mohan Roy's *Letter to Lord Amherst*, The Rise of the Indian English Novel, Novel as a Social Act.

Unit II: Poetry

1. Toru Dutt: Prahlad; Our Casuarina Tree;
2. R. Tagore: Gitanjali: First five and last five poems
3. Sarojini Naidu: Coromandel Fishers, Indian Weavers
4. Aurobindo: *Savitri* Canto-I

Unit III: Drama

1. Girish Karnad: *Hayavadana*

2. Vijay Tendulkar: *Silence! The Court is in Session*

3. Mahesh Dattani: *The Final Solution*

Unit IV: Fiction

1. Mulk Raj Anand: *Untouchable*
2. Raja Rao: *Kanthapura*
3. R.K. Narayan: *A Tiger for Malgudi*

Unit IV: Criticism

1. Hiriyanna: *Art Experience*: Indian Aesthetics (Chs. 1 and 2)
2. Ananda Coomaraswamy: "The Dance of Shiva"
3. Aurobindo: The Poets of Dawn -1&2 (From Future Poetry)

Books/Texts for Reference and Further Reading:

K.R. Srinivasa Iyengar: *Indian Writing in English*
C.D. Narasimhaiah: "Towards an Understanding of the Species Called Indian Writing in English"
Meenakshi Mukherjee: *The Perishable Empire* Chapter on: "The Anxiety of Indianness"

Course IV – (HC-IV) 20th CENTURY WOMEN'S WRITING: THEORY AND PRACTICE

Course Code: ENB-040 **Credits: 4**
Teaching Hours: 60 (4 Hours/Week)

Course Outcomes

At the end of the Course, student able to

CO1: Learn history and growth of feminism as a movement, and the waves of feminism.
CO2: Understand the phrases such as Sex and Gender, women's rights.
CO3: Explore feminist issues in the novels of Buchi Emecheta, Margaret Atwood and Mahasweta Devi.
CO4: Read and understand the feminist ideas in the works of Simone de Beauvoir, Virginia Woolf and Showalter.
CO5: Appreciate and analyse the poems of Kamala Das and Maya Angelou.

Unit I (Background Study)

Feminism, History of Feminism, Feminist Movements, Sex and Gender, Society and Gender, Women's rights

Unit II (Novel)

Buchi Emecheta: *The Joys of Motherhood*
Mahasweta Devi: *Imaginary Maps* (A Collection of Short Stories)
Margaret Atwood: *Edible Woman*

Unit III (Prose)

Simone de Beauvoir: *The Second Sex*
Virginia Woolf: *A Room of One's Own*
Showalter Elaine: *"Feminist Criticism in Wilderness"*

Unit IV (Poetry)

Kamala Das: *An Introduction, My Grandmother's House, The Old Playhouse, Suicide*
Maya Angelou: *Phenomenal Woman, Caged Bird, Human Family, Women Work*

Books for Reference and Further Reading:

1. The Female Imagination: Patricia Mayor Spack
2. Gender Trouble: Feminism and Subversion of Identity: Judith Butler
3. The Feminine Mystique: Betty Friedan
4. Feminism and Recent Fiction in English: Sushila Singh
5. The New Feminist Criticism: Essays on Women's Literature and Theory: Elaine Showalter
6. Sexual / Textual Politics: Toril Moi

Any one of the soft cores to be chosen for earning 4 credits

Course IV – (SOFT CORE-II) DALIT LITERATURE

Course Code: ENB-230 **Credits: 4**

Teaching Hours: 60 (4 Hours/Week)

Course Outcomes

At the end of the Course, student able to

CO1: Understand the origin and growth of Dalit literature in India.

CO2: Understand the sufferings of marginalised in Dalit writings.

CO3: Compare and analyse the life of oppressed in the works various languages translated into English like Kannada, Gujarathi, Punjabi, Tamil and Telugu.

CO4: Compare and analyse the different forms of Dalit Literature based on different experiences.

UNIT I: Introduction to Dalit Literature

Essays:

1. Movements of Dalit identity- K C Das
2. Indian Dalits (Introduction- Sharankumar Limbale. (Dalit Literature and Aesthetics)
3. Dalit Literature- B Krishnappa (The Exercise of Freedom)
4. We Too Are Human-B R Ambedkar (The Exercise of Freedom)

Unit II: Poetry

1. H Govindaiah. "In The Soil of Tears" and "A Letter to Father Searching For Me"
2. Challapalli Swaroopa Rani: "Water" and "Forbidden Theory"
3. Sukirtharani: "Paraia God" and "Untitled Poem"
4. Jyoti Lanjewar: "Cave" and "Mother"
5. Gurudas Alam: "For Freedom" and "Treatment of Untouchables" (From The *Core Of Untouchable's)*
6. Bipin Gohel: "To The Fading Man I Sing" and "To A Poet At Mushaira"

Unit III: Short Stories

1. Devanoora Mahadeva: "Odallala"
2. Pathik Parmar : "Naked Feet"
3. M.M. Vinodini: "The Parable of Lost Daughter –Luke15"

Unit IV: Autobiographies

1. Dr. Siddalingaiah – "Ooru Keri-I"
2. Urmila Pawar – "The Weave of My Life: A Dalit Woman's Memoirs"
3. Bama Faustina- "Karukku"

Books for Reference and Further Reading:

D.R. Nagaraj *The Flaming Feet*

Eleanor Zelliot *From Untouchable To Dalit*

Mulk Raj Anand *Apology For Heroism*

Arjun Dangle *Poisoned Bread*

Encyclopedia of Dalits in India: Literature

Sathyanarayana: The Exercise of Freedom

K. Singh: Dalitism and Feminism: Locating Woman in Dalit Literature

(SOFT CORE-II) ENGLISH ESSAYISTS

Course Code: ENB-220 **Credits: 4**

Teaching Hours: 60 (4 Hours/Week)

Course Outcomes

At the end of the Course, student able to

CO1: Understand the genre of prose essays and appreciate the essayist's artistic statements.

CO2: Learn to appreciate the literary devices employed by the essayists.

CO3: Understand the importance of essays as a genre to bring social change based on close reading of the essayist's observations on society.

CO4: Appreciate and analyse the views in Bacon, Hazlitt, Charles Lamb, Bertrand Russell, Mathew Arnold and Orwell's essays.

Unit I

General Introduction to Essay as a genre of literary art, Notable Essayists of British Literature

Unit II

1. Francis Bacon: a) Of Studies
   b) Of Ambition

2. Hazlitt: a) On Going a Journey
   b) On the Ignorance of the Learned

Unit III

3. Charles Lamb: a) Poor Relations
   b) Chimney Sweepers

4. Bertrand Russell: a) Behaviorism and Values
   b) Freedom versus Authority in Education

Unit IV

5. Mathew Arnold: a) Wordsworth
   b) John Keats

6. George Orwell: a) Charles Dickens
   b) Politics and English Language

Books/Texts for Reference and Further Reading:

1. The English Critical Tradition: An Anthology of English Literary Criticism, Vol-2, Edited by S. Ramaswamy & V.S. Sethuraman
2. Wimsatt and Brook, Literary Criticism: A Short History
3. G. Tillostone, Criticism and the Nineteenth Century

III SEMESTER

Course I – (HARD CORE-I) THE MODERN AGE – II

Course Code: ENC 010 **Credits: 4**
Teaching Hours: 60 (4 Hours/Week)

Course Outcomes

At the end of the Course, student able to

CO1: Understand the social, political and cultural milieu of the age.
CO2: Learn and analyse the impact of World War I and II on 20th Century fiction.
CO3: Appreciate the use of various literary devices and postmodern techniques such as Stream of Consciousness, Dark Humour in modern writings.
CO4: Understand and write about the new theatres evolved in modern age.

UNIT – I
Post-World War Scenario, Twentieth Century Social Milieu, Twentieth Century Theatre, Twentieth Century Novel, Great Economic Depression, Stream of Consciousness, Postmodernism

UNIT – II
DH Lawrence: *The Rainbow*

Virginia Woolf: *To the Lighthouse*

E.M. Forster: *A Passage to India*

Doris Lessing: *The Golden Notebook*

UNIT – III
Samuel Beckett- *Waiting for Godot*

John Osborne: *Look Back in Anger*

UNIT – IV
Virginia Woolf: "On Modern Fiction"

George Lukacs: "The Meaning of Contemporary Realism" (chapters on Kafka & Modernist Fiction)

Raymond Williams: "When was Modernity"

Books for Reference and Further Reading:

1. Norton Anthology of English Literature
2. Vasudevan. *Perspectives: Selection from Modern English Prose and Fiction*

Course II – (HARD CORE-II) INDIAN WRITING IN ENGLISH - II

Course Code: ENC 020 **Credits: 4**
Teaching Hours: 60 (4 Hours/Week)

Course Outcomes

At the end of the Course, student able to

CO1: Understand characteristic features of post-independent Indian Writing in English.
CO2: Read, compare and critically analyse essays of Indian critics.
CO3: Describe the Indianness in Indian Writing in English.
CO4: Write about the use of various literary devices by Indian writers, such as Arundati Roy, Amitav Ghosh, Shanta Gokhale and RK Narayan.

UNIT –I
Colonization and its aftermath, Culture Vs Modernity: The Indian Context, The Modern Indian Psyche vis a vis Indian Writing in English and in Translation,

UNIT – II

1. Arundhati Roy: *God of Small Things*
2. Amitav Ghosh: *Shadow Lines*
3. Jahnavi Barua: *Next Door*

UNIT – III

1. M. K. Gandhi: *My Experiments with Truth*
2. Shanta Gokhale: *One Foot on the Ground*
3. R K Narayan: *My Days*

UNIT – IV

1. Gayathri Spivak: "Can the Subaltern Speak?"
2. Meenakshi Mukherjee: "The Anxiety of Indianness"
3. Aijaz Ahamed: *In Theory (Chapter 8* on Indian Literature)

Books for Reference and Further Reading:

1. K R Srinivasa Iyengar – *Indian Writing in English*
2. M. K Naik – *Critical Essays in Indian Writing in English*
3. Ramakrishnan E V- *Locating Indian Literature*
4. A K Mehrotra (ed): *A Concise History of Indian Literature in English*,
5. Saleem Peeradina (ed): *Contemporary Indian Poetry in English*
6. Makarand Paranjape (ed): *Indian Poetry in English*
7. Girish Karnad – *Fire and Rain*

Course III – (HARD CORE-III) NEW LITERATURES IN ENGLISH

Course Code: ENC 030 **Credits: 4**
Teaching Hours: 60 (4 Hours/Week)

Course Outcomes
At the end of the Course, student able to
CO1: Learn the emergence of New Literatures from Commonwealth literature.
CO2: Learn the thematic concerns in New Literatures.
CO3 Read and analyse the cultural conflict in New literatures such as African, Australian, Canadian and Caribbean and the impact of colonisation on native cultures.
CO4: Write focused analytical essays on the novels of Chinua Achebe, Wole Soyinka, Alice Munro, Patrick White, and V S Naipaul.
CO5: Appreciate the use of various literary devices in the poetry of Dennis Brutus, David Diop, AJM Smith, Judith Wright, Derek Walcott, and Braithwaite.
CO6: Learn and write critical analysis on the essays of Ngugi, Northrop Frye and Wilson Harris.

UNIT 1
Philosophy and Aesthetics of Commonwealth Literature, paradigm shifts from commonwealth to New Literatures

UNIT II- African Literature
Chinua Achebe: *A Man of the People*
Ngugi Wa Thiong'o: *Homecoming* Part-II (a) The Writer and His Past (b) The Writer in a Changing Society
Wole Soyinka: *The Lion and the Jewel*
Denis Brutus: If This Life is All That We Have, I am the tree...
I must conjure from my Past
2) David Diop: *Africa, Vultures*
3) Gabriel Okara: *Piano and Drums, Once Upon A Time*

UNIT III- Canadian and Australian Literature
Alice Munro*: Lives of Girls and Women*
Northrop Frye: "Conclusion" to *Literary History of Canada*
AJM Smith: *The Lonely Land E.J. Pratt: The Dying Eagle*
Patrick White: *Voss*
Judith Wright: *Preoccupations in Australian Poetry* (Chapter 13 on A.D. Hope)
Judith Wright: *Woman to Man, A.D. Hope: Australia*

UNIT- IV- Caribbean Literature
V S Naipaul: *Guerrillas*
Wilson Harris: *Tradition and the West Indian Novel*
Derek Walcott: *Almond Trees, A Far Cry from Africa*
Braithwaite: *Starvation, Caliban*

Books/Texts for Reference and Further Reading:
1. Anna Rutherford. Commonwealth
2. Oxford Companion to Canadian Literature
3. Macaulay. *A Map of Australian Verse*
4. Arnold. *Companion to Postcolonial Literature*
5. Helen Tiffin et al. *The Empire Writes Back*

Any one of the soft cores to be chosen for earning 4 credits

Course IV – (SOFT CORE-I) INDIAN ENGLISH POETRY AFTER INDEPENDENCE

Course Code: ENC 230 **Credits: 4**
Teaching Hours: 60 (4 Hours/Week)

Course Outcomes
At the end of the Course, student able to
CO1: Learn and appreciate the use of Indianness in the modern Indian poetry.
CO2: Analyse the themes, imagery, symbolism in the poems of Ezekiel, Ramanujan, Daruwalla, de Souza, Mahapatra, Parthasarathy, Anita Nair and Vikram Seth.
CO3: Understand and appreciate the human values and human predicament in modern Indian poetry.
CO4: Analyse the trend setting themes explored in contemporary Indian poetry.

Unit-I

1. Nissim Ezekiel: Night of the Scorpion; Enterprise
Urban; Poet, Lover, Birdwatcher

2. A K Ramanujan: Obituary, A River
Love Poem for a Wife II, Small Reflections on a Great House

Unit II

3. Keki N Daruwalla: Death of a Bird, The Mistress, The Ghaghra in Spate

4. Eunice de Souza: Bequest, Advice to Women, Women in Dutch Paintings, Feeding the Poor on Christmas

Unit III

5. Jayanta Mahapatra: Hunger, Freedom, Grandfather, Dhauli

6. R Parthasarathy: Rough Passage: a. Exile b. Trial c. Homecoming

Unit IV

7. Anita Nair: Happenings On the London Underground, The Last Rites
Hello Lust How Men Eat

8. Vikram Seth: How rarely all these few years, From California, The Wind

***Note:** Two lectures to introduce new themes and techniques of recent Indian poetry in English

Books/Texts for Reference and Further Reading:

1. King Bruce (ed): *Modern Indian Poetry in English*
2. *The Oxford Anthology of Modern Indian Poetry*
3. Saleem Peeradina (ed): *Contemporary Indian Poetry*
4. Zenia Mitra (ed): *Indian Poetry in English: Critical Essays*
5. R. Parthasarathy (ed): *Ten Twentieth Century Indian Poets*

Course V – (SOFT CORE-II) FEMINISM

Course Code: ENC 220 **Credits: 4**
Teaching Hours: 60 (4 Hours/Week)

Course Outcomes

At the end of the Course, student able to

CO1: Analyse the texts critically and write the main ideas given in the prescribed texts.
CO2: Write logically the feelings expressed by the feminists.
CO3: Learn to appreciate the literary theories employed by the feminists to bring gender justice in the society and in literary representation.
CO4: Analyse the critical ideas expressed by Shoshona Felman, Elaine Showalter, Toril Moi and Susie Tharu in their prescribed essays or prose works.

1. Shoshona Felman: "Women and Madness: The Critical Fallacy"

2. Elaine Showalter: "The Female Tradition"

3. Toril Moi: Feminist, Female, Feminine

4. Susie Tharu: Problems for a Contemporary Theory of Gender

Books for Reference and Further Reading:

The Female Imagination: Patricia Mayor Spack

Gender Trouble: Feminism and Subversion of Identity: Judith Butler

The Feminine Mystique: Betty Friedan

Feminism and Recent Fiction in English: Sushila Singh

The New Feminist Criticism: Essays on Women's Literature and Theory: Elaine Showalter
Sexual / Textual Politics: Toril Moi

OPEN ELECTIVES COURSE

A COURSE ON WRITTEN AND SPOKEN ENGLISH

Dept. code 570 **Credits: 4**

Teaching Hours: 60 (4 Hours/Week)
Course Outcomes

At the end of the Course, student able to

CO1: Learn the correct use of parts of speech and English grammar.
CO2: Understand grammar rules and apply them in conversation and communication.
CO3: Write effectively describing impressions, feelings and experiences.
CO4: Talk about familiar topics and give explanations and reasons for opinions, past actions and future plans.
CO5: Understand comprehension passages and answer the implied questions rightly.

UNIT I

Basic Grammar
Definition of Parts of Speech and correct usage

1. Noun 2. Pronoun 3. Adjectives: Degrees of comparison and correct usage.
4. Verb, Tenses: Present, Past and Future and their correct usage.
5. Adverb: Kinds of Adverbs and their correct usage
6. Conjunction 7. Preposition
8. Articles
9. Active and Passive voice
10. Direct and Indirect Speech
11. Punctuation

UNIT II

Oral communication is the ability to explain and present one's ideas in clear English, to diverse audiences; speaking effectively, Effective **Listening** and **Reading skills** to be taught.

Short and long conversation involving two or more people: Greeting, introducing, making an enquiry, casual/formal telephone conversation, Conversation at the bank, at the department store, at the post office, at the doctor's, at the travel agent, at the railway station/bus stop etc.
Informal conversation between friends.
Reading Skills with a focus on Idioms, Phrases, Antonyms, Homophones, Homonyms and Figures of Speech

Unit-III

Written communication: The ability to write effectively in a range of contexts and for different audiences and purposes, with a good command of the English language is taught.

1. Letter Writing:
   Personal letters
   Leave note
   Application for a job
   Letter to the editor

Letters of complaints
Placing orders

2. Precise Writing
3. Short Essay writing

Unit - IV
Writing skills to be taught through:

A. Guided Composition
B. Expansion of an Idea/ Proverb
C. Comprehension

Comprehension of Poetry/ Prose/ Short Story/ Essay of selected texts

Comprehension of Poetry: **1.** Robert Frost: **Stopping by Woods on a Snowy Evening**
2. Wole Soyinka: **Telephone Conversation**

Comprehension of Prose: Radhakrishnan: **Humanities V/S Science**

Comprehension of Short Story: Maxim Gorky: **One Autumn Night**

Books for Reference and Further Reading:

1. Sidney Green Baum, The Oxford English Grammar, Oxford University Press,
2. Cowie, A.P. & R. Macklin, Oxford Dictionary of Phrasal verbs, Oxford University Press,
3. Cowie, A.P. & R. Macklin& I.R. Mc Caig, Oxford Dictionary of Phrasal English Idioms, Oxford University Press,
4. Stuart Redman, English Vocabulary in Use pre-intermediate and intermediate; low price editions, Oxford University Press,
5. Rosemary T., Fruehling& Joan M. Lacombe, Communication for Results, A.I.T.B.S. Publishers and Distributors,
6. How to write and speak better, Reader's Digest
7. Modern Grammar with Practical Exercises, Vikas Publishing House Pvt. Ltd.

IV SEMESTER

Course I – (HARD CORE-I) LITERARY CRITICISM-II

Course Code: END 010 **Credits: 4**
Teaching Hours: 60 (4 Hours/Week)

Course Outcomes

At the end of the Course, student able to

CO1: Learn the meaning, elements and characteristics of contemporary literary criticism.

CO2: Writes the essays using the skills of literary critical analysis.

CO3: Learn to write analytical essays on the literary texts of the prescribed critics.

CO4: Articulate and discuss the latest developments in the specific field of practice of literary theories.

Unit I

Russian Formalism, Psychoanalysis, Structuralism, Deconstruction, Post colonialism, Phenomenology and certain other forms of Hermeneutics. The Archetypes of Literature‟ Marx, Nietzsche, Freud, Gramsci

Unit II:

1. T.S. Eliot: Tradition and Individual Talent
2. F.R. Leavis: Literature and Society, Tragedy and the Medium (From The Common Pursuit)
3. Carl Jung: "Psychology and Literature"

Unit III:

1. Northrop Frye: Architypes of Literature
2. G. Genette: "Structuralism and Literary Criticism
3. J. Derrida: "Structure, Sign and Play in the Discourse of Human Sciences"

Unit IV:

1. Elaine Showalter: Towards a Feminist Poetics
2. Helene Cixous: The Laugh of the Medusa
3. Sara Suleri: Woman Skin Deep: Feminism and Postcolonial Condition

Books for Reference and Further Reading:

Eagleton, Terry: *Theory – An Introduction*

Selden, Raman: *A Reader's Guide to Contemporary Literary Theory* Belsey, Catherine.

Critical Practice: Culler, Jonathan.

Structuralist Poetics: Structuralism, Linguistics and the Study of Literature Newton,

K.M. *Twentieth Century Literary Theory: A Reader*

Course II – (HARD CORE-II) AMERICAN LITERATURE

Course Code: END 020 **Credits: 4**

Teaching Hours: 60 (4 Hours/Week)

Course Outcomes

At the end of the Course, student able to

CO1: Understand the significance of Renaissance, Transcendentalism and journey metaphor in American literature.
CO2: Appreciate and analyse the poems of Emily Dickinson, Wallace Stevens, Walt Whitman and Robert Frost.
CO3: Understand and write critically about the themes, narrative techniques, character analysis in the novels of Mark Twain, Douglas, Toni Morisson and Ray Bradbury.
CO4: Acquire the ability to understand and explore the human condition in the plays of Arthur Miller, Eugene O'Neill and Edward Albee.

UNIT –I

American Renaissance, Journey as Metaphor, Westward Movement, Transcendentalism

UNIT – II

Emerson: American Scholar
Thoreau: Walden (Chapters on Economy & Where I Lived and What I Lived For)
Emily Dickinson: Because I Could Not Stop for Death, The Soul Selects her Own Society
I Heard a Fly Buzz
Wallace Stevens: Emperor of Ice-Cream, Anecdote of The Jar
Walt Whitman: When Lilacs Last in the Dooryard Bloomed, A Noiseless Patient Spider,
Robert Frost: Mending Wall, The Road Not Taken, Birches

UNIT III

Mark Twain: Huckleberry Finn
Fredrick Douglas: Narrative of the Life of an American Slave
Toni Morrison: The Bluest Eye
Ray Bradbury: Fahrenheit 451

UNIT – IV

Arthur Miller: Death of a Salesman
Eugene O'Neill: The Hairy Ape
Edward Albee: The Zoo Story

Books for Reference and Further Reading:

Norton Anthology of American Literature
Richard J Gray. *A History of American Literature*
The Cambridge History of American Literature. Vol. 1 to 4

Any one of the soft cores to be chosen for earning 4 credits

COURSE - III: SOFTCORE Elective I: INDIAN DIASPORA FICTION
Course Code: END 240 **Credits: 4**

Course Outcomes:
At the end of the Course, student able to
Course Outcomes

CO1: Learn the background of Diaspora Literature & major themes of Diaspora Literature
CO2: Compare and Contrast authors' treatment of themes, characters, subject matter etc.
CO3: Identify and analyse literary elements like plot, setting, tone, point of view, style, image, symbols, etc.
CO4: Trace the role of partition, corruption, fantasy, migration, etc. and psychological aspects behind human behaviour in the novels prescribed.

Unit I:
1. Salman Rushdie: *Midnight Children*
2. Tanuja Desai Hidier: *Born Confused*

Unit II:
1. Jhumpa Lahiri: *The Namesake*
2. Chitra Banerjee Divakaruni: *The Mistress of Spices*

Unit III:
1. Kiran Desai: *Inheritance of Loss*
2. Rohinton Mistry: *A Fine Balance*

Unit IV:
1. Aravind Adiga: *White Tiger*
2. Hari Kunzru: *Gods without Men*

***Note: Two lectures to introduce India Diaspora**

Books for Reference and Further Reading:

1. Avtar Brah. *Cartographies of Diaspora: Contesting Identities*. London: Routledge, 1996.
2. Homi K. Bhabha. *The Location of Culture*, 1994.
3. Edward W. Said. *Orientalism*. New Delhi: Penguin, 2001.

COURSE - III (SOFTCORE Elective-II) AFRICAN FICTION

Course Code: END-230 **Credits: 4**
Teaching Hours: 60 (4 Hours/Week)

Course Outcomes

At the end of the Course, student able to

CO1: Learn the social, political and cultural milieu of the African society represented in fiction.
CO2: Understand and write critical essays on contemporary African novels such as Anthills of the Savannah, Purple Hibiscus, The Bride Price and Changes: A Love Story.
CO3: Articulate and discuss the latest developments in the specific fields of postcolonial African writings to bring gender justice in the society.
CO4: Write critically on the role of the characters in the novels of Achebe, Adichie. Emecheta and Aidoo.

Unit I: Chinua Achebe: *Anthills of the Savannah*

Unit II: Chimamanda Adichie Ngozi: *Purple Hibiscus*

Unit III: Buchi Emecheta: *The Bride Price*

Unit IV: Ama Ata Aidoo: *Changes: A Love Story*

Suggested Reading:

1. Butler, Judith. *Gender Trouble*: *Feminism and the Subversion of Identity*. New York: Routledge, 1990.
2. Ogundipe-Leslie, Omolara. *Re-Creating Ourselves African Women and Critical Transformations*. Trenton, NJ: Africa World P, 1994.
3. Palmer, Eustace (ed.). An Introduction to the African Novel. A Critical Study of Twelve Books. London: Heinemann, 1979.
4. Ashcroft, Bill. *Post-Colonial Transformation*. London and New York: Routledge, 2001.
5. Ashcroft, Bill, Gareth Griffiths, and Helen Tiffin. Eds. *The Post-Colonial Studies Reader*. London and New York: Routledge, 2002.

Course – IV – (HARDCORE - III) Major Project Work Leading to a Dissertation

Course Code: END 030 **Credits: 4**
Teaching Hours: 60 (4 Hours/Week)

Course Outcomes

At the end of the Course, student able to

CO1: Learn to investigate the area of topic chosen for project work in detail.
CO2: Learn research skills and demonstrate scholarly expertise in exploring the subject to prepare the dissertation for the project work.
CO3: Learn the skills of research analysis in writing thesis.
CO4: Able to think logically and relate the issues and findings to real life scenario.

Students will be encouraged to undertake a major project work in disciplines related to literature of contemporary interest.

Suggested Areas:

Folklore
Performing Arts
Popular Culture
Gender and Sexuality
Dalit and Subaltern Discourses
Media Studies
World Literatures in English
General Survey of Poetic Works of Classical Writers
General Survey of Poetic Works of Modern Writers

The distribution of marks for The Project Work will be as per the stipulations laid down by the university.

SOFTCORES OFFERED

1. Cross Cultural Women Writers
2. Caribbean Literature
3. Novels of Childhood
4. Indian Classics in Translation
5. Folklore and Literature-I
6. Folklore and Drama
7. Myth and Drama-I
8. Myth and Drama-II
9. Cultural Theory
10. Canada and the World
11. Feminist Theory-I
12. Australian Poetry
13. Folk Epics of Karnataka
14. Postcolonial Theory
15. Writers from African Diaspora
16. Canadian Science Fiction by Women
17. Theories on Culture: An Introduction
18. Postcolonial Criticism
19. Travel Literature
20. Popular Culture and Censorship
21. Adventure Novels
22. Novels and Metropolis
23. Short Fictions of Russia and USA
24. Contemporary Indian Novels in English
25. Translations
26. Dalit Literature-I
27. Recent Indian Poetry in English
28. Dalit Literature-II
29. Women Writings from the Margins
30. English Essayists
31. Post 1990 Indian Women Narratives
32. Indian Novels in English: 2000 and after
33. Twentieth Century Indian Poets in English
34. Contemporary Indian Regional Poetry in English Translation
35. Realism and Fiction
36. Indian Women Novelists
37. African Fiction in English
38. Jewish American Fiction
39. Introduction to Canadian Literature
40. South Asian Immigrant Literature in Canada
41. Introduction to Australian Literature.
42. Feminist Theory-II
43. Indian Classics in Translation
44. Shakespeare Criticism
45. Literature and Popular Culture
46. Postcolonial African Fiction
47. Arab Women Short Stories
48. Indian Diaspora Fiction

POSTGRADUATE DEPARTMENT OF ENGLISH
Question Paper Pattern

END SEMSETER EXAM (C 3)

Course Code Title of the Course (HC/ SC)

Max Marks: 70 Time: 3 Hours

Instruction: Answer all sections.

SECTION – I

I. Answer the following questions in **one or two** sentences 10X1= 10

1.
2.
3.
4.
5.
6.
7.
8.
9.
10.

SECTION-II (from Unit-I)

II. Answer any one of the following. 1x15=15

1.
2.
3.

SECTION-III (from Unit-II)

III. Answer any one of the following. 1x15=15

1.
2.
3.

SECTION-IV (from Unit-III)

IV. Answer any one of the following. 1x15=15

1.
2.
3.

SECTION-V (from Unit-IV)

V. Answer any one of the following. 1x15=15

1.
2.
3.

LIST OF APPROVED PANEL OF EXAMINERS:

Sl. No	Name	Designation and DOB	Joining Date	Phone number
	Internal Examiners			
1.	Dr.Prathibha S JSS College, Ooty Road, Mysore	Asso. Prof. 28/04/1964	28/08/1986	9243707241
2.	Gayathri Devi N Jss College, Ooty Road, Mysore	Asst. Prof.	01-01-2005	8050684736
3.	Kiran B L JSS College, Ooty Road, Mysore	Asst. Prof.	23-09-2015	9638219347
4.	Pooja N JSS College, Ooty Road, Mysore	Asst. Prof.	30-08-2017	9844210414
	External Examiners			
5.	Dr. Ravikumar B S AVK College For Women, Hassan	Asso. Prof. 13/07/1962	16/07/1987	8861716456
6.	Mallikarjunamiah M N Maharani`s Science college For Women, Mysore	Asso. Prof. 05/11/1963	14/08/1992	9880006223
7.	Dr. Hemavathi C Govt. First grade college, Vijayanagar, Mysuru	Asso. Prof. 05/04/1966	17/08/1992	9980748813
8.	Dr. Vijay C R Maharani`s Science College For Women, Mysore	Asso. Prof. 01/10/1962	29/12/1992	9448028585
9.	Dr. Shivalingaiah Maharani`s Science College for Women, Mysore	Asst. Prof. 01/06/1968	08/01/1996	9036766869
10.	Dr. Purushotham S P Maharani`s Science College for Women, Mysore	Asst. Prof. 15/05/1967	02/08/1996	9448115524
11.	Dr. Lingaraju D P AVK College for Women, Hassan	Asst. Prof. 26/02/1965	23/10/2002	9108585024
12.	Dr. Basavaraju G L Govt College for Women, Mandya	Asst. Prof. 21/07/1976	30/01/2004	
13.	Dr. Devika M Saradavilas College, Mysore	Asst. Prof. 14/03/1970	14/12/2005	9880024483
14.	Dr. Pruthviraj Sri Mahadeshwara Govt. First grade college	Asso. Prof.		9448925262
15.	Dr. Nataraju Maharani`s Science College for Women, Mysore	Asso. Prof.		9448033901
16.	Dr. Suresh N S Maharani`s Science College for Women, Mysore	Asst. Prof. 25/02/1975	02/05/2006	9242243601
17.	Dr. Jayalakshmi B Maharani`s Science College for Women, Mysore	Asst. Prof. 18/11/1974	14/07/2006	9482640645
18.	Sowmya H K Govt Science College,Hassan	Asst. Prof. 18/06/1970	22/12/2007	7338466887
19.	Dr. Thoyajaksha Govt Science College, Hassan	Asst. Prof. 20/07/1970	24/12/2007	9743779983
20.	Sandhya Rani D Maharani`s Science College for Women, Mysore	Asst. Prof. 24/08/1972	24/12/2007	9448602597
21.	Dr. Pushpalatha H G Maharani`s Science College for Women, Mysore	Asst. Prof. 23/12/1979	26/12/2007	9480442844
22.	Dr. Ashok N Pyati Maharani`s Science College for Women, Mysore	Asst. Prof. 22/04/1970	28/12/2007	7204661365
23.	Dr. Deepa Hebbar Maharani`s Science College for Women, Mysore	Asso. Prof.		9632869690

24.	Indushree PES College, Mandya	Asst. Prof.		8151917465
25.	Dr. Lalitha V Maharani`s Science College for Women, Mysore	Asst. Prof.		8105004148
26.	Revanamaba B Maharani`s Science College for Women, Mysore	Asst. Prof.		9448528471
27.	Dr. Sharvani, K.A Yuvarajas college, Mysore.	Asst. Prof.		9845885896
28.	Dr. Krishna Yuvarajas college, Mysore.	Asst. Prof.		
29.	Dr. Krishnamurthy Yuvarajas college, Mysore.	Asst. Prof.		
30.	Kalpashree Yuvarajas college, Mysore	Asst. Prof.		8088413446
31.	Dr. Anil Kumar Yuvaraja College, Mysuru	Asst. Prof.		8970945497
32.	Dr. Girijamba Maharani`s Science College for Women, Mysore	Asst. Prof.		9945616792
33.	Dr. Netra Maharani`s Science College for Women, Mysore	Asst. Prof.		9620782198
34.	Dr. Poornima Yuvaraja College, Mysuru	Asst. Prof.		8217642534
35.	Nayana, K. N. Yuvaraja College, Mysuru	Asst. Prof.		9964041544
36.	Dr. Shamala Maharani`s Science College for Women, Mysore	Asst. Prof.		7019453250

Aims of Bachelor's degree programme in Botany

The broad aims of the bachelor's degree programme in Botany are:

1. To provide an environment that ensures the cognitive development of students in a holistic manner. A dialogue about plants and their significance is fostered in this framework, rather than didactic monologues on mere theoretical aspects
2. To provide the latest subject matter, both theoretical as well as practical, such a way to foster their core competency and discovery learning. A botany graduate as envisioned in this framework would be sufficiently competent in the field to undertake further discipline-specific studies, as well as to begin domain-related employment.
3. To mould a responsible citizen who is aware of the most basic domain-independent knowledge, including critical thinking and communication.
4. To enable the graduate to prepare for national as well as international competitive examinations, especially UGC-CSIR NET, and UPSC Civil Services Examination.

Program Learning Outcomes

The students graduating with the Degree B.Sc. Three years and B. Sc. (Honors) Botany should be able to acquire.

Core competency: Students will acquire core competency in the subject Botany, and allied subject areas.

1. The student will be able to identify major groups of plants and compare the characteristics of lower (e.g. algae and fungi) and higher (angiosperms and gymnosperms) plants.
2. Students will be able to use the evidence-based comparative botany approach to explain the evolution of organisms and understand the genetic diversity on the earth. The students will be able to explain various plant processes and functions, metabolism, concepts of gene, genome, and how organism's function is influenced at the cell, tissue, and organ level.
3. Students will be able to understand the adaptation, development, and behavior of different forms of life.
4. The understanding of networked life on earth and tracing the energy pyramids

through nutrient flow is expected from the students.

5. Students will be able to demonstrate the experimental techniques and methods of their area of specialization in Botany.

Analytical ability:

The students will be able to demonstrate the knowledge in understanding research and addressing practical problems.

1. Application of various scientific methods to address different questions by formulating the hypothesis, data collection, and critically analyze the data to decipher the degree to which their scientific work supports their hypothesis.

Critical Thinking and problem-solving ability:

An increased understanding of fundamental concepts and their applications of scientific principles is expected at the end of this course. Students will become critical thinkers and acquire problem-solving capabilities.

Digitally equipped:

Students will acquire digital skills and integrate the fundamental concepts with modern tools. **Ethical and Psychological strengthing:** Students will also strengthen their ethical and moral values and shall be able to deal with psychological weaknesses.

Team Player: Students will learn team workmanship in order to serve efficiently institutions, industry, and society

Independent Learner:

Apart from the subject-specific skills, generic skills, especially in botany, the program outcome would lead to gain knowledge and skills for further higher studies, competitive examinations, and employment. Learning outcomes-based curriculum would ensure equal academic standards across the country and a broader picture of their competencies. The Bachelor's program in Botany and Botany honors may be mono-disciplinary or multidisciplinary with following broad objectives.

1. Critically evaluation of ideas and arguments by collecting relevant information about the plants, to recognize the position of the plant in the broad classification and Phylogenetic level.
2. Identify problems and independently propose solutions using creative approaches, acquired through interdisciplinary experiences, and a depth and breadth of knowledge/expertise in the field of Plant Identification.
3. Accurately interpretation of collected information and use taxonomical information to evaluate and formulate a position of the plant in taxonomy.

4. Students will be able to apply the scientific method to questions in botany by formulating testable hypotheses, collecting data that address these hypotheses, and analyzing those data to assess the degree to which their scientific work supports their hypotheses.
5. Students will be able to present scientific hypotheses and data both orally and in writing in the formats that are used by practicing scientists.
6. Students will be able to access the primary literature, identify relevant works for a particular topic, and evaluate the scientific content of these works.
7. Students will be able to apply fundamental mathematical tools (statistics, calculus) and physical principles (physics, chemistry) to the analysis of relevant biological situations.
8. Students will be able to identify the major groups of organisms with an emphasis on plants and be able to classify them within a phylogenetic framework. Students will be able to compare and contrast the characteristics of plants, algae, and fungi that differentiate them from each other and other forms of life.
9. Students will be able to use the evidence of comparative biology to explain how the theory of evolution offers the only scientific explanation for the unity and diversity of life on earth. They will be able to use specific examples to explicate how descent with modification has shaped plant morphology, physiology, and life history.
10. Students will be able to explain the ecological interconnectedness of life on earth by tracing energy and nutrient flow through the environment. They will be able to relate the physical features of the environment to the structure of populations, communities, and ecosystems
11. Students will be able to demonstrate proficiency in the experimental techniques and methods of analysis appropriate for their area of specialization within biology.

B. Sc. Botany Programme outcomes as per NEP 2020

Name of the Degree Program: B.Sc. **Discipline Core: Botany**

Total Credits for the Program: 176 **Starting year of implementation: 2021-22**

Program Outcomes:

By the end of the program the students will be able to:

(Refer to literature on outcome based education (OBE) for details on Program Outcomes)

PO1: Skill development for the proper description using botanical terms, identification, naming and classification of life forms especially plants and microbes.

PO2: Acquisition of knowledge on structure, life cycle and life processes that exist among plant and microbial diversity through certain model organism studies.

PO3: Understanding of various interactions that exist among plants and microbes; to develop the curiosity on the dynamicity of nature.

PO4: Understanding of the major elements of variation that exist in the living world through comparative morphological and anatomical study.

PO5: Ability to explain the diversity and evolution based on the empirical evidences in morphology, anatomy, embryology, physiology, biochemistry, molecular biology and life history.

PO6: Skill development for the collection, preservation and recording of information after observation and analysis- from simple illustration to molecular database development.

PO7: Making aware of the scientific and technological advancements- Information and Communication, Biotechnology and Molecular Biology for further learning and research in all branches of Botany..

PO8: Internalization of the concept of conservation and evolution through the channel of spirit of inquiry.

PO 9: To enable the graduates to prepare for national as well as international level competitive examinations like UGC-CSIR, UPSC, KPSC etc.

PO10: To enable the students for practicing the best teaching pedagogy as a biology teacher including the latest digital modules.

PO 11: The graduates should be knowledgeable and competent enough to appropriately deliver on aspects of global importance like climate change, SDGs, green technologies etc at the right opportunity.

PO 12: The graduate should be able to demonstrate sufficient proficiency in the hands-on experimental techniques for their area of specialization within biology during research and in the professional career

B. Sc. Botany Programme specific outcomes as per NEP 2020

PSO1: The framework of curriculum for the Bachelor's program in Botany aims to transform the course content and pedagogy to provide a multidisciplinary, student-centric, and outcome-based, holistic education to the next generation of students.

PSO2: Aside from structuring the curriculum to be more in-depth, focused, and comprehensive with significant skill-set for all exit levels; keeping in mind the job prospects; the emphasis has been to maintain academic coherence and continuum throughout the program of study and help build a strong footing in the subject, thereby ensuring a seamless transition into their careers.

PSO3: Special attention is given to eliminate redundancy, discourage rote learning, and espouse a problem-solving, critical thinking, and inquisitive mindset among learners.

The curriculum embraces the philosophy that science is best learned through experiential learning, not limited to the confines of a classroom but rather through hands-on training, projects, field studies, industrial visits, and internships.

PSO4: This updated syllabus, with modern technology, helps students stay informed on the leading- edge developments in plant sciences and promotes curiosity, innovation, and a passion for research, that will serve them well in their journey into scientific adventure and discovery beyond graduation.

PSO5: The goal is to equip students with holistic knowledge, competencies, professional skills, and a strong positive mindset that they can leverage while navigating the current stiff challenges of the job market.

SUGGESTED METHODOLOGY FOR TEACHING, LEARNING AND EVALUATION

TEACHING-LEARNING

The whole programme is an Outcome Based Education. Different methods are to be used for teaching learning evaluation; in order to attain the fixed outcomes.

Theory:

***Student**:* Review of Literature, Assignment, Presentation, e-learning, Discussion and Debate with peer group, teachers and experts.

Teacher: Lecture, Demonstration, Presentation, Discussion and Debate.

Practical:

Student: Identification, Comparison, Differentiation and Categorization of different plants and their parts by observing Permanent Slides, Hand sectioning etc., Demonstration, Experimentation, Field visit, Report Writing and Keeping records

Teacher: Demonstration, Experimentation, Field visit, Certification

Project: The finalization of the topic should be done at the beginning of the fourth semester and the list should be kept with the HOD for the perusal of the University Examination authorities. There should be at least three projects from a department. The selection of the topic and group should be student centered as far as possible. A project log book/register is to be maintained by each student and submitted along with the project report during the final submission.

Student: Suggestion of Topic, Discussion with the Project guide and Peer group, Review of Literature, Project planning and Designing, Experimentation, Data Analysis and Project Report Preparation and Presentation.

Teacher: Confirmation of Topic, Demonstration, Planning of Experimentation, Guidance and Correction and Certification.

Experiential Learning (Internships etc.):

Student should choose one of the topics for self-study from the beginning of the seventh semester. A report should be submitted by the end of Eighth Semester.

Suggested topics include: Studies on mangroves / Sacred groves / Campus flora; Cultivation of RET / Fruit / Vegetable / Medicinal plants / Mushroom; Topics related to Social responsibility- River restoration, PBR (People Biodiversity Register) preparation, Herbarium arrangement, VFC (Village Forest Committee), VNRC (Village Natural Resource Committee) formation, Landscaping and Green Auditing.

Field Study / Study Tour:

The plant diversity studies should be carried out with the support of Field Study / Study Tour. During each year there should be a field study of 1-5 days duration, with a minimum of 5 days for the completion of the programme.

EVALUATION

External Evaluation:

External assessment by the University level examinations on specified times announced by the University for all the courses, theory, practical and Project/Viva Voce. Each student should go through the evaluation process according to the University Regulations 2021-2022

End Semester Evaluation-Theory:

The components of external evaluation and their unit wise and each theory and practical course and the time of examination will be in accordance with the calendar prepared by

the University for each academic year. At the end of each semester, there will be an examination for theory courses. The duration of examinations for all theory and practical courses in Botany will be three hours, except for the Generic Elective Course papers.

External –Practical:

Practical Courses have external examination for all semester. There will be an external practical examiner and an internal examiner / skilled assistant for every practical examination of three hour duration. The external evaluation should be carried out by the team of examiners.

EXTERNAL – PROJECT / FIELD STUDY / VIVA VOCE

The Project/Field Study/General Viva Voce will be conducted in I/II/III/IV/V/VI/VII/ VIII Semester Practical Examination.

Viva should be based on:

Project work

Experiential Learning (Internships

etc) Field Study

General Learning Activity of four years:

For the external evaluation the components and weightage of Project/Field Study/ Viva Voce can be discussed and determined finally by the Board of Examiners; the suggested components and their weightage is given below. The project viva should be based on the Project and importance should be given to the Scientific method undertaken in that project. The general viva should be on based the changes in the outlook of the student after the learning activity of the 4 year programme, field study and Experiential Learning (Internships etc.). Time taken for each practical batch should be 3 hrs, by giving nearly 10-15 minutes for each student. The project/field study/viva voce evaluation should be conducted by external examiners and internal examiner.

ELIGIBILITY TO APPEAR FOR PRACTICAL EXAMINATION

1. 80% Attendance (All Sem.)
2. Certified Bona-fide Record (All Sem.)
3. Herbarium and Field Book (Respective Sem.)
4. Field Study Reports (Respective Sem.)
5. Certified Bona-fide Project Report (Eighth Sem.)
6. Report on Experiential Learning (Internships etc.) (Eighth Sem.)

CONTINUOUS INTERNAL EVALUATION

Internal evaluation is a continuous evaluation in all types of courses- theory/ practical / Project / Field study. The teacher has flexibility in deciding the components and their weightage in accordance with the University Regulations, 2021-22. Internal evaluation should be verytransparent to the students and the components and relative weightage should be announced at the beginning of each learning activity by the concerned teacher. Internal evaluation should be published in the notice board, one week before the closure of each semester.

INTERNAL –THEORY

The percentile system can be adopted for calculating the internal component, test paper.

Sl. No.	COMPONENTS	WEIGHTAGE
1	**Attendance**	**10**
	Test Papers	**40**
2	**Assignment**	**20**
	Seminar	**20**
	Viva	**10**

INTERNAL – PRACTICAL

The internal evaluation may be regular internal assessment on hourly basis or unit wise, whichever is communicated with the student.

Sl. No.	COMPONENTS	WEIGHTAGE
1	**Regularity**	**25**
2	**Practical Skill**- (Sectioning, Drawing, Labeling, Record Keeping Etc)	**50**
3	**Regular Viva/Model Examination**	**25**

INTERNAL - PROJECT/FIELD STUDY/VIVA VOCE

Internal evaluation of the project should start with the beginning of the project and can be finalized by the project viva.

Sl. No.	COMPONENTS	WEIGHTAGE
1	**Participation**	**50**
2	**Viva**	**25**
3	**Field Study and other Assignment Reports**	**25**

Curriculum Structure for the Undergraduate Degree

Program B.Sc. BOTANY

Total Credits for the Program: 176 **Starting year of implementation:**

2021-22 Name of the Degree Program: B.Sc. **Discipline/Subject: BOTANY**

Program Articulation Matrix:

This matrix lists only the core courses. Core courses are essential to earn the degree in that discipline/subject. They include courses such as theory, laboratory, project, internships etc. Elective courses may be listed separately.

Semester	Title / Name Of the course	Program outcomes that the course addresses (not more than 3 per course)	Pre-requisite course(s)	Pedagogy	Assessments
1	BOT A1 Microbial Diversity and Technology	PO1	---	Ex. MOOC	Quiz
2	BOT A2 Diversity of Non flowering Plants	PO2, PO3	BOT A1	Desk Work	Debate
3	BOT A3 Plant Anatomy and	PO4, PO5	BOT A1 and A2	Problem solving,	

	Developmental Biology			Book Chapter Seminar, Project based learning, Term paper Assignment, Group Discussion Research Project Instrumentation	Class work Class work Seminar Project writing Articles writing, Interpretation of results
4	BOT A4 Ecology and Conservation Biology	PO4, PO5	BOT A1 A2 A3		
5.	BOT A5 Plant Taxonomy and Resource Botany	PO6, PO7	BOT A1 A2 A3		
	BOT A6 Cell Biology and Genetics	PO6, PO7	BOT A6 A1 A2 A3 A4 A5		
6.	BOT A7 Plant Physiology and Biochemistry	PO6, PO7, PO9	BOT A5		
	BOT A8 Plant Biotechnology	PO8. PO9	BOT A5		
7.	BOT A9 Molecular Biology	PO8, PO9	BOT A6 A8		
	BOT A10 Seed Biology and Seed Technology	PO9, PO10	BOT A5 A8 A9		
	BOT A11 Plant Health Technology	PO9, PO10	BOT A5 A4 A8		

8.	BOT A12 Medicinal Plants and Phytochemistry	PO9, PO10	BOT A4 A5 A7 A8		
	BOT A13 Bioinformatics and Computational Biology	PO9, PO10	BOT A5 A8 A9		
	BOT A14 Research Methodology	PO9, PO10	BOT A13		

- Pedagogy for student engagement is predominantly lectures. However, other pedagogies enhancing better student engagement to be recommended for each course. The list includes active learning/ course projects/ problem or project based learning/ case studies/self-study like seminar, term paper or MOOC

- Every course needs to include assessment for higher order thinking skills (Applying/ Analyzing/ Evaluating/ Creating). However, this column may contain alternate assessment methods that help formative assessment (i.e. assessment for learning).

IIA. Model Program Structures for the Under-Graduate Programs in Universities and Colleges in Karnataka Bachelor of Science (Basic/ Hons.) (Botany as Major)

Sem.	Discipline Core (DSC) (L+T+P)	Discipline Elective (DSE) / Open Elective (OE)	Ability Enhancement Compulsory Courses (AECC), Languages (L+T+P)		Skill Enhancement Courses (SEC)		Total Credits
					Skill based (L+T+P)	Value based (L+T+P)	
I	Discipline A 1(6) **Microbial Diversity and Technology** Discipline B 1(5)	**OE-1 (3)**	**L1-1 (3), L2-1(3) (3+1+0 each)**		SEC-1: Digital Fluency (2) (1+0+2)	Health and Wellness/ Social & Emotional Learning (2) (1+0+2)	24
II	Discipline A 2(5) **Diversity of non flowering plants** Discipline B 2(6)	**OE-2 (3)**	**L1-2(3), L2-2 (3) (3+1+0 each)**	Environmental Studies (2)		Sports/NCC/NSS etc. (2) (1+0+2)	24
Exit option with Certificate (48 credits)							
III	Discipline A 3(6) **Plant Anatomy and Developmental Biology** Discipline B 3(5)	**OE-3 (3)**	**L1-3 (3), L2-3(3) (3+1+0 each)**	Constitution of India (2)	SEC-2: Artificial Intelligence (2)(1+0+2)		24
IV	Discipline A 4(5) **Ecology and conservation biology** Discipline B 4(6)	**OE-4 (3)**	**L1-4 (3), L2-4(3) (3+1+0 each)**		SEC-3: Cyber Security (2) (1+0+2)	Sports/NCC/NSS etc. (2) (1+0+2)	24
Exit option with Diploma (96 credits)							
Choose any one Discipline as Major, the other as the Minor							
V	Discipline A 5(5) **Plant Taxonomy and resource botany** Discipline A 6(5) **Cell biology and Genetics** Discipline B 5(5)	DSE A-1 (3) **Algal and Fungal Biotechnology**			SEC-3: (2) (2+0+2)	Ethics & Self Aware-ness (2) (1+0+2)	20
VI	Discipline A 7(5) **Plant Physiology and biochemistry** Discipline A 8(5) **Plant Biotechnology** Discipline B 6(5)	DSE A-2 (3) **Herbal Technology**			SEC-4: Professional/ Societal Communication (2)		20
Exit option with Bachelor of Science, B. Sc. Basic Degree (136 credits)							
VII	Discipline A-9(5) **Molecular Biology** Discipline A-10(5) **Seed biology and seed Technology** Discipline A-11(4) **Plant Health Technology.**	DSE A-3 (3) **Plant Propagation and Tissue Culture (3)**					20
VIII	Discipline A-12(4) **Medicinal Plants and Phytochemistry** Discipline A-13(4) **Bioinformatics and Computational Biology** Discipline A-14(3) **Research Methodology**	DSE A-4 (3) **Landscaping, Gardening and Green House Technology**					20
Award of Bachelor of Bachelor of Science Honours, B.Sc. (Hons) degree in a discipline etc. (176 credits)							

DISCIPLINE CORE PAPERS (DSC)

Sl. No.	Semester Details	Subject	Paper No
1	Semester I	Microbial Diversity and Technology	**A-1**
2	Semester II	Diversity of Non Flowering Plants	**A-2**
3	Semester III	Plant Anatomy and Development Biology	**A-3**
4	Semester IV	Ecology and Conservation Biology	**A-4**
5	Semester V	Plant taxonomy and Resource Botany	**A-5**
		Genetics and Cell Biology	**A-6**
6	Semester VI	Plant Physiology and Biochemistry	**A-7**
		Plant Biotechnology	**A-8**
7	Semester VII	Molecular Biology	**A-9**
		Seed Biology and Seed Technology	**A-10**
		Plant Health Technology	**A-11**
8	Semester VIII	Medicinal Plants and Phytochemistry	**A-12**
		Bioinformatics and Computational Biology	**A-13**
		Research Methodology	**A-14**

CORESPECIFIC ELECTIVE PAPERS (DSE)

Sl No.	Semester Details	Subject: Botany	Credits	Paper No
1	Semester V	**DSE 1:** Algal and Fungal Biotechnology	03	E-1
2	Semester VI	**DSE 2:** Herbal Technology	03	E-2
3	Semester VII	**DSE 3:** Plant Propagation and Tissue Culture	03	E-3
4	Semester VIII	**DSE 4:** Landscaping, Gardening and Green House Technology	03	E-4

BOTANY COURSE OUTCOMES (COs):

At the end of the course the student should be able to:

(Write 3-7 course outcomes. Course outcomes are statements of observable student actions that serve as evidence of knowledge, skills and values acquired in this course)

Semester I (A-1): Microbial Diversity and Technology

1. Understand the fascinating diversity, evolution, and significance of microorganisms.
2. Comprehend the systematic position, structure, physiology and life cycles ofmicrobes and their impact on humans and environment.
3. Gain laboratory skills such as microscopy, microbial cultures, staining, identification, preservation of microbes for their applications in research and industry.

Semester II (A-2): Diversity of Non- Flowering Plants

1. Understand the diversity and affinities among Algae, Bryophytes, Pteridophytes and Gymnosperms.
2. Understand the morphology, anatomy, reproduction and life cycle across Algae, Bryophytes, Pteridophytes and Gymnosperms, and their ecological and evolutionary significance.
3. Obtain laboratory skills/explore non-flowering plants for their commercial applications.

Semester III (A-3): Plant Anatomy and Developmental Biology

1. Observation of variations that exist in internal structure of various parts of a plant and as well as among different plant groups in support for the evolutionary concept.
2. Skill development for the proper description of internal structure using botanical terms, their identification and further classification.
3. Understanding the basic concepts in plant morphogenesis, embryology and organ development.

Semester IV (A-4): Ecology & Conservation Biology

1. Understanding the fundamental concepts in ecology, environmental science and phyto geography.
2. Concept development in conservation, global ecological crisis, Sustainable development and pros and cons of human intervention.
3. Enable the student to appreciate bio diversity and the importance of various conservation strategies, laws and regulatory authorities and global issues related to climate change and sustainable development.

Semester V (A-5): Plant Taxonomy &Resource Botany

1. Ability to identify, classify and describe the plants in scientific terms. Identification of plants using dichotomous keys.
2. Recognition, processing and utilization of economically important plants.
3. Skill development in processing of biomass and plant products as source of food, healthcare, energy and natural products.

Semester V (A-6): Cell Biology & Genetics

1. Identify the basic principles and current trends in classical genetics and Cell biology.
2. Recognize the historical process of the evolution of molecular genetics from classical genetics.
3. Develop theoretical background on molecular genetics to provide a strong support for the student for future research and employability.

Semester VI (A-7): Plant Physiology & Biochemistry

1. Preliminary understanding of the basic functions and intermediary metabolism in a plant body.
2. Awareness on the interdisciplinary nature of botany, chemistry and physics by studying the principles of plant life, growth and reproduction.
3. Recognizing the wonderful mechanism of transport and the Interrelationships existing between metabolic pathways thereby gaining and idea about the importance of plants in the dynamicity of nature.

Semester VI (A-8): Plant Biotechnology

1. Learning of knowledge & skill in plant tissue culture, plant molecular biology and transgenic.
2. Application of plant biotechnology in plant genomics, phylogenetic studies and metabolic engineering.
3. Understanding of new molecular techniques in cell and metabolic manipulations.

Semester VII (A-9): **Molecular Biology**

1. Understanding the mechanism and concepts of life process at molecular level through central dogma concept.
2. Skill acquiring in the basic molecular biology techniques & characterization of micro- molecules.
3. Acquiring the emerging technology skills in plant genetic engineering & proteomics.

Semester VII (A-10): **Seed Biology & Seed Technology**

1. Understanding the seed structure and related functions, seed health and productivity.
2. Technology for assessing the seed pathology, purity, and preservation.
3. Learning the field and laboratory protocols of seed production, certification and quality.

Semester VII (A-11): Plant Health Technology

1. Understanding & learning common diseases & control measures of plant diseases.
2. Acquiring skills in plant disease diagnosis, control & management through IPM.
3. Learning of new skills in health clinic through biological methods.

Semester VIII (A-13): Medicinal Plants & Phytochemistry

1. Knowledge of Indian system of medicine with regard to medicinal plants.
2. Acquiring skills in identification, cultivation and preservation of medicinal plants.
3. Isolation, identification, characteristics of active principles in medicinal plants & drug formulations.

Semester VIII (A-14): Bioinformatics & Computational Biology

1. Learning of basic principles of application, ICT Technology in biological studies & research.
2. Acquiring skill to utilize the computational apps, active data basis and tools in analysis in genetics & proteomics.
3. Learning skills and software used for biological research & process understanding.

Semester VIII (A-15): Research Methodology

1. Understanding the working of science for further application in free, independent, individual needs and in designing scientific experimentation.
2. Acquire knowledge on the principles, components and applications of various scientific equipment in biology.
3. Foundation knowledge in the basic concepts, components and functions of informatics and the importance of statistical principles in biological research.

Job opportunities in Botany

Exit after ONE Year: Certificate Course

I Sem. - A1: Microbial Diversity and Technology

II Sem. – A2: Diversity and Conservation of Non- Flowering plants

Job opportunities in Botany
• *Preparation of algal, fungal microbial, bryophyte*, pteridophyte, and gymnosperm slides for educational institutions and other line departments (Entrepreneurship). • Providing algal, fungal microbial, bryophyte, pteridophyte, and gymnosperm materials for educational institutions and other line departments (Entrepreneurship). • Developing Nursery (Entrepreneurship). • Nursery supervisor/manager • Mushroom cultivation (Entrepreneurship). • Cyanobaterial, algal and microbial culture (Entrepreneurship). • Fermentation industries. Dairy farming industries. Dairy products industries. Spice Industries (Lichens) • Quarantine dept., Quality control/analyst, packaging, Lab. assistant

Job opportunities in Botany

Exit After **TWO** Year: **Diploma Course**

I Semester-A3: Plant Anatomy and Developmental Biology

IV Semester-A4: Ecology and Conservation Biology

Job opportunities in Botany
In Addition to one year certificate • Preparation of Anatomy embryology and Ecological slides for educational institutions and other line departments (Entrepreneurship). • Providing Anatomy embryology and Ecological materials for educational institutions and other line departments (Entrepreneurship). • Lab technician • Garden / nursery supervisor • Developing his/her own nursery (Entrepreneurship). • Forest guard, Wild life watch guard. • Forest nursery (Entrepreneurship).

Job opportunities in Botany

Exit After **THREE** Year: **Degree Course**

V Semester-A5: Plant Taxonomy and Resource Botany

V Semester-A6: Genetics and Cell Biology

VISemester-A7: Plant Physiology and Biochemistry

VI Semester-A8: Plant Biotechnology

Job opportunities in Botany
In Addition to two year diploma • Supplying the angiosperm plants and cytological slides to the educational institutions and other line departments (Entrepreneurship). • Advisor for Health department • Marketing NTFPs species (Entrepreneurship). • RFO/ forest officers • Biochemical Laboratory (Soil, Water, Air testing etc). (Entrepreneurship). • Adviser to grow advanced crop (Biotech crop). • Farmer friendly liaison officer. • Advisor for crop improvement programme.

Job opportunities in Botany

Exit After FOUR Year: Degree Course (Honors)

VII Semester-A9: Molecular Biology

VII Semester-A10: Seed Biology and Seed Technology

VII Semester-A11: Plant Health Technology

VIII Semester-A12: Medicinal Plants and Phytochemistry

VIII Semester-A13: Bioinformatics & Computational Biology

VIII Semester-A14: Research Methodology

Jobs opportunities in Botany
In Addition to three year degree
• Assisting for Ayurvedic doctors. • Medicinal plants Marketing (Entrepreneurship). • R & D Botany, Biotechnology, Ayurvedic and Pharmaceutical Lab. • Laboratory on checking food adulteration (Entrepreneurship). • Soil and water assessment laboratory (Entrepreneurship). • Biological material analysis Laboratory (Entrepreneurship). • Teacher in primary and High Schools. • Prepare for joining Research institution for Ph.D. programmes. • Wild life photographer • Separation and Analyzing phytochemical compounds. • Seed technician. • Plant health manager

SUGGESTED DISCIPLINE SPECIFIC ELECTIVE PAPERS (DSE): UG - BOTANY

Srl No	Subject
1.	Aquatic Botany
2.	Bio-analytical techniques.
3.	Stress Biology
4.	Introduction to plant breeding
5.	Biostatistics
6.	Biofuels & Technology
7.	Horticulture post-harvest practices
8.	Reproductive biology of Angiosperms.
9.	Agroforestry
10.	Food Science
11.	Plant Microbe interaction
12.	IPR
13.	Good laboratory practices
14.	Forensic Botany
15.	Botanical garden, landscaping & Greenhouse technology
16.	Herbal Technology
17.	Plant tissue culture
18.	Genetic Engineering in plants and biosafety
19.	Fermentation Technology
20.	Palynology
21.	Organic Farming
22.	Plant Genomics and proteomics
23	Mushroom Cultivation
24	Global Climate Change
25	Dendrology and Arboriculture

I B.Sc., I- Semester DSC-1

Microbial Diversity and Technology

Number of Theory Credits	Number of lecture hours/semester	Number of practical Credits	Number of practical hours / semester
4	56	2	56

Content of Theory Course 1	56 Hrs
Unit –1	15
Chapter No. 1: Microbial diversity-Introduction to microbial diversity; Methods of estimation; Hierarchical organization and positions of microbes in the living world. Whittaker's five-kingdom system and Carl Richard Woese's three-domain system. Distribution of microbes in soil, air, food and water. Significance of microbial diversity in nature	5
Chapter No. 2 History and developments of microbiology-Microbiologists and their contributions **(**Leeuwenhoek, Louis Pasteur, Robert Koch, Joseph Lister, Dmitri Iwanowski, Sergius Winogradsky and M W Beijerinck and Paul Ehrlich**)**	5
Chapter No. 3 Microscopy-Working principle and applications of light, dark field, phase contrast and electron microscopes (SEM and TEM). Microbiological stains (acidic, basic and special) and Principles of staining. Simple, Gram's and differential staining.	5

Unit – 2	15
Chapter No. 4. Culture media for Microbes-Natural and synthetic media, Routine media -basal media, enriched media, selective media, indicator media, transport media, and storage media.	5
Chapter No. 5. Sterilization methods -Principle of disinfection, antiseptic, tyndallisation and Pasteurization, **Sterilization-**Sterilization by dry heat, moist heat, UV light, ionization radiation, filtration. Chemical methods of sterilization-phenolic compounds, anionic and cationic detergents.	5
Chapter No. 6. Microbial Growth-Microbial growth and measurement. Nutritional types of Microbes- autotrophs and heterotrophs, phototrophs and chemotrophs; lithotrophs and organotrophs.	5
Unit – 3	11
Chapter No. 7 Microbial cultures and preservation-Microbial cultures. Pure culture and axenic cultures, subculturing, Preservation methods-overlaying cultures with mineral oils, lyophilisation. Microbial culture collections and their importance. A brief account on ITCC, MTCC and ATCC.	5
Chapter No. 8. Viruses- General structure and classification of Viruses; ICTV system of classification. Structure and multiplication of TMV, SARS-COV-2, and Bacteriophage (T2). Cultivation of viruses. Vaccines and types.	4
Chapter No. 9. Viroids- general characteristics and structure of Potato Spindle Tuber Viroid (PSTVd); Prions - general characters and Prion diseases**.** Economic importance of viruses.	2

Unit – 4	15
Chapter No. 10. Bacteria- General characteristics and classification. Archaebacteria and Eubacteria. Ultrastructure of Bacteria; Bacterial growth and nutrition. Reproduction in bacteria- asexual and sexual methods. Study of *Rhizobium* and its applications. A brief account of Actinomycetes and Cyanobacteria. Mycoplasmas and Phytoplasmas- Generalcharacteristics and diseases. Economic importance of Bacteria.	5
Chapter No. 11. Fungi-General characteristics and classification. Thallus organization and nutrition in fungi. Reproduction in fungi (asexual and sexual). Heterothallism and parasexuality. Type study of *Phytophthora, Rhizopus, Neurospora, Puccinia, Penicillium and Trichoderma***.** Economic importance of Fungi.	6
Chapter No. 12. Lichens – Structure and reproduction. **VAM Fungi** and their significance. **Plant diseases**-Late Blight of Potato, Black stem rust of wheat; Downy Mildew of Bajra, Grain smut of Sorghum, Sandal Spike, Citrus Canker, Root Knot Disease of Mulberry.	4

Text Books

1. Ananthnarayan R and Panikar JCK. 1986. Text book of Microbiology. Orient Longman ltd. New Delhi.
2. Arora DR. 2004. Textbook of Microbiology, CBS, NewDelhi.
3. William CG.1989. Understanding microbes. A laboratory text book for Microbiology. W.H. Freeman and Company. New York.
4. Dubey RC and Maheshwari DK. 2007. A textbook of Microbiology, S. Chand and Company, NewDelhi.
5. Dubey RC and Maheshwari DK. 2002. A Text book of Microbiology, S.C.Chand and Company, Ltd. Ramnagar, New Delhi.
6. Sharma R. 2006. Text book of Microbiology. Mittal Publications. New Delhi. 305pp.
7. Sharma PD. 1999. Microbiology and Plant Pathology. Rastogi publications. Meerut, India.
8. Vasanthkumari R. 2007. A textbook of Microbiology, BI Publications Pvt. Ltd., New Delhi.

References

1. Alexepoulos CJ and Mims CW. 1989. Introductory Mycology, Wiley Eastern Ltd., NewDelhi.
2. Allas RM. 1988. Microbiology: Fundamentals and Applications, Macmillan publishing co. New York.
3. Brook TD, Smith DW and Madigan MT. 1984. Biology of Microorganisms, 4th ed. Eaglewood Cliffts. N.J.Prentice- Hall. New Delhi.
4. Burnell JH and Trinci APJ. 1979. Fungal walls and hyphal growth, Cambridge UniversityPress. Cambridge.
5. Jayaraman J. 1985. Laboratory Manual of Biochemistry, Wiley Eastern Limited. New Delhi.
6. Ketchum PA. 1988. Microbiology, concepts and applications. John Wiley and Sons. New York.
7. Michel J, Pelczar Jr.EC and Krieg CR. 2005. Microbiology, Mc.Graw-Hill, NewDelhi.
8. Powar CB and Daginawala. 1991. General Microbiology, Vol – I and Vol – II Himalaya publishing house,Bombay.
9. Reddy S and Ram. 2007. Microbial Physiology. Scientific Publishers, Jodhpur, 385pp.
10. Sullia SB and Shantharam S. 1998. General Microbiology. Oxford and IBH publishing Co.Pvt.Ltd. New Delhi.
11. Schlegel HG. 1986. General Microbiology. Cambridge. University Press. London, 587pp.
12. Roger S, Ingrahan Y, Wheelis JL, Mark L and Page PR. 1990. Microbial World 5th edition. Prentice-Hall India, Pvt. Ltd. New Delhi.
13. Sullia SB. and Shantharam S. 2005. General Microbiology, Oxford and IBH, NewDelhi.

I B.Sc., I- Semester DSC-1

MICROBIAL DIVERSITY AND TECHNOLOGY

PRACTICALS **Lectures: 56 Hours**

(4 Hours/week)

Practical 1: Safety measures in microbiology laboratory and study of equipment/appliances used for microbiological studies (Microscopes, Hot air oven, Autoclave/Pressure Cooker, Inoculation needles/loop, Petri plates, Incubator, LAF, Colony counter, Haemo cytometer, Micrometer etc.).

Practical 2: Enumeration of soil/food /seed microorganisms by serial dilution technique.

Practical 3: Preparation of culture media (NA/PDA) sterilization, inoculation, incubation of *E coli / B. subtilis/* Fungi and study of cultural characteristics.

Practical 4: Determination of cell count by using Haemocytometer and determination of microbial cell dimension by using Micrometer.

Practical 5: Simple staining of bacteria (Crystal violet /Nigrosine blue) / Gram's staining of bacteria.

Practical 6: Isolation and study of morphology of *Rhizobium* from root nodules of legumes

Practical 7: Preparation of spawn and cultivation of paddy straw (Oyster) mushroom.

Practical 8: Study of vegetative structures and reproductive structures - *Albugo, Phytophthora, Rhizopus, Saccharomyces, Puccinia, Agaricus, Lycoperdon, Penicillium,(Depending on local availability)*

Practical 9: Preparation of agar slants, inoculation, incubation, pure culturing and preservation of microbes by oil overlaying.

Practical 10: Study of late blight of Potato, Downy mildew of Bajra, Citrus canker, Tobacco mosaic disease, Sandal spike disease.

Practical 11: Study of well-known microbiologists and their contributions through charts and photographs (As mentioned in theory).

Practical-12: Visit to water purification units/Composting/ microbiology labs/dairy and farms to understand role of microbes in day today life.

(**Note:** Botanical study tour to a floristic rich area for 1-2 days and submission of study report is compulsory)

SCHEME OF BOTANY THEORY EXAMINATION
I SEMESTER
MICROBIAL DIVERSITY AND TECHNOLOGY

Time: 2.5 Hours **Max Marks-** 60

Instructions: Draw neat labelled diagrams wherever necessary

I. Define/Explain any Four of the following: 2X4=8 Marks

1.
2.
3.
4.
5.
6.

II. Answer any Four of the following: 5X4=20 Marks

7.
8.
9.
10.
11.
12.

III. Answer any Four of the following: 8X4=32 Marks

13.
14.
15.
16.
17.
18.

***

BLUE PRINT OF BOTANY THEORY EXAMINATION

I SEMESTER-BLUE PRINT

MICROBIAL DIVERSITY AND TECHNOLOGY

Time: 2.5 Hours **Max Marks- 60**

Weightage of Marks				
Units	**2 marks**	**5 marks**	**8 marks**	**Total Mks.**
I	2X2=4	5X2=10	8X1=08	22
II	2X1=2	5X1=05	8X2=16	23
III	2X2=4	5X1=05	8X1=08	17
IV	2X1=2	5X2=10	8X2=16	28
	12 Marks	**30Marks**	**48 Marks**	**90 Marks**

I SEMESTER: PAPER A-1

SCHEME OF PRACTICAL QUESTION PAPER

MICROBIAL DIVERSITY AND TECHNOLOGY

Time: 3 Hours **Max Marks**- 25

I. Write critical notes on A, B & C **3X2=6 Marks**

A and B- Microbial Instruments (As mentioned in the syllabus)
C- Microbiologists (As mentioned in the Syllabus)
(Identification- 1 mark, Application/Contribution- 1Mark)

II. Bacterial staining D -Simple / Gram's staining **5 Marks**

(Preparation- 3 Marks Flow chart- 2 Marks)

III. Prepare a temporary stained slide E of the given material and leave the preparation for evaluation. **5 Marks**

(Rhizobium, Rhizopus, Saccharomyces, Penicillium)
(Identification- 1 Mark, Mounting- 2 Marks, Diagram with reasons- 2 Marks)

IV. Identify the Specimens F & G **2X3=6 Marks**

(F- Albugo, Phytophthora, Agaricus, Lycoperdon)
(G - Plant Diseases (As Mentioned in the Syllabus)
(Identification with Diagram - 2 Marks, Reason – 1Mark

V. Identify the Permanent Slide J **3 Marks**

(Fungi/Pathology)
(Identification & Diagram- 2 Marks, reasons- 1 Marks)

****

I SEMESTER: PAPER A-1

PRACTICAL QUESTION PAPER

MICROBIAL DIVERSITY AND TECHNOLOGY

Time: 3 Hours **Max Marks**- 25

I.	Write critical notes on **A, B** & **C**	**6 Marks**
II.	Bacterial staining **D -**Simple / Gram's staining	**5 Marks**
III.	Prepare a temporary stained slide **E** of the given material and leave the preparation for evaluation.	**5 Marks**
IV.	Identify the Specimens **F & G**	**2X3=6 Marks**
V.	Identify the Permanent Slide **J**	**3 Marks**

NOTE: Duly valued, Certified practical record & Submissions/ Assignments/ Tour or field visit reports are compulsorily to be submitted by the student.

****

B.Sc. BOTANY: Open Elective Course (OE-1.1)

Semester I

OE-1.1: PLANTS AND HUMAN WELFARE

Course Outcome:

On completion of this course, the students will be able to

1. To make the students familiar with economic importance of diverse plants that offer resources to human life.
2. To make the students known about the plants used as-food, medicinal value and also plant source of different economic value.
3. To generate interest amongst the students on plants importance in day today life, conservation, ecosystem and sustainability.

Number of Theory Credits	Number of lecture hours/semester	Number of practical Credits	Number of practical hours / semester
3	39	0	00

Content of Theory Course OE-1.1: PLANTS AND HUMAN WELFARE	39 Hrs
Unit I	13
Origin of Cultivated Plants. Concept of Centres of Origin, their importance with reference to Vavilov's work. Examples of major plant introductions. Crop domestication and loss of genetic diversity (Only conventional plant breeding methods). Importance of plant bio- diversity and conservation. **Cereals**: Wheat and Rice (origin, evolution, morphology, post-harvest processing & uses).Green revolution. Brief account of millets and their nutritional importance. **Legumes:** General account (including chief pulses grown in Karnataka- red gram, green gram, chick pea, soybean). Importance to man and ecosystem.	
Unit II	13
Cash crops: Morphology, new varieties and processing of sugarcane, products and by-products of sugarcane industry. Natural Rubber –cultivation, tapping and processing. **Spices:** Listing of important spices, their family and parts used, economic importance with special reference to Karnataka. Study of fennel, clove, black pepper and cardamom. **Fruits:** Mango, grapes and Citrus (Origin, morphology, cultivation ,processing and uses) **Beverages:** Tea, Coffee (morphology, processing&uses)	.
Unit III	13
Oils and fats: General description, classification, extraction, their uses and health implications; groundnut, coconut, sunflower and mustered (Botanical name, family & uses). Non edible oil yielding trees and importance as biofuel. Neem oil and applications.	

Essential Oils: General account. Extraction methods of sandal wood oil, rosa oil and eucalyptus oil. Economic importance as medicine, perfumes and insect repellents. **Drug-yielding plants:** Therapeutic and habit-forming drugs with special reference to Cinchona, Digitalis, Aloe vera and Cannabis. **Fibers:** Classification based on the origin of fibers; Cotton and jute (origin morphology, processing and uses).	

Text Books and References

1. Kochhar, S.L. (2012). Economic Botany in Tropics. MacMillan & Co. New Delhi.
2. Wickens, G.E. (2001). Economic Botany: Principles & Practices. The Netherlands: Kluwer Academic Publishers. Netherland.
3. Chrispeels, M.J. and Sadava, D.E. (1994) Plants, Genes and Agriculture. Jones & Bartlett - Publishers. Lincoln, United Kingdom

Pedagogy:

Lectures, Practicals, Field and laboratory visits, Participatory Learning, Seminars, Assignments, specimen submission etc

B.Sc. BOTANY: Open Elective Course (OE-1.2)

Semester I
OE 1.2: BOTANY FOR THE BEGINNERS

Course Outcome:

On completion of this course, the students will be able to

1. To make the students familiar with importance of Botany: plants as natural resources.
2. To make the students known about the plants used as-food, medicinal value and economic value for sustainable development.
3. To generate interest amongst the students to know the importance of plants in day today life, ecosystem restoration.

Number of Theory Credits	Number of lecture hours/semester	Number of practical Credits	Number of practical hours / semester
3	39	0	00

Content of Theory OE 1.2: BOTANY FOR THE BEGINNERS	39 hrs
UNIT I: Living World	**13 hrs**.
Origin of Cultivated Plants. Concept of Centres of Origin, their importance with reference to Vavilov's work. Examples of major plant introductions. Crop domestication and loss of genetic diversity (Only conventional plant breeding methods). Importance of plant bio- diversity and conservation. Concept of Living and Non Living: Viruses, Bacteria, Fungi, Plants and Animals; Five kingdom Classification- Classification of plants- Eichler's system – general characters of groups- An introduction to the Life cycle of plants. Cell Structure-Prokaryote and eukaryote	
UNIT II: Morphology of Angiosperms, Origin and Evolution of Life	**13 hrs**
Typical angiosperm plant: Functions of each organ viz. Root, Stem, leaves, inflorescence, flowers, fruit and seed. Flower: Basic structure - essential and non essential whorls. Definition, Ancient Concepts and Modern Concepts. Origin of Life – Geological Time scale – Variation in Hydrosphere, Lithosphere, Atmosphere and Biosphere from Pre Cambrian to Coenozoic era. Darwin's Natural Selection theory and Modern evidences at molecular and organismic level in support of Darwin's theroy	
UNIT III: Interaction between plants and animals	**13 hrs**
General concept on Interaction between plants, microbes and animals. Ecological Significance of Plants – Solar energy fixing Producers, Nitrogen fixation, biofertilisers, biopesticides, Symbiotic relationships-Mutualism, Commensalism, Protoco-operation, Parasitism.	

Plants and Animals for pollination and seed/fruit dispersal- Pollination- Entomophily, Chiropterophily, Myrmecophily Seed Dispersal: Zoochory, Specific case studies on examples for co evolution- Dodo and Calvaria, Butterflies and plants; Wasps and Ficus, mimicking for pollinators. Medicinal uses of plants – traditional knowledge and scientific knowledge – a brief account	

Text Books and References

1. Agarwal, S. K. (2009), Foundation Course in Biology, Ane Books Pvt. Ltd., New Delhi.
2. Datta, A C Class Book of Botany. New Delhi.
3. Mamatha Rao, Microbes and Non flowering plants-impacts and applications, Ane Books, Pvt Ltd, New Delhi.
4. Pandey, B. P. 2001.College Botany, Vol. I: Algae, Fungi, Lichens, Bacteria, Viruses, Plant Pathology, Industrial Microbiology and Bryophyta. S. Chand & Company Ltd, New Delhi.
5. Prithipal Singh (2007), An introduction to Biodiversity. Ane Books India, New Delhi
6. Raven, P.H; Johnson, G.B; Losos, J.B; Singer, S.R (2005), Biology, seventh edition, Tata McGraw Hill, New Delhi
7. Robert A Wallace. Biology: The world of life. Harper Collins Publishers

Pedagogy:

Lectures, Practicals, Field and laboratory visits, Participatory Learning, Seminars, Assignments, specimen submission etc

B.Sc. BOTANY: Open Elective Course (OE-1.3)

Semester I

OE 1.3: MUSHROOM CULTIVATION

Course Outcome:

On completion of this course, the students will be able to

1. To make the students familiar with mushroom cultivation for commercial exploitation.
2. To make the students known about the *Agaricus* (mushroom) used as-food, medicine and economic value for sustainable development.
3. To generate interest amongst the students to know the importance of mushroom in day today life.

Number of Theory Credits	Number of lecture hours/semester	Number of practical Credits	Number of practical hours / semester
3	39	0	00

Content of Theory Course OE 1.3: MUSHROOM CULTIVATION	39 hrs
UNIT-I . Mycology and Mushroom Biology	**13 hrs**.
Five kingdom classification of organisms. Kingdom fungi. General characters of form, function, reproduction and relationship with other organisms. Importance of fungi in human welfare. Morphology (range of form, macro-morphology, micro-morphology), life cycle of a typical mushroom and biological function. Edible, non-edible and poisonous species. Domestication of mushroom. Importance of mushroom in human nutrition, sustainable livelihood, ecosystem function and quality of the environment.	
UNIT II. Applied Mushroom Biology	**13 hrs**
Mushroom cultivation and production. Lab scale, pilot plant and large scale cultivation of commercial species. Crop cycle- spawn, substrate, substrate processing, spawning, spawn run, cropping, harvesting, environment requirement, post harvest practices, shelf life, preservation, storage, transport and marketing. Value-added products of mushroom. Constraints and environment management. Economics of mushroom cultivation. Designs of mushroom facility. Economics of mushroom cultivation and marketing.	
UNIT IV. Mushroom Biotechnology.	**13 hrs**
Concept. Preparation of flavours, appetizers, neutraceuticals, dietary supplements and cosmetics. Mushroom bioremediation. Cleaning of polluted sites. Utilization of mushroom mycelium or enzymes in recycling biological materials. Mycofiltration and applications of the process. Mycorrhiza applications. Biopulping, biobleaching and biotransformations. Biodetergents.	

References.

1. Harandar Singh 1991. Mushrooms: the art of Cultivation. Sterling Publishers.
2. Kaul, T.N.2001. Biology and conservation of Mushrooms. Oxford and IBH Publishing Company. New Delhi.
3.Tripathi, M. Mushroom Cultivation. Oxford and IBH Publishing Company. New Delhi.
4. Suman B.C. and Sharma V P.2007. Mushroom Cultivation in India. Eastern Book Corporation. New Delhi.
5. Singh R. and U.C.Singh 2005. Modern Mushroom Cultivation. Agrobios. New Delhi.

Pedagogy:

Lectures, Practicals, Field and laboratory visits, Participatory Learning, Seminars, Assignments, specimen submission etc

OPEN ELECTIVE
SCHEME OF BOTANY THEORY EXAMINATION I SEMESTER
MODEL QUESTION PAPER

Time: 2.5 Hours **Max Marks**- 60

Instructions: Draw neat labelled diagrams wherever necessary

I. Define/Explain any Four of the following 2X4=8 Marks

1.
2.
3.
4.
5.
6.

II. Answer any Four of the following 5X4=20 Marks

7.
8.
9.
10.
11.
12.

III. Answer any Four of the following 8X4=32 Marks

13.
14.
15.
16.
17.
18.

***

OPEN ELECTIVE
BLUE PRINT OF BOTANY THEORY EXAMINATION I SEMESTER

Time: 2.5 Hours **Max Marks- 60**

Weightage of Marks				
Units	**2 marks**	**5 marks**	**8 marks**	**Total Mks.**
I	**2X2=4**	**5X2=10**	**8X2=16**	**30**
II	**2X2=4**	**5X2=10**	**8X2=16**	**30**
III	**2X2=4**	**5X2=10**	**8X2=16**	**30**
	12 Marks	**30Marks**	**48 Marks**	**90 Marks**

I B.Sc., II- Semester DSC-2

Diversity of Non- Flowering Plants

Number of Theory Credits	Number of lecture hours/semester	Number of practical Credits	Number of practical hours/semester
4	56	2	56

Content of Theory Course 2	56Hrs
Unit –1	15
Chapter No. 1 Algae –Introduction and historical development in algology. General characteristics and classification of algae, Diversity- habitat, thallus organization, pigments, reserve food, flagella types, life-cycle and alternation of generation in Algae. Distribution of Algae.	5
Chapter No. 2 Morphology and reproduction and life-cycles of Nostoc, *Oedogonium, Chara, Sargassum and Batrachospermum*. Diatoms and their importance. Blue-green algae-A general account. Algal blooms and toxins.	5
Chapter No. 3 Algal cultivation- Cultivation of microalgae-*Spirulina* and *Dunaliella;* Algal cultivation methods in India. Algal products- Food and Nutraceuticals, Feed stocks, food colorants; fertilizers, aquaculture feed; therapeutics and cosmetics; medicines; dietary fibres from algae and uses.	5

Unit – 2	15
Chapter No. 4. Bryophytes – General characteristics and classification of Bryophytes, Diversity-habitat, thallus structure, Gametophytes and sporophytes.	5
Chapter No. 5 Distribution, morphology, anatomy, reproduction and life-cycles of *Riccia, Anthoceros*, and *Funaria.* Ecological and economic importance of Bryophytes. Fossil Bryophytes.	5
Chapter No. 6. . Pteridophytes- General characteristics and classification; Structure of sporophytes and life-cycles. Distribution, morphology, anatomy, reproduction and life-cycles in *Selaginella*, *Equisetum*, *Pteris* and *Salvinia*.	5
Unit – 3	15
Chapter No. 7 A brief account of heterospory and seed habit. Stelar evolution in Pteridophytes. Affinities and evolutionary significance of Pteridophytes. Ecological and economic importance.	5
Chapter No. 8. Gymnosperms- General characteristics. Distribution and classification of Gymnosperms. Study of the habitat, distribution, habit, anatomy, reproduction and life-cycles in Cycas, Pinus and Gnetum.	5
Chapter No. 9. Affinities and evolutionary significance of Gymnosperms. Economic importance of Gymnosperms - food, timber, industrial uses and medicines.	5

Unit – 4	11
Chapter No. 10. Origin and evolution of Plants: Origin and evolution of plants through Geological Time scale.	2
Chapter No. 11. Paleobotany- Paleobotanical records, plant fossils, Preservation of plant fossils - impressions, compressions, petrification's, moulds and casts, pith casts. Radiocarbon dating.	5
Chapter No. 12. Fossil taxa- *Rhynia, Lepidodendron, Lepidocarpon,Lyginopteris and Cycadeoidea*. Exploration of fossil fuels. Birbal Sahni Institute of Paleosciences.	4

Text Books

1) Chopra, G.L. A text book of Algae. Rastogi & Co., Meerut, Co., New Delhi, Depot.Allahabad.
2) Johri, Lata anf Tyagi, 2012, A Text Book of, Vedam e Books, New Delhi.
3) Sharma, O.P. 1990. Text Book of Pteridophyta. McMillan India Ltd. New Delhi.
4) Sharma, O.P. 1992. Text Book of Thallophytes. McGraw Hill Publishing Co. New Delhi.
5) Sharma, O.P., 2017, Algae Singh-Pande-Jain 2004-05. A Text Book of Botany.Rastogi Publication, Meerut.

References

1. Sambamurty, A.V.S.S.. A Text Book of Algae. I.K. International Private Ltd., New Delhi.
2. Agashe, S.N. 1995. Paleobotany. Plants of the past, their evolution, paleoenvironment and Allied plants. Hutchinson & Co., Ltd., London.
3. Anderson R.A. 2005, Algal cultural Techniques, Elsievier, London.
4. Publication, Application in exploration of fossil fuels. Oxford & IBH., New Delhi.

5. Eams, A.J., (1974) Morphology of vascular plants - Lower groups. Tata Mc Grew- Hill Publishing Co. New Delhi, Freeman & Co., New York.
6. Fritze, R.E. 1977. Structure and reproduction of Algae. Cambridge University Press.
7. Goffinet B and Shaw A.J. 2009, Bryophyte Biology, 2nd ed. Cambridge Unversity Press, Cambridge.Gymnosperms.
8. Srivastava, H N, 2003. Algae Pradeep Publication, Jalandhar, India.
9. Kakkar, R.K. and B.R.Kakkar (1995) The Gymnosperms (Fossils and Living) Central Publishing House, Allahabad.
10. Kumar H. D., 1999, Introductory Phycology, Affiliated East-West Press, Delhi.
11. Lee, R.E., 2008, Phycology, Cambridge Unversity Press, Cambridge. 4th edition.McGraw Hill Publishing Co., New Delhi.
12. Parihar, N.S. 1970. An Introduction to Embryophyta. Vol. I. Bryophyta. Central Book, Allhabad.
13. Parihar, N.S. (1976) An Introduction to Pteridophytes, Central Book Depot, Allhabad.
14. Parihar, N.S. 1977. The Morphology of Pteridophytes. Central Book Depot., Allahabad.Press, Cambridge.
15. Rashid, A. 1998. An Introduction to Pteridophyta. II ed., Vikas Publishing House, New Delhi.
16. Smith, G.M. 1971. Cryptogamic Botany. Vol. II. Bryophytes & Pteridophytes. Tata Tata McGraw Hill Publishing, New Delhi.
17. Smith, G.M. 1971. Cryptogamic Botny. Vol.I Algae & Fungi. Tata McGraw Hill Publishing. New Delhi.
18. Sporne, K.R. 1965. The Morphology of Gymnosperms. Hutchinson & Co., Ltd., London.
19. Stewart, W.M. 1983. Paleobotany and the Evolution of Plants, Cambridge University Cambridge.
20. Sundarajan, S. 1997. College Botany Vol. I. S Chand & Co. Ltd., New Delhi.
21. Vanderpoorten, A. and Goffinet, B. 2009, Introduction to Bryophytes, Cambridge Unversity Press, Cambridge.
22. Vashista, B.R. 1978. Bryophytes. S Chand & Co. Ltd., New Delhi.

I B.Sc., II- Semester DSC-2

Diversity of Non- Flowering Plants

PRACTICALS **Lectures: 56 Hours**

(4 Hours/week)

Practical-1: Study of morphology, classification, reproduction and lifecycle of

Nostoc.

Practical-2: Study of morphology, classification, reproduction and life-cycle of

*Oedogonium & Chara,*Sargassum, *Batrachospermum/ Polysiphonia*.

Practical-3: Study of morphology, classification, reproduction and life-cycle of

Riccia/Marchantia &Anthoceros.

Practical-4: Study of morphology, classification, anatomy, reproduction and life-cycle of

Selaginella and Equisetum.

Practical -5: Study of morphology, classification, anatomy, reproduction and life-cycle of

Pteris, Azolla..

Practical -6: Study of morphology, classification, anatomy and reproduction

in *Cycas*.

Practical -7: Study of morphology, classification & anatomy, reproduction in

Pinus.

Practical -8: Study of morphology, classification & anatomy, reproduction in

Gnetum.

Practical -9: Study of imporratnt blue green algae causing water blooms in

the lakes.

Practical -10: Study of different methods of cultivation of ferns in a nursery.

Practical -11: Preparation of natural media and cultivation of *Azolla* in artificial ponds.

Practical -12: Media preparation and cultivation of *Spirulina*.

Practical -13: Study different algal products and fossils impressions and slides/Photographs.

Practical-14: Visit to algal cultivation units/lakes with algal blooms/Fern house/ Nurseries/Geology museum/lab to study plant fossils.

(Note: Botanical study tour to a floristic rich area for 1-2 days and submission of study report is compulsory)

SCHEME OF BOTANY THEORY EXAMINATION
II SEMESTER
MODEL QUESTION PAPER
DIVERSITY OF NON FLOWERING PLANTS

Time: 2.5 Hours **Max Marks-** 60

Instructions: Draw neat labelled diagrams wherever necessary

I. Define/Explain any Four of the following: 2X4=8 Marks

1.
2.
3.
4.
5.
6.

II. Answer any Four of the following: 5X4=20 Marks

7.
8.
9.
10.
11.
12.

III. Answer any Four of the following: 8X4=32 Marks

13.
14.
15.
16.
17.
18.

***

BLUE PRINT OF BOTANY THEORY EXAMINATION II SEMESTER

DIVERSITY OF NON FLOWERING PLANTS

Time: 2.5 Hours **Max Marks-** 60

Weightage of Marks				
Units	**2 marks**	**5 marks**	**8 marks**	**Total Mks.**
I	2X2=4	5X2=10	8X1=08	22
II	2X1=2	5X2=10	8X2=16	28
III	2X1=2	5X1=05	8X2=16	23
IV	2X2=4	5X1=05	8X1=08	17
	12 Marks	**30Marks**	**48 Marks**	**90 Marks**

II SEMESTER

SCHEME OF PRACTICAL QUESTION PAPER

DIVERSITY OF NON- FLOWERING PLANTS

Time: 3 Hours **Max Marks**- 25

I. Prepare a temporary stained slide of the given material A and leave the preparation for evaluation `5 Marks

Algae (Nostoc, Oedogonium, Chara, Batrachospermum / Polysiphonia)

(Preparation - 2 Mark, Diagram-1 Marks, Identification with Reasons- 2 Marks)

II. Identify the given specimens B & C 2X3=6 Marks

B- Bryophytes (Marchantia and Anthoceros)
C- Pteridophytes (Selaginella, Equisetum, Pteris , Azolla,)

(Identification- 1 Mark, Diagram with reasons- 2 Marks)

III. Identify the Permanent Slides D, E, F & G 4X2=8 Marks

(One each from Algae, Bryophyte, Pteridophyte and Gymnosperms)

(Identification- 1 Mark, Diagram with Reasons-1 Marks)

IV. Comment on H & I 2X3=6 Marks

H- Gymnosperm
I – Fossils

(Identification- 1 Mark, Diagram with Reasons- 2 Marks)

****

II SEMESTER

PRACTICAL QUESTION PAPER

DIVERSITY OF NON- FLOWERING PLANTS

Time: 3 Hours **Max Marks**- 25

I. Prepare a temporary stained slide of the given material **A** and leave the preparation for evaluation

5 Marks

II. Identify the given specimens **B &C** **2X3=6 Marks**

III. Identify the Permanent Slides **D, E, F & G** **4X2=8 Marks**

IV. Comment on **H & I** **2X3=6 Marks**

NOTE: Duly valued, Certified practical record & Submissions/ Assignments/ Tour or field visit reports are compulsorily to be submitted by the student.

****

Open Elective Course (OE-2.1)
I B.Sc., Semester II

PLANT PROPAGATION, NURSERY MANAGEMENT AND GARDENING

Paper Outcome:

On completion of this course, the students will be able to

1. To gain knowledge of gardening, cultivation, multiplication, raising of seedlings of garden plants.
2. To get knowledge of new and modern techniques of plant propagation.
3. To develop interest in nature and plant life.

Number of Theory Credits	Number of lecture hours/semester	Number of practical Credits	Number of practical hours / semester
3	39	0	00

Unit I :Nursery and Vegetative propagation	13
Definition, objectives and scope and general practices and building up of infrastructure for nursery, planning and seasonal activities. Planting - direct seeding and transplants, Soil free/soilless/ synthetic growth mediums for pots and nursery. Air-layering, cutting, selection of cutting, collecting season, treatment of cutting, rooting medium and planting of cuttings. Hardening of plants .Green house, mist chamber, shed root, shade house and glass house.	
Unit II :Gardening	13
Definition, objectives and scope. Different types of gardening - landscape and home/terrace gardening, parks and its components. Plant materials and design. Computer applications in landscaping, Gardening operations: soil laying, manuring, watering, management of pests and diseases and harvesting.	
Unit III: Seed, Sowing/raising of seeds and seedlings	13
Structure and types - Seed dormancy; causes and methods of breaking dormancy. Seed storage: Seed banks, factors affecting seed viability, genetic erosion Seed production technology. Seed testing and certification. Transplanting of seedlings - Study of cultivation of different vegetables and flowering plants: cabbage, brinjal, lady's finger, tomatoes, carrots, bougainvillea, roses, geranium, ferns, petunia, orchids etc. Storage and marketing procedures. Developing and maintence of different types of lawns. Bonsai technique.	

Text Books and References

1. Agrawal, P.K. (1993). Hand Book of Seed Technology. Dept. of Agriculture and Cooperation, National Seed Corporation Ltd. New Delhi.
2. Bose T.K., Mukherjee, D. (1972). Gardening in India. Oxford & IBH Publishing Co. New Delhi.
3. Jules, J. (1979). Horticultural Science, 3rd edition. W.H. Freeman and Co. San Francisco, California.
4. Kumar, N. (1997). Introduction to Horticulture. Rajalakshmi Publications. Nagercoil, Tamil Nadu.
5. Musser E., Andres. (2005). Fundamentals of Horticulture. McGraw Hill Book Co. New Delhi
6. Sandhu, M.K. (1989). Plant Propagation. Walle Eastern Ltd. Bangalore.

Pedagogy:

Lectures, Practicals, Field and laboratory visits, Participatory Learning, Seminars, Assignments, specimen submission etc

Open Elective Course (OE-2.2)

I B.Sc., Semester II

BIO-FUELS

Course Outcome:

On completion of this course, the students will be able to

1. To make the students familiar with Bio-fuel plant species cultivation for commercial exploitation.
2. To make the students known about the Bio-fuel used in automobile industries and solving fuel problems in feature.
3. To generate interest amongst the students to know the importance of Bio-fuel in day today life and economic wellbeing.

Number of Theory Credits	Number of lecture hours/semester	Number of practical Credits	Number of practical hours / semester
3	39	0	00

UNIT-I	**10 hrs**.
Introduction, definition, scope and Importance of Bio-fuel with respect to climate change and environmental issues. Public awareness. Biofuels scenario in India and world. History of Biofuels. Advantages and disadvantages of biofuels. Developmental generation of biofuels: first, second, third and fourth generation of biofuels and present status.	
UNIT II	**16 hrs**
Biofuel feed stocks: Agricultural waste, farm waste, forestry waste, organic wastes from the residential, institutional and industrial waste and its importance.(Biomass-plant, animal and microbial based waste). Algal biofuel. Biodiesel species: *Pongamia pinnata, Simarouba gluca, Jatropha curcas, Azardirachta india, Madhuca indica* and *Callophyllum innophyllum* . Seed harvesting, processing, oil extraction, and characterization.	
UNIT III	**13 hrs**
Introduction to biodiesel, bioethanol, biogas and bio hydrogen. Production technology of biofuels (Biodiesel, ehanol and biogas). Quality analysis of biodiesel, bioethanol and biogas and its comparison with national and international standards. Biofuel sustainability; Biofuel Policy in Karnataka and India. Biofuel production statistics. Fuel against food security concepts.	

Text Books and References

1) The Biodiesel Handbook (2005). Jurgen Krahl, Jon Harlan Van Gerpen.AOCS Press.
2) Bioenergy and Biofuels (2017).Ozcan Konur. CRC Press, Taylor & Franci's group.
3) https://mnre.gov.in/biofuels

Pedagogy:

Lectures, Practicals, Field and laboratory visits, Participatory Learning, Seminars, Assignments, specimen submission etc

Open Elective Course (OE-2.3)

I B.Sc., Semester II

BIOFERTILISERS

Course Outcome:

On completion of this course, the students will be able to

1. To make the students familiar with bio-fertilizer plant species cultivation for commercial exploitation.
2. To make the students known about the bio-fertilizer used in agriculture forming and industries and solving problems erupted by synthetic fertilizer.
3. To generate interest amongst the students to know the importance of bio-fertilizer in day today agricultural practices and economic wellbeing.

Number of Theory Credits	Number of lecture hours/semester	Number of practical Credits	Number of practical hours / semester
3	39	0	00

Content of Theory Course 2.3: BIOFERTILISERS	39 hrs
UNIT-I . General account, isolation and mass multiplication	**13 hrs**.
General account about the microbes used as biofertilizer – Rhizobium – isolation, identification, mass multiplication, carrier based inoculants, Actinorrhizal symbiosis. *Azospirillum:* isolation and mass multiplication – carrier based inoculants, associative effect of different microorganisms. *Azotobacter*: classification, characteristics – crop response to *Azotobacter* inoculum, maintenance and mass multiplication	
UNIT II. Association of Cyanobacteria and Fungi	**13hrs**
Cyanobacteria (blue green algae), *Azolla* and *Anabaena Azollae* association, nitrogen fixation, factors affecting growth, blue green algae and *Azolla* in rice cultivation Mycorrhizal association, types of mycorrhizal association, taxonomy, occurrence and distribution, phosphorus nutrition, growth and yield – colonization of VAM –its influence on growth and yield of crop plants	
UNIT III. Applications of Cyanobacteria and Fungi	**13 hrs**
Organic farming – Green manuring and organic fertilizers, Recycling of biodegradable municipal, agricultural and Industrial wastes – bio-compost making methods, types and method of vermin-composting – field Application.	

Suggested Readings

1. Dubey, R.C., 2005 A Text book of Biotechnology S. Chand & Co, New Delhi.
2. Kumaresan, V. 2005, Biotechnology, Saras Publications, New Delhi.
3. John Jothi Prakash, E. 2004. Outlines of Plant Biotechnology. Emkay Publication, New Delhi.
4. Sathe, T.V. 2004 Vermiculture and Organic Farming. Daya Publishers. New Delhi.
5. Subha Rao, N.S. 2000, Soil Microbiology, Oxford & IBH Publishers, New Delhi.
6. Vayas, S.C, Vayas, S. and Modi, H.A. 1998 Bio-fertilizers and organic Farming Akta Prakashan, Nadiad

PEDAGOGY:

Lectures, Practicals, Field and laboratory visits, Participatory Learning, Seminars, Assignments, specimen submission etc

OPEN ELECTIVE
SCHEME OF BOTANY THEORY EXAMINATION II SEMESTER
MODEL QUESTION PAPER

Time: 2.5 Hours **Max Marks**- 60

Instructions: Draw neat labelled diagrams wherever necessary

I. Define/Explain any Four of the following 2X4=8 Marks

1.
2.
3.
4.
5.
6.

II. Answer any Four of the following 5X4=20 Marks

7.
8.
9.
10.
11.
12.

III. Answer any Four of the following 8X4=32 Marks

13.
14.
15.
16.
17.
18.

***

OPEN ELECTIVE
BLUE PRINT OF BOTANY THEORY EXAMINATION II SEMESTER

Time: 2.5 Hours **Max Marks- 60**

Weightage of Marks				
Units	**2 marks**	**5 marks**	**8 marks**	**Total Mks.**
I	**2X2=4**	**5X2=10**	**8X2=16**	**30**
II	**2X2=4**	**5X2=10**	**8X2=16**	**30**
III	**2X2=4**	**5X2=10**	**8X2=16**	**30**
	12 Marks	**30Marks**	**48 Marks**	**90 Marks**

JSS COLLEGE OF ARTS COMMERCE & SCIENCE
(Autonomous)
Ooty Road, Mysuru – 25

DEPARTMENT OF COMMERCE AND MANAGEMENT

BBA Pragramme
(I Year)

Syllabus as per NEP
2021-22 Scheme

BBA PROGRAM

Semester I								
Sl. No.	Course Code	Title of the Course	Category of Courses	Teaching Hours per Week (L + T + P)	SEE	CIE	Total Marks	Credits
1	Lang.1.1	Language - I	AECC	3+1+0	60	40	100	3
2	Lang.1.2	Language - II	AECC	3+1+0	60	40	100	3
3	BBA.1.1	Management Principles & Practice	DSC	4+0+0	60	40	100	4
4	BBA.1.2	Fundamentals of Business Accounting	DSC	3+0+2	60	40	100	4
5	BBA.1.3	Marketing Management	DSC	4+0+0	60	40	100	4
6	BBA.1.4	Digital Fluency	SEC-SB	1+0+2	50	50	100	2
7	BBA.1.5	Business Organization and Management / Skills For Management	OEC	3+0+0	50	50	100	3
Sub –Total (A)					450	250	700	23
Semester II								
Sl. No.	Course Code	Title of the Course	Category of Courses	Teaching Hours per Week (L + T + P)	SEE	CIE	Total Marks	Credits
8	Lang.2.1	Language - I	AECC	3+1+0	60	40	100	3
9	Lang.2.2	Language - II	AECC	3+1+0	60	40	100	3
10	BBA.2.1	Financial Accounting and Reporting	DSC	3+0+2	60	40	100	4
11	BBA.2.2	Human Resource Management	DSC	4+0+0	60	40	100	4
12	BBA.2.3	Business Environment/ Business Mathematics	DSC	4+0+0/ 3+0+2	60	40	100	4
13	BBA.2.4	Health Wellness/ Social & Emotional Learning	SEC-VB	1+0+2	-	100	100	2
14	BBA.2.5	Environmental Studies	AECC	2+0+0	50	50	100	2
15	BBA.2.6	People Management / Functional Areas of Management	OEC	3+0+0	50	50	100	3
Sub –Total (B)					450	350	800	25

Notes:

- **One Hour of Lecture is equal to 1 Credit.**
- **One Hour of Tutorial is equal to 1 Credit (Except Languages).**
- **Two Hours of Practical is equal to 1 Credit**

Acronyms Expanded

- **AECC : Ability Enhancement Compulsory Course**
- **DSC © : Discipline Specific Core (Course)**
- **SEC-SB/VB : Skill Enhancement Course-Skill Based/Value Based**
- **OEC : Open Elective Course**
- **DSE : Discipline Specific Elective**
- **SEE : Semester End Examination**
- **CIE : Continuous Internal Evaluation**
- **L+T+P : Lecture+Tutorial+Practical(s)**

Note: Practical Classes may be conducted in the Business Lab or in Computer Lab or in Class room depending on the requirement. One batch of students should not exceed half (i.e., 30 or less than 30 students) of the number of students in each class/section. 2 Hours of Practical Class is equal to 1 Hour of Teaching, however, whenever it is conducted for the entire class (i.e., more than 30 students) 2 Hours of Practical Class is equal to 2 Hours of Teaching.

Revised Syllabus for 1st And 2nd Semester BBA Degree as Per NEP Regulations to be implemented From the Academic Year 2023-2024

I. OBJECTIVES OF THE COURSE:

1. To develop the skills required for the application of business concepts and techniques learnedin the classroom at the workplace.
2. To provide competent and technical skills personnel to the industry in the area of Marketing, Finance, Human Resource, Data Analytics, Retailing and Logistics And Supply Chain Management. To enhance the employability skills of the management students.
3. To enhance the capability of the students improve their decision-making skills.
4. To encourage entrepreneurship among students pursuing education in the field of BusinessAdministration.
5. To empower students for pursuing professional courses like MBA, Chartered Accountancy, Company Secretary, etc.,
6. To ensure holistic development of Business administration students.

II. ELIGIBILITY FOR ADMISSION:

Candidates who have passed Two Year Pre University Course of Karnataka State in any discipline or its equivalent (viz., 10+2 of other states, ITI, Diploma etc.) are eligible for admission into this program.

III. DURATION OF THE PROGRAM:

The program of study is Four years of Eight Semesters. A candidate shall complete his/her degree within eight academic years from the date of his/her admission to the first semester. The NEP 2020 provides multiple exit options for students as specified below:

EXIT OPTION:

a. The students who successfully complete ONE year/ 2 Semesters and leave the program, will be awarded Certificate in Business Administration.
b. The students who successfully complete TWO years/ 4 Semesters and leave the program, will be awarded Diploma in Business Administration.
c. The students who successfully complete THREE years/ 6 Semesters and leave the program, will be awarded Bachelors Degree in Business Administration (BBA)

IV. MEDIUM OF INSTRUCTION

The medium of instruction shall be English.

V. ATTENDANCE

a. For the purpose of calculating attendance, each semester shall be taken as a Unit.
b. A student shall be considered to have satisfied the requirement of attendance for the semester, if he/she has attended not less than 75% in aggregate of the number of working periods in eachof the subjects compulsorily.

c. A student who fails to complete the course in the manner stated above shall not be permitted totake the University Examination.

VI. TEACHING AND EVALUATION

MBA graduates with BBM/BBA, B.Com and BBS as basic degree from a recognized University are only eligible to teach and to evaluate all the Business Administration courses except Languages, Constitution of India, Environmental Studies, Health Wellness/Social and Emotional learning, Sports/NCC/NSS/Other)

VII. SKILL DEVELOPMENT / RECORD MAINTENANCE

a. Every college is required to establish a dedicated business lab for the purpose of conducting practical/ assignments to be written in the record.
b. In every semester, the student should maintain a record book in which a minimum of 5exercise or activities per course are to be recorded.

VIII. SCHEME OF EXAMINATION

a. There shall be an University examination at the end of each semester. The maximum marks for the university examination in each paper shall be 60 marks for DSC, DSE, Vocational,SEC and OEC.
b. Internal Assessment 40 marks for DSC, DSE, Vocational, SEC and OEC.

IX. GUIDELINES FOR CONTINUOUS INTERNAL EVALUATION AND SEMESTER END EXAMINATION:

The CIE and SEE will carry 40% and 60% weightage each, to enable the course to be evaluated for a total of 100 marks, irrespective of its credits. The evaluation system of the course is comprehensive & continuous during the entire period of the Semester. For a course, the CIE and SEE evaluation will be on the following parameters:

Sl No.	Parameters for the Evaluation	Marks
	Continuous Internal Evaluation (CIE)	
1	Continuous and Comprehensive Evaluation (CCE) – (A)	20 Marks
2	Internal Assessment test (IAT) – (B)	20 Marks
	Total of CIE (A+B)	**40 Marks**
3	Semester End Examination (SEE) – (C)	60 Marks
	Total of CIE and SEE (A+B+C)	**100 Marks**

Continuous Internal Evaluation (CIE)

a. **Continuous & Comprehensive Evaluation (CCE):** The CCE will carry a maximum of 20% weightage (20 marks) of total marks of a course. Before the start of the academic session in each semester, a faculty membershould choose for his/her course, minimum of the following assessment methods with 5markse each (4x5=20 marks)

   i. Individual Assignments

   ii. Seminars/Class room Presentations/Quizzes

iii. Group Discussions/Class Discussion / group assignments

iv. Casestudies/ Caselets

v. Participatory &Industry-Integrated Learning/Industrial visits

vi. Practical Activities / Problem Solving Exercises

vii. Parucipation in seminars/ academic events /symposia

viii. Mini project / Capstone projects

b. Internal Assessment Test (IAT):

The IAT will carry a maximum of 20% weightage (20 marks) of total marks of a course. Under this component, two tests will have to be conducted in a semester for 30 marks each and the same is to be scaled down to 10 marks each.

c. Semester End Examination (SEE):

The semester end examination for all the students for which students who get registered during the semester shall be conducted for 60 marks. SEE of the course shall be conducted subject to their fulfillment of minimum attendance requirement as per the university norms. The BOS of the university shall prepare the SEE framework and the question paper pattern.

d. Minimum marks for a Pass:

Candidates who have obtained 35% marks in semester end examination i.e., 21 marks out of 60 marks of theory examination and 40% in aggregate i.e., total 40 marks out of 100 marks of semester end examination marks and continuous internal evaluation marks.

Name of the Program: Bachelor of Business Administration (BBA)
Course Code: BBA 1.1
Name of the Course: Management Principles & Practice

Course Credits	No. of Hours per Week	Total No. of Teaching Hours
4 Credits	4 Hrs	56 Hrs

Pedagogy: Classrooms lecture, tutorials, Group discussion, Seminar, Case studies & field work etc.,

Course Outcomes: On successful completion of the course, the Students will demonstrate

a) The ability to understand concepts of business management, principles and functionof management.
b) The ability to explain the process of planning and decision making.
c) The ability to create organization structures based on authority, task and responsibilities.
d) The ability to explain the principles of direction, importance of communication,barrier of communication, motivation theories and leadership styles.
e) The ability to understand the requirement of good control system and control techniques.

Syllabus:	Hours
Module No. 1: INTRODUCTION TO MANAGEMENT	**10**
Introduction –Meaning, Evolution of management thought, Pre-Scientific Management Era, Classical Management Era, Neo-Classical Management Era, Modern Management Era; Nature and Characteristics of Management - Scope and Functional areas of Management; Management as a Science, Art or Profession; Management and Administration; Principles of Management.	
Module No. 2: PLANNING AND DECISION MAKING	**08**
Nature, Importance and Purpose of Planning - Planning Process; Objectives; Types of plans (Meaning only); Decision making- Importance and steps; MBO and MBE (Meaning only)	
Module No. 3: ORGANIZING AND STAFFING	**12**
Nature and purpose of Organization; Principles of Organizing; Delegation of Authority; Types of Organization - Departmentation, Centralization vs Decentralization ofAuthority and Responsibility, Span of Control; Nature and importance of Staffing	
Module No. 4: DIRECTING AND COMMUNICATING	**12**
Meaning and Nature of Direction, Principles of Direction; Communication - Meaning and Importance, Communication Process, Barriers to Communication, Steps to overcome Communication Barriers, Types of Communication; Motivation theories – Maslow's Need Hierarchy Theory, Herzberg's Two Factor Theory, Mc.Gregor's X and Y theory. Leadership – Meaning, Formal and Informal Leadership, Characteristics of Leadership; Leadership Styles – Autocratic Style, Democratic Style, Participative Style, Laissez Faire Leadership Styles, Transition Leadership, Charismatic Leadership Style.	
Module No. 5: COORDINATING AND CONTROLLING	**10**
Coordination–Meaning, Importance and Principles. Controlling-Meaning and steps in controlling, Essentials of Effective Control system, Techniques of Control (in brief).	
Module No. 6: BUSINESS SOCIAL RESPONSIBILITY AND MANAGERIAL ETHICS	**04**

Business Social Responsibility - Meaning, Arguments for and against Business Social Responsibility; Green management - Meaning, Green Management Actions; Managerial Ethics – Meaning - Importance of Ethics in Business, Factors that determine Ethical or Unethical behavior.

Skill Developments Activities:

1. Two cases on the above syllabus should be analyzed by the teacher in the classroom and the same needs to be recorded by the student in the Skill Development Book.
2. Draft different types of Organization structure.
3. Draft Control charts.

Text Books:

1. Stephen P. Robbins, Management, Pearson
2. Koontz and O‟‟Donnell, Management, McGraw Hill.
3. L M Prasad, Principles of management, Sultan Chand and Sons
4. V.S.P Rao/Bajaj, Management process and organization, Excel Books.GH25
5. Appanniah and Reddy, Management, HPH.
6. T. Ramaswamy : Principles of Management, HPH.

Note: Latest edition of text books may be used.

Name of the Program: Bachelor of Business Administration (BBA)

Course Code: BBA 1.2

Name of the Course: Fundamentals of Business Accounting

Course Credits	No. of Hours per Week	Total No. of Teaching Hours
4 Credits	**4 Hrs**	**56 Hrs**

Pedagogy: Classrooms lecture, tutorials, and problem solving.

Course Outcomes: On successful completion of the course, the Students will demonstrate

a) Understand the framework of accounting as well accounting standards.
b) The Ability to pass journal entries and prepare ledger accounts
c) The Ability to prepare subsidiaries books
d) The Ability to prepare trial balance and final accounts of proprietary concern.
e) Construct final accounts through application of tally.

Syllabus:	**Hours**
Module No. 1: INTRODUCTION TO FINANCIAL ACCOUNTING	**08**
Introduction – Meaning and Definition – Objectives of Accounting – Functions of Accounting – Users of Accounting Information – Limitations of Accounting – Accounting Cycle - Accounting Principles – Accounting Concepts and Accounting Conventions. Accounting Standards – objectives- significance of accounting standards. List of Indian Accounting Standards.	
Module No. 2: ACCOUNTING PROCESS	**12**
Meaning of Double entry system − Process of Accounting − Kinds of Accounts − Rules - Transaction Analysis − Journal − Ledger − Balancing of Accounts − Trial Balance − Problems on Journal, Ledger Posting and Preparation of Trial Balance.	
Module No. 3: SUBSIDIARY BOOKS	**14**
Meaning − Significance − Types of Subsidiary Books −Preparation of Purchases Book, Sales Book, Purchase Returns Book, Sales Return Book, Bills Receivable Book, Bills Payable Book. Types of Cash Book- Simple Cash Book , Double Column Cash Book , Three Column Cash Book and Petty Cash Book(Problems only on Three Column Cash Book and Petty Cash Book), Bank Reconciliation Statement − Preparation of Bank Reconciliation Statement (Problems on BRS)	
Module No. 4: FINAL ACCOUNTS OF PROPRIETARY CONCERN	**10**
Preparation of Statement of Profit and Loss and Balance Sheet of a proprietary concern with special adjustments like depreciation, outstanding and prepaid expenses, outstanding and received in advance of incomes, provision for doubtful debts, drawings and interest on capital.	
Module No. 5: ACCOUNTING SOFTWARE	**12**

Introduction-meaning of accounting software, types accounting software-accounting software Tally-Meaning of Tally software − Features − Advantages, Creating a New Company, Basic Currency information, other information, Company features and Inventory features. Working in Tally: Groups, Ledgers, writing voucher, different types of voucher, voucher entry Problem on Voucher entry - Generating Basic Reports in Tally-Trail Balance, Accounts books, Cash Book, Bank Books, Ledger Accounts, Group Summary, Sales Register and Purchase Register, Journal Register, Statement of Accounts, and Balance Sheet**.**

Skill Developments Activities:

1. List out the accounting concepts and conventions.
2. Prepare a Bank Reconciliation Statement with imaginary figures
3. Collect the financial statement of a proprietary concern and record it.
4. Prepare a financial statement of an imaginary company using tally software.

Text Books:

1. Hanif and Mukherjee, Financial Accounting, Mc Graw Hill Publishers
2. Arulanandam & Raman; Advanced Accountancy, Himalaya Publishing House
3. S.Anil Kumar,V.Rajesh Kumar and B.Mariyappa–Fundamentals of Accounting,
4. Himalaya Publishing House.
5. Dr. S.N. Maheswari, Financial Accounting, Vikas Publication
6. S P Jain and K. L. Narang, Financial Accounting, Kalyani Publication
7. Radhaswamy and R.L. Gupta, Advanced Accounting , Sultan Chand
8. M.C. Shukla and Goyel, Advaced Accounting , S Chand.

Note: Latest edition of text books may be used.

Name of the Program: Bachelor of Business Administration (BBA)
Course Code: BBA 1.3
Name of the Course: Marketing Management

Course Credits	No. of Hours per Week	Total No. of Teaching Hours
4 Credits	4 Hrs	56 Hrs

Pedagogy: Classrooms lecture, tutorials, Group discussion, Seminar, Case studies & field work etc.,

Course Outcomes: On successful completion of the course, the Students will demonstrate

a) Understand the concepts and functions of marketing.
b) Analyse marketing environment impacting the business.
c) Segment the market and understand the consumer behaviour
d) Describe the 4 p's of marketing and also strategize marketing mix
e) Describe 7 p's of service marketing mix.

Syllabus:	Hours
Module No. 1: INTRODUCTION TO MARKETING	**10**

Meaning and Definition, Concepts of Marketing, Approaches to Marketing, Functions of Marketing. **Recent trends in Marketing**-E- business, Tele-marketing, M-Business, Green Marketing, Relationship Marketing, Concept Marketing, Digital Marketing, social media marketing and E-tailing (Meaning only).

Module No. 2: MARKETING ENVIRONMENT	**10**

Micro Environment – The company, suppliers, marketing intermediaries competitors, public and customers; **Macro Environment**- Demographic, Economic, Natural, Technological, Political, Legal, Socio-Cultural Environment.

Module No. 3: MARKET SEGMENTATION AND CONSUMER BEHAVIOUR	**10**

Meaning and Definition, Bases of Market Segmentation, Requisites of Sound Market Segmentation; Consumer Behavior-Factors influencing Consumer Behavior; Buying Decision Process.

Module No. 4: MARKETING MIX	**20**

Meaning, Elements of Marketing Mix (Four P's) – Product, Price, Place, Promotion.
Product-Product Mix, Product Line, Product Lifecycle, New Product Development, Reasons for Failure of New Product, Branding, Packing and Packaging, Labeling,
Pricing – Objectives, Factors influencing Pricing Policy, Methods of Pricing;
Physical Distribution–Meaning, Factors affecting Channel Selection, Types of Marketing Channels.
Promotion – Meaning and Significance of Promotion, Personal Selling and Advertising (Meaning Only)

Module No. 5: SERVICES MARKETING	**06**

Meaning and definition of services, difference between goods and services, features of services, seven P's of services marketing (concepts only).

Skill Developments Activities:

1. Two cases on the above syllabus should be analyzed and recorded in the skill development
2. Design a logo and tagline for a product of your choice
3. Develop an advertisement copy for a product.
4. Prepare a chart for distribution network for different products.

Text Books:

1. Philip Kotler, Marketing Management, Prentice Hall.
2. Lovelock Christopher, Services Marketing: People, Technology, Strategy, PHI
3. William J. Stanton, Michael J.Etzel, Bruce J Walker, Fundamentals of Marketing, McGraw Hill Education.
4. Bose Biplab, Marketing Management, Himalaya Publishers.
5. J.C. Gandhi, Marketing Management, Tata McGraw Hill.
6. Ramesh and Jayanti Prasad: Marketing Management, I.K. International
7. Sontakki, Marketing Management, Kalyani Publishers.
8. P N Reddy and Appanniah, Marketing Management

Note: Latest edition of text books may be used.

Name of the Program: Bachelor of Business Administration (BBA)
Course Code: BBA 1.5 (OEC)
Name of the Course: Business Organization and Management

Course Credits	No. of Hours per Week	Total No. of Teaching Hours
3 Credits	3 Hrs	45 Hrs

Pedagogy: Classrooms lecture, tutorials, Group discussion, Seminar, Case studies & field work etc.,

Course outcomes: on successful completion of the course, the Students will demonstrate:

a) To Understand the concepts of Business organizations and Social Responsibilities of Business
b) To Describe the various forms of Business organization
c) To Understand the levels of managements and Describe the contribution of management thinkers
d) To demonstrate the functions of management effectively
e) To describe the technology driven work Place and some recent trends in Management

Syllabus:	Hours
Module No. 1: NATURE AND SCOPE OF BUSINESS	**08**
Meaning and Definition of Business, Characteristics, Objectives. Classification of Business Activities; Manufacturing, Trading and Services Organizations. Relationship between Trade, Industry and Commerce. Social Responsibilities of business towards stake holders.	
Module No. 2: FORMS OF BUSINESS ORGANISATIONS	**12**
Meaning and Features of Sole Proprietorship, Partnership, One Person Company, Limited Liability Partnerships, Hindu Undivided Family and Joint Stock Companies: Difference between Private and Public companies	
Module No. 3: NATURE OF MANAGEMENT	**08**
Definition , Characteristics- Management as an Art, Science or Profession - Levels of Management – Management Thoughts of FW Taylor , Henry Fayol, Max Weber and Peter Drucker.	
Module No. 4: FUNCTIONS OF MANAGEMENT	**10**
Planning – Importance, Steps in planning, Types of plans. Organising - Meaning, Organisation structure. Directing – Motivation, Leadership, Communication and Coordination – Definition and Meaning. Controlling: Concept and Process	
Module No 5: CURRENT TRENDS IN MANAGEMENT	**07**
Technology Driven Work place, Learning Organisations, Diversity of Work Force, Public Consciousness, Global market place, Community of stake holders	

Skill Developments Activities:

1. Collection of Partnership Deed
2. Collect the nature of business activities of any 10 Private and Public Companies
3. Collect the profiles of FW Taylor and Henry Fayol
4. Preparation of Imaginary Business plan
5. List the latest trends in Management

Text Books:

1. C B. Guptha - Business Organisation and Management, Sultan Chand & Sons.
2. Dr. S. C. Saxena - Business Administration & Management, Sahitya Bhawan.
3. M. C. Shukla - Business Organisation and Management. S Chand & Company Pvt. Ltd.
4. S.A Sherlekar - Business Organization, Himalaya Publishing House.
5. Y.K. Bhushan. Fundamentals of Business Organisation and Management, Sultan Chand& Sons.
6. R.K. Sharma, Business Organisation & Management Kalyani Publishers
7. Dr. I.M. Sahai, Dr. Padmakar Asthana,' Business Organisation & Administration', Sahitya Bhawan Publications Agra.
8. Richard L. Daft – Principles of management

Name of the Program: Bachelor of Business Administration (BBA)
Course Code: BBA 1.5(OEC)
Name of the Course: Skills For Management (OEC)

Course Credits	No. of Hours per Week	Total No. of Teaching Hours
3 Credits	**3 Hrs**	**45 Hrs**

Pedagogy: Classrooms lecture, tutorials, Group discussion, Seminar, Case studies & field work etc.,

Course Outcomes: On successful completion of the course, the Students will demonstrate

a) The Ability to communicate and Present effectively by inculcating listing skills
b) To Understand the value of Time through various Time Management tips and strategies
c) To take the right decisions of the enterprise for success and to achieve its predetermined goals
d) To Identify as a Responsible team member and carry out the team activates effectively and abili understand need leadership in management
e) To apply Emotional Intelligence at organization and Overcoming the conflicts using various techniques

Syllabus:	**Hours**
Module No. 1: COMMUNICATION AND PRESENTATION	**08**
Fundamentals, Types - Horizontal, Vertical, Oral, Written, Email Etiquettes; Virtual Meetings; Listening, Importance and Need, Features of a Good Listening**;** Presentation skills, Etiquettes for Effective Presentation	
Module No. 2: TIME MANAGEMENT	**10**
Importance of Discipline & Punctuality – The Pareto Principle, Time Management Matrix – Scheduling - Grouping of Activities, Overcoming Procrastination – Time Circle Planner, Time Management Tips and Strategies.	
Module No. 3: DECISION MAKING	**10**
Decision making, Importance, Types of Decisions, Programmed and Non- programmed decisions - Steps in decision making Process - Decision Making Styles -Participation in decision making.	
Module No. 4: TEAM BUILDING AND LEADERSHIP	**10**
Teams – Types of Teams, Characteristics of an effective team- Stages of team Development- Team cohesiveness and its importance. Leadership- Nature of Leadership, Leadership vs Management-Leadership traits - Leadership styles	
Module No. 5 : EMOTIONAL INTELLIGENCE AND CONFLICT MANAGEMENT	**07**
Emotional Intelligence- Concept, Components and Application of Emotions Intelligence in organizations. Conflict- Types of conflict, Sources of Conflict, Conflict resolution techniques.	

Skill Developments Activities:

1. Preparation of Business presentation
2. Team Building Practices through group exercises, team task.
3. Practice by Game play & other learning methodology for achieving Given targets
4. Writing Business Letters through E-mails

Text Books:

1. Alex K., Managerial Skills, S. Chand
2. V.S.P. Rao Managerial Skills Excel Books, New Delhi
3. David A Whetten, Cameron Developing Management skills, PHI 2008
4. Ramnik Kapoor Managerial Skills Path Makers, Bangalore
5. Kevin Gallagher, Skills development for Business and Management Students,Oxford
6. Monipally,Muttthukutty Business Communication Strategies Tata McGraw Hill.

Note: Latest edition of text books may be used.

Name of the Program: Bachelor of Business Administration (BBA)
Course Code: BBA 2.1
Name of the Course: Financial Accounting and Reporting

Course Credits	No. of Hours per Week	Total No. of Teaching Hours
4 Credits	4 Hrs	56 Hrs

Pedagogy: Classrooms lecture, tutorials, and Problem Solving.

Course Outcomes: On successful completion of the course, the Students will demonstrate

a) The ability to prepare final accounts of partnership firms
b) The ability to understand the process of public issue of shares and accounting for the same
c) The ability to prepare final accounts of joint stock companies.
d) The ability to prepare and evaluate vertical and horizontal analysis of financial statements
e) The ability to understand company's annual reports.

Syllabus:	Hours
Module No. 1: FINAL ACCOUNTS OF PARTNERSHIP FIRM	**10**
Meaning of Partnership Firm, Partnership deed-clauses in partnership deed, Preparation of Final accounts of partnership firm-Trading and Profit and Loss Account, Profit and Loss Appropriation Account, Partners capital account and Balance sheet. Goodwill- Nature, Factors influencing goodwill and methods of valuation of goodwill (Average and super profit methods)	
Module No. 2: ISSUE OF SHARES	**08**
Meaning of Share, Types of Shares – Preference shares and Equity shares – Issue of Shares at par, at Premium, at Discount: Pro-Rata Allotment; Journal Entries relating to issue of shares; Preparation of respective ledger accounts; Preparation of Balance Sheet in the Vertical form (Practical Problems).	
Module No. 3: FINAL ACCOUNTS OF JOINT STOCK COMPANIES	**12**
Statutory Provisions regarding preparation of Company Final Accounts – Treatment of Special Items, Managerial Remuneration, Tax deducted at source, Advance payment of Tax, Provision for Tax, Depreciation, Interest on debentures, Dividends, Rules regarding payment of dividends, Transfer to Reserves, Preparation of Profit and Loss Account and Balance Sheet (Vertical Form Schedule -III) (Practical Problems).	
Module No. 4: FINANCIAL STATEMENTS ANALYSIS	**12**
Comparative Statements - Comparative Income Statement, Comparative Balance Sheet; Common size Statements – Common Size Income Statement, Common Size Balance Sheet – Trend Percentages. (Analysis and Interpretation)	
Module No. 5: CORPORATE FINANCIAL REPORTING PRACTICES	**10**

Corporate Financial Reporting - meaning, types, characteristics of Corporate financial report, users of corporate financial report; Components corporate financial report– general corporate information, financial highlights, management's discussion and analysis; Financial Statements- balance sheet, income statement, cash flow statement, and notes to the financial statements; Auditor's report; Significant Accounting Policies; Corporate Governance Report; Corporate Social Responsibility Report (Discuss only Role and Significance of above components of corporate financial report).

Skill Developments Activities:

1. Collect financial statement of a company for five years and analyse the same using trend analysis.
2. Refer annual reports of two companies and list out the components.
3. Draft a partnership deed as per Partnership Act.
4. List out the accounting policies in annual report of the company

Text Books:

1. Stephen P. Robbins, Management, Pearson
2. Koontz and O‟‟Donnell, Management, McGraw Hill.
3. L M Prasad, Principles of management, Sultan Chand and Sons
4. V.S.P Rao/Bajaj, Management process and organization, Excel Books.GH25
5. Appanniah and Reddy, Management, HPH.
6. T. Ramaswamy : Principles of Management, HPH.

Note: Latest edition of text books may be used.

Name of the Program: Bachelor of Business Administration (BBA)
Course Code: BBA 2.2
Name of the Course: Human Resource Management

Course Credits	No. of Hours per Week	Total No. of Teaching Hours
4 Credits	**4 Hrs**	**56 Hrs**

Pedagogy: Classroom's lecture, tutorials, Group discussion, Seminar, Case studies & field work etc.,

Course Outcomes: On successful completion of the course, the students will be able to demonstrate

a) Ability to describe the role and responsibility of Human resources management functions on business
b) Ability to describe HRP, Recruitment and Selection process
c) Ability to describe to induction, training, and compensation aspects.
d) Ability to explain performance appraisal and its process.
e) Ability to demonstrate Employee Engagement and Psychological Contract.

Syllabus:	**Hours**
Module No. 1: Introduction to Human Resource Management	**10**

Meaning and Definition of HRM – Features Objectives, Differences between Human Resource Management and Personnel Management, Importance, Functions and Process of HRM, Role of HR Manager, Trends influencing HR practices

Module No. 2: Human Resource Planning, Recruitment & Selection	**14**

Human Resource Planning: Meaning and Importance of Human Resource Planning, Process of HRP
HR Demand Forecasting- Meaning and Techniques (Meanings Only) and HR supply forecasting.
Succession Planning – Meaning and Features
Job Analysis: Meaning and Uses of Job Analysis, Process of Job Analysis – Job Description, Job Specification**,** Job Enlargement, Job Rotation, Job Enrichment (Meanings Only)
Recruitment – Meaning, Methods of Recruitment, Factors affecting Recruitment, Sources of Recruitment
Selection – Meaning, Steps in Selection Process, Psychometric tests for Selection, Barriers to effective Selection, Making Selection effective; Placement, Gamification – Meaning and Features

Module No. 3: Induction, Training and Compensation	**10**

Induction: Meaning, Objectives and Purpose of Induction, Problems faced during Induction, Induction Program Planning.
Training: Need for training, Benefits of training, Assessment of Training Needs and Methods of Training and Development; Kirkpatrick Model; Career Development.
Compensation: Direct and Indirect forms of Compensation (Meaning Only), Compensation Structure.

Module No. 4: Performance Appraisal, Promotion & Transfers	**14**

Performance appraisal: Meaning and Definition, Objectives and Methods of Performance Appraisal – Uses and Limitations of Performance Appraisal, Process of Performance Appraisal

Promotion: Meaning and Definition of Promotion, Purpose of Promotion, Basis of Promotion **ransfer:** Meaning of Transfer, Reasons for Transfer, Types of Transfer, Right Sizing ofWork Force, Need for Right Sizing

Module No. 5: Employee Engagement and Psychological Contract	**08**

Employee Engagement (EE): Meaning and Types of EE, Drivers of Engagement - Measurement of EE, Benefits of EE. **Psychological contract**: Meaning and features

Skill Developments Activities:

1. Preparation of Job Descriptions and Job specifications for a Job profile
2. Choose any MNC and present your observations on training program
3. Develop a format for performance appraisal of an employee.
4. Discussion of any two Employee Engagement models.
5. Analysis of components of pay structure based on the CTC sent by the Corporate to the institute for the various jobs of different sectors.

Textbooks:

Aswathappa, Human Resource Management, McGraw Hill

Edwin Flippo, Personnel Management, McGraw Hill

C.B.Mamoria, Personnel Management, HPH

Subba Rao, Personnel and Human Resources Management, HPH

Reddy & Appanniah, Human Resource Management, HPH

Madhurimalal, Human Resource Management, HPH

S.Sadri & Others: Geometry of HR, HPH

Rajkumar: Human Resource Management I.K. Intl

Michael Porter, HRM and Human Relations, Juta & Co.Ltd.

K. Venkataramana, Human Resource Management, SHBP

Note: Latest edition of textbooks may be used.

Name of the Program: Bachelor of Business Administration (BBA)
Course Code: BBA 2.3
Name of the Course: BUSINESS ENVIRONMENT

Course Credits	No. of Hours per Week	Total No. of Teaching Hours
4 Credits	**4 Hrs**	**56 Hrs**

Pedagogy: Classrooms lecture, tutorials, Group discussion, Seminar, Case studies.

Course Outcomes: On successful completion Student will demonstrate

a) An Understanding of components of business environment.
b) Ability to analyse the environmental factors influencing business organisation.
c) Ability to demonstrate Competitive structure analysis for select industry.
d) Ability to explain the impact of fiscal policy and monetary policy on business.
e) Ability to analyse the impact of economic environmental factors on business.

Syllabus:	**Hours**
Module No. 1: INTRODUCTION BUSINESS ENVIRONMENT	**12**
Meaning of business, scope and objectives Business, business environment, Micro and Macro-environment of business (social, cultural, economic, political, legal technological and natural) Impact of these factors on decision making in business, Environmental analysis.	
Module No. 2: GOVERNMENT AND LEGAL ENVIRONMENT	**16**
Government Functions of the State, Economic role of government, State intervention in business- reasons for and types of state intervention in business. Impact of Monetary policy, Fiscal policy, Exim policy and industrial policy on business. **Legal environment -** Various laws affecting Indian businesses	
Module No. 3: ECONOMIC ENVIRONMENT AND GLOBAL ENVIRONMENT	**13**
An overview of economic environment, structure of economy, factors affecting economic environment. **Globalisation of business;** meaning and dimensions, stages, essential conditions of globalisation, foreign market entry strategies, merits and demerits of globalisation of business, Impact of Globalisation on Indian businesses, Forms of globalisation of businesses - MNCs, TNCs etc..	
Module No. 4: TECHNOLOGICAL ENVIRONMENT	**10**
Meaning and features; types of innovation, Impact of Technological changes on business, Technology and Society, Technological Acquisition modes, IT revolution and business, Management of Technology.	
Module No. 5: NATURAL ENVIRONMENT	**05**
Meaning and nature of physical environment. Impact of Natural environment on business.	

Skill Developments Activities:

a) List out key features of recent Monetary policy published by RBI impacting businesses.
b) Give your observation as to how technology has helped society.
c) Draft Five Forces Model for Imaginary business.
d) Identify the benefits of Digital transformation in India.

Text Books:

1. Dr. K Ashwatappa: Essentials Of Business Environment
2. Sundaram & Black: The International Business Environment; Prentice Hall
3. Chidambaram: Business Environment; Vikas Publishing
4. Upadhyay, S: Business Environment, Asia Books
5. Chopra, BK: Business Environment in India, Everest Publishing
6. Suresh Bedi: Business Environment,Excel Books
7. Economic Environment of Business by M. Ashikary.
8. Business Environment by Francis Cherrinulam

Note: Latest edition of text books may be used.

Name of the Program: Bachelor of Business Administration (BBA)
Course Code: BBA 2.3
Name of the Course: Business Mathematics

Course Credits	No. of Hours per Week	Total No. of Teaching Hours
4 Credits	**4 Hrs**	**56 Hrs**

Pedagogy: Classroom's lecture, tutorials, Problem solving.

Course Outcomes: On successful completion of the course, the students will demonstrate

a) The Understanding of the basic concepts of business maths and apply them to create solve and interpret application problems in business
b) Ability to solve problems on various types of equation.
c) Ability to solve problems on Matrices and execute the laws of indices, law of logarithm and evaluate them.
d) Ability to apply the concept of simple interest and compound interest bills discounted etc. and apply them in day-to-day life.
e) Ability to solve problems on Arithmetic progression, Geometric progression and construct logical application of these concepts.

Syllabus:	**Hours**
Module No. 1: NUMBER SYSTEM	**04**
Introduction – Natural Numbers - Even Numbers – Odd Numbers – Integers – Prime Numbers – Rational and Irrational numbers, Real Numbers, HCF and LCM (Simple problems).	
Module No. 2: THEORY OF EQUATIONS	**10**
Introduction – Meaning - Types of Equations – Simple/ Linear Equations and Simultaneous Equations (only two variables), Elimination and Substitution Methods only. Quadratic Equation - Factorization and Formula Method ($ax^2 + bx + c = 0$ form only). Simple problems.	
Module No.3: INDICIES, MATRICES AND LOGARITHMS	**16**
Meaning – types – operation on matrices – additions – subtractions and multiplication of two matrices – transpose – determinants – minor of an element – co-factor of an element – inverse – crammers rule in two variables – problems. Indices and Logarithms: Meaning- Basic Laws of Indices and their application for simplification. Laws of Logarithms –Common Logarithm, Application of Log Table for Simplification.	
Module No. 4: COMMERCIAL ARITHMETIC	**16**
Simple Interest, Compound Interest including yearly and half yearly calculations, Annuities, Percentages, Bills Discounting, Ratios and proportions, duplicate-triplicate and sub-duplicate of a ratio. Proportions: third, fourth and inverse proportion - problems.	
Module No. 5: PROGRESSIONS	**10**
PROGRESSIONS: Arithmetic Progression - Finding the 'n^{th}' term of AP and Sum to nth term of AP. Insertion of Arithmetic Mean Geometric Progression – Finding the 'n^{th}' term of GP and sum to 'n^{th}' term of GP and insertion of Geometric Mean.	

Skill Developments Activities:

1. Develop an Amortization Table for Loan Amount – EMI Calculation.
2. Secondary overhead distribution summary using Simultaneous Equations Method.
3. Application of Matrix In Business Problems

Text Books:

1. Saha: Mathematics for Cost Accountants, Central Publishers
2. R.G. Saha and Others – Methods and Techniques for Business Decisions, VBH
3. Dr. SanchetiandKapoor: Business Mathematics and Statistics, Sultan Chand
4. Zamarudeen: Business Mathematics, Vikas
5. R.S Bhardwaj :Mathematics for Economics and Business
6. Madappa, mahadi Hassan, M. IqbalTaiyab – Business Mathematics, Subhash
7. G.R. Veena and Seema : Business Mathematics and Statistics I.K. Intl Publishers

Note: Latest edition of text books may be used.

Name of the Program: Bachelor Business Administration (BBA)
Course Code: BBA.2.6 (OEC)
Name of the Course: People Management

Course Credits	No. of Hours per Week	Total No. of Teaching Hours
3 Credits	**3 Hrs**	**45 Hrs**

Pedagogy: Classroom's lecture, tutorials, Group discussion, Seminar, Case studies.

Course outcome: On successful completion of the course, student will demonstrate:

1. Ability to examine the difference between People Management with Human resource Management
2. Ability to explain the need for and importance of People Management.
3. Ability to explain role of manager in different stages of performance management process
4. Ability to list modern methods of performance and task assessment.
5. Ability to analyse the factors influencing the work life balance of an working individual.

Syllabus:	**Hours**
Module No. 1: Introduction to People Management	**06**
Diversity in organisation: age, gender, ethnicity, race, and ability. People Management: Meaning, Features, Significance of people management, Difference between People Management and Human Resource Management, impact of individual and organizational factors on people management.	
Module No. 2: Getting Work Done and Assessment and Evaluation	**12**
Getting work done: Challenges of getting work done, significance of prioritization and assigning work to team members. Performance Management: meaning, role of a manager in the different stages of the performance management process, Types of Performance assessment, Assessment and Evaluation Process of evaluation of tasks in the organisation. Modern tools of assessment and evaluation of tasks and performance.	
Module No. 3: Building Peer Networks and Essentials of Communication	**12**
Building Peer Networks: Understanding the importance of peer networks in an organization; being able to influence those on whom you have no authority; challenges Peer networking and different types of people networking in the workplace. **Essentials of Communication**: Concept of the communication process with reflection on various barriers to effective communication and ways to overcome, Types of Communication and Channels of Communication.	
Module No. 4: Motivation	**08**
Meaning, Importance and need for motivation, team motivation- meaning, importance team motivation, types of Motivators and Modern methods of motivation	
Module No. 5: Managing Self	**07**
Reflection on what does it mean to be a people manager; building a personal development plan for oneself, Self-Stress Management: Causes for stress, work life Balance, Importance of Work life balance, Factors influencing Work life Balance.	

Skill Developments Activities:

1. Analyse two cases on any of the above content indicated above.
2. List out the modern tools to performance assessment and evaluation.
3. Conduct a survey of work life balance of working individuals
4. Draft a Career development of working individual in the middle level management.

Text Books:

1. McShane, Steven L. and Mary Ann Von Glinow, Organizational Behavior: Emerging Knowledge and Practice for the Real World. McGraw-Hill, latest edition, ISBN: 0-07-115113-3.
2. Bernardin, H. John and Joyce E. A. Russell. Human Resource Management: An Experiential Approach. McGraw-Hill, 6/e. ISBN: 0078029163
3. Argyris, C. (1974). Personality vs. Organization. Organizational Dynamics. Vol. 3. No. 2, Autumn.
4. Blume, B. Baldwin, T. and Ryan, K. (2013). Communication Apprehension. A barrier to students leadership, adaptability and multicultural appreciation. Academy of Management Learning & Education, Jun, Vol. 12 Issue 2, p158-172.
5. Colquitt, J.A., LePine, J.A., & Wesson, M.J. (2009) Organizational Behavior: Improving Performance and Commitment in the Workplace (International edition). New York: McGraw-Hill.
6. Goleman, D. (1998). Working with Emotional Intelligence. Bantam Books,

Note: Latest edition of text books may be used.

Name of the Program: Bachelor of Business Administration
Course Code: BBA 2.6 (OEC)
Name of the Course: Functional Areas of Management

Course Credits	No. of Hours per Week	Total No. of Teaching Hours
3 Credits	3 Hrs	45 Hrs

Pedagogy: Classroom's lecture, tutorials, Group discussion, Seminar, Case studies.

Course Outcomes: On successful completion Student will demonstrate ;

a) Understand the concepts and functions of marketing and analyzing the Marketing Mix.
b) Ability to describe Man power Planning and Implement Recruitment, Selection process and Evaluate Performance
c) Understanding various functions of Financial Management
d) Understanding the basics of production and operations management
e) Understanding the need for Information Systems in organization.

Syllabus:	Hours
Module No. 1: MARKETING MANAGEMENT	**10**
Meaning and Definitions-Evolution of marketing-Marketing Vs Selling-Marketing concepts-Nature and Scope of Marketing-Functions of Marketing, Elements of Marketing Mix (7Ps)	
Module No. 2: HUMAN RESOURCE MANAGEMENT	**10**
Meaning and Definitions-Functions of HR-Man power planning-Recruitment-Selection-Training and development- Placement-Compensation-Incentives-monetary and non monetary-Performance Appraisal	
Module No. 3: FINANCIAL MANAGEMENT	**10**
Meaning-Definitions-Objectives-Profit maximization vs. Wealth maximization-Scope of Financial management-Investment decisions- Financing decisions, Dividend decisions-Working capital decisions	
Module No. 4: PRODUCTION AND OPERATIONS MANAGEMENT	**08**
Meaning, Objectives and Functions -Plant Location -Plant Layout-Factors-Types- Production Planning and Control-Inventory Management-Total Quality Management-Concept of Supply Chain management	
Module No. 5: INFORMATION SYSTEM	**07**
Introduction, Data Vs Information, Information system in an Organisation, Importance of Information System in Decision making - Information system and sub systems	

Skill Developments Activities:

1. List the sources of recruitment and draw a Selection process chart of an organisation
2. Draw a chart showing a Plant layout operations
3. List out the current trends in Marketing and Human Resource Management
4. List out the Factors Influencing Financing and Investment Decisions

Books Recommended:

1. Richard Pettiger. Introduction to Management, Palgrave Macmillan, New York
2. M.J.Mathew,Functional Management, RBSA Publishers, Jaipur.
3. Meenakshy Gupta . Principles of Management, PHI, New Delhi.
4. Koonts and Heinz Weihrich. Essentials of Management, Tata McGraw-Hill Publishing Co.Ltd.
5. Modern Production Management Buffa Ekwood. S, and Rakesh K. Saren, John wiley and Sonss., 2003
6. Operations Management K.N. Krishnaswamy
7. Management Information System – C.S.V Murthy

JSS COLLEGE OF ARTS COMMERCE & SCIENCE

(Autonomous)

Ooty Road, Mysuru – 25

DEPARTMENT OF COMMERCE AND MANAGEMENT

Syllabus

CHOICE BASED CREDIT SYSYTEM

BBA Programme

(II & III Year)

2019-20 Scheme

CDC21001

III SEMESTER

MANAGEMENT INFORMATION SYSTEM – DSC -7

L: T: P - 2:0:2

Course Outcome:

On successful completion of this course the students are able to:

CO1: Understand in depth the evolution, significance and need of Management Information System
CO2: Learn in depth the structure of MIS based on management activity
CO3: Types of information systems - Operations support system - Transaction Processing Systems - Decision support System - Process Control Systems
CO4: Identify the Information required for various levels of management and Value of information in decision making
CO5: Understand in depth the details of Managing and Controlling information
CO6: Understand in depth the ERP Concepts, Evolution of ERP, and ERP packages,

Unit 1: Introduction to MIS:
Meaning, concept - Evolution - significance and need - Objectives and features - subsystems of MIS - MIS and other academic disciplines – operating elements of MIS - structure of MIS based on management activity - based on organizational functions.

Unit 2: Concepts of Information:
Nature of information - Definition and Types of management information - data Vs information - Information for various levels of management -Value of information in decision making - age of information.

Unit 3: Value and Cost of information:
Types of information systems - Operations support system - Transaction Processing Systems - Decision support System - Process Control Systems -Executive support system - Formal and Informal information system - Knowledge Work Systems- Expert system Artificial intelligence

Unit 4: Planning Information System:
Developing information system - System Analysis and design - Implementing Information System acquisition - Managing and Controlling information system resources - Information resources management.

Unit 5: Application Technologies:
Introduction, ERP Concepts, Evolution of ERP, ERP
packages, ERP Evaluation, ERP implementation Application Examples - Tally.ERP 9.

References:

1. Management Information System – CSV Murthy
2. Management Information System – Guptha
3. Management Information System – "Management Information Systems" by James A. O'Brien Tata McGrawHill Publication.
4. Management Information System – Kenneth C. Laudon

Note: Latest edition of the text books should be used.

CDC22001

III SEMESTER

FINANCIAL ACCOUNTING – III – DSC – 8

L: T: P - 4:1:0

Course Outcome:

On successful completion of this course the students can:
CO1: Learn in depth different sources of finance and become a corporate accountant
CO2: Understand the provision of Companies Act 2013
CO3: Identify the provisions for issue of debenture and bonds
CO4: Prepare the financial statement of companies as per the schedule of Companies Act 2013
CO5: Understand the details of liquidation of company and can become a liquidator

Unit 1: Accounting for Share Capital:
Issue, forfeiture and re-issue of forfeited shares - over subscription and under subscription of shares,

Unit 2: Accounting for Debentures and Bonds:
Issue of Debentures and Bonds, types of debentures and Bonds, differences betweenshares and debentures and Bonds and Debentures. Methods of redemption of Debentures conditions for issue of debentures. Simple problems on issue of debentures.

Unit 3: Final Accounts:
Financial statements of a company profit and loss account and balance sheet. (as per new regulations)

Unit 4: Liquidation:
Liquidation of company, Preparation of liquidator's final statement of account.

Unit 5: Redemption:
Redemption of preference shares (simple problems only)

Unit 6: Accounting for Bonus Shares:
Right shares, stock option, E-Trading BSE, NSE and SEBI. Bonus shares- problems on Bonus shares.

References:

1. Financial Accounting B S Raman
2. Advanced Accounting RL Guptha&Radhaswamy M
3. Advanced Accounting M C Shukla and T S Grewal
4. Financial Accounting S P Jain and Narang K L

Note: Latest edition of the text books should be used.

CDC23001

III SEMESTER

COST ACCOUNTING – DSC -9

L:T:P - 4:1:0

Course Outcome:

On successful completion of this course the students can:

CO 1: Identify and classify different elements of cost and able to prepare cost sheet, estimation, tender and quotation

CO 2: Learn in depth characteristics of a cost accountant and help the management in decision making

CO 3: Deliberate in depth cost minimization and profit maximization

CO 4: Deliberate the details of reconciliation of cost and financial statement

CO5: Write down the characteristics of inventory, labour and overhead control techniques and apply the same in manufacturing concern

Unit 1: Cost Accounting

Introduction, meaning, definitions of cost, Costing and CostAccounting, objectives, advantages and disadvantages of Cost Accounting. Comparison between Cost Accounting and Financial Accounting, Elements of Cost, classification of Cost, Cost unit,Cost centre, statement of Cost, preparation of Cost sheet including Estimations, Quotation and Tender.

Unit 2: Materials

Meaning, nature, classifications and codification. Purchase procedure,
functions of store keeper. Inventory control-meaning, techniques-problems on stock levels, pricing the issue of materials-methods, problems on FIFO AND LIFO only.

Unit 3: Labour

Meaning, methods of time keeping and time booking, methods of remunerations
to labour overtime and idle time and their treatment problems on time wage, piece wage, Halsey and Rowan plan.

Unit 4: Overheads

Meaning, Overhead accounting process-classifications, codifications, allocation, apportionment, re-apportionment and absorption of Overheads. Problems on primary and secondary distribution (Repeated Distribution method only). Machine Hour Rate- Meaning and problems.

Unit 5: Methods of Costing:

Introduction, different methods of costing and applications-Contract Costing-problems, Process Costing-problems on Process losses only.

Unit 6: Operating Costing:

Introduction, Format of operating Cost Sheet-problems on Operating Costing- Transport undertakings only.

References:

1. Cost Accounting- S P Jain and K L Narang
2. Cost Accounting R S.N. PillaiandVBagavathi
3. Cost Accounting M Ravi Kishore
4. Cost Accounting Shukla M.C. and Grewal T.S.

Note: Latest edition of the text books should be used.

CDD21001

IV SEMESTER

QUANTATIVE TECHNIQUES– DSC -10

L:T:P - 4:1:0

Course Outcome:

On successful completion of this course the students can:
CO1: Understand in depth the classification and operation of matrices and determinants
CO2: Learn the details of progression and their application to business
CO3: Understand in detail the concept of Ratio, proportion and variation
CO4: Learn in depth the Laws of indices and logarithms and its application
CO5: Understand the details of simple interest and compound interest

Unit1: Indices
Meaning - Law of Indices and their application for simplification. Logarithms – Laws of Logarithms – Common Logarithms – Application of Logarithms for simplification.

Unit 2: Progressions
Meaning of sequence and series – Types of Progression – Arithmetic Progression and Geometric Progression – General terms and sum of 'n' terms of Arithmetic Progression and Geometric Progression – Business applications – Problems on Arithmetic and Geometric Progression.

Unit3:Ratio Proportions and Percentages
Meaning and their application to business. Permutations – Factorial notations – Linear and circular Permutations. Combinations – Business applications – problems on Permutations and Combinations.

Unit 4: Commercial Arithmetic
Simple interest and Compound interest- Bills discounting concepts, Bankers discount, true discount, Bankers gain and present value of bill.

Unit 5: Matrices and determinants
Meaning, Definition and types of matrices – Matrix operations and properties.Determinants – Determinants of a square Matrix – Solutions of linear equations by usingCramer's Rule.

References:

1.Business Mathematics---D C Sancheti and V K Kapoor
2. Business Mathematics---K Madappa and M S Sridhar Rao
3. Business Mathematics---P R Vittal
4. Commercial Arithmetic---R H Dhareshwar

Note: Latest edition of the text books should be used.

CDD22001

IV SEMESTER

COMMERCIAL LAW– DSC -11

L:T:P - 4:1:0

Course Outcome:

On successful completion of this course the students can:

CO1: Understand in details various laws related to business and able to work as legal adviser of Business enterprises

CO2: Understand the characteristics of legal environment and practice business ethics

CO3: Learn in depth and apply the basic legal knowledge to business enterprises

CO4: Understand the characteristics of different intellectual properties and protect them

CO5: Deliberate the provisions of competition Protection Act 2002

CO6: Identify the provisions of special contracts

Unit 1: Contract

Definition – Essentials – Types – Offer – Acceptance - Rules –Consideration- Rules and Exceptions.

Unit 2: Contractual Capacity

Minor's Agreement – Free Consent – Essentials.Discharge ofContract – Modes – Remedies.

Unit 3: Special Contracts

Contract of Indemnity - Guarantee - Bailment and Pledge - Contract of Agency -Essentials - Rights and liabilities.

Unit 4: Intellectual Property Rights

Meaning – Provisions – Importance – Cyber Law –Meaning – Types of Crimes – Offence and Punishment.

Unit 5: Competition Protection Act, 2002

Objectives, Anti Competition Agreement, Prevention and Abuse of Dominant Position, Competition Commission of India.

References:

1. M.C. Kuchhal, and VivekKuchhal, *Business Law*, Vikas Publishing House, New Delhi.
2. Avtar Singh, *Business Law*, Eastern Book Company, Lucknow.
3. Ravinder Kumar, *Legal Aspects of Business*, Cengage Learning
4. SN Maheshwari and SK Maheshwari, *Business Law*, National Publishing House, New Delhi.

Note: Latest edition of the text books should be used.

CDD23001

IV SEMESTER

ORGANISATIONAL BEHAVIOUR– DSC -12

L:T:P - 3:1:0

Course Outcome:

On successful completion of this course the students can:

CO1: Understand in detail behaviour of employees and able to manage them efficiently

CO2: Identify in details employees performance and able to motivate for effective performance

CO3: Learn in depth and analyse the behaviour of employees

CO4: Understand in details key positions in an organisation and able to occupy them

CO5: Learn in details with examples frame policies and strategies in organisation

Unit 1:Introduction

Organisational Behaviour: Introduction, definition, historical development, fundamental principles of OB, contributing disciplines, approaches, challenges and opportunities.

Unit 2: Foundations of Individual Behaviour-Individual Behavior

Foundations of individual behavior. Ability**:** Intellectual abilities, Physical ability, the role of disabilities. Personality**:** Meaning, formation, determinants, traits of personality, personality attributes influencing OB .Attitude**:** Formation, components of attitudes, relation between attitude and Behavior.

Unit 3: Perception and Emotions-Perception

Process of perception, factors influencing perception, link between perception and individual decision making. Emotions**:** Affect, mood and emotion and their significance, basic emotions, emotional intelligence, self-awareness, self management, social awareness, relationship management.

Unit 4: Motivation and Leadership-Motivation

Meaning, theories of motivation-needs theory, two factor theory, Theory X and Y, application of motivational theories**.** Leadership**:** Meaning, styles of leadership, leadership theories, trait theory, behavioural theories, managerial grid, situational theories-Fiedler's model, SLT, transactional and transformation leadership.

Unit 5: Group Behaviour

Definition, types, formation of groups, building effective teams. Conflict**:** Meaning, nature, types, process of conflict, conflict resolution. Power and politic**s:** Basis of power, effectiveness of power tactics.

Unit 6: Emerging Challenges:

Emerging challenges, managing diversity, Behavior Action, technology transformation, e-business, promoting ethical Behavior.

References:

1. Organisational Behavior, Stephen P Robbins, Timothy A. Judge, NeharikaVohra, 14th Edition, Pearson
2. Organization Behaviour – Ashwathappa, Himalaya Publication House
3. Organisational Behaviour: A modern approach – Arun Kumar and Meenakshi, Vikas Publishing House
4. Organisational Behaviour – Fred Luthans, McGraw Hill International

Note: Latest edition of the text books should be used.

CDD24001

IV SEMESTER

MANAGEMENT ACCOUNTING – DSC -13

L:T:P - 4:1:0

Course Outcome:

On successful completion of this course the students can:

CO1: Learn in depth the characteristics to become a management accountant and able to work effectively

CO2: Understand in detail the required characteristics to become a good decision maker and able to make effective decisions

CO3: Understand in depth the accounting for management and able to occupy key position in an organisation

CO4: Learn in depth the financial analysis techniques and able to analyse and interpret the financial statements

CO5: Learn in depth the details of different types of budget and able to prepare them

CO6: Understand in depth standard costing and variance analysis

Unit 1: Management Accounting

Meaning and Definitions, Nature, Scope and Objectives of Management Accounting, Difference between Cost and Management Accounting and Management Accounting and Financial Accounting. Limitations of Management Accounting.

Unit 2: Marginal Costing

Basic concepts and Definitions, assumptions contribution, P/V ratio.BEP, margin of safety. Make or buy decisions, graphical analysis.

Unit 3: Relevant Costs

Meaning, Distinction between Incremental Cost and Opportunity Cost. Simple problems on relevant cost in decision making.

Unit 4: Analysis of Financial Statements

Meaning, tools of financial statements-(Common size, comparative, Trend analysis, Ratio analysis).Profitability Ratio- G/P, N/P, Operating Ratio, EPS, Turnover Ratio, Debtors Turnover ratio, Creditors Turnover ratio, Stocks Turnover ratio, working Capital Turnover ratio, Fixed Assets turnover ratio. Financial ratio- Current ratio, Liquid ratio, Debt-equity ratio, Proprietary ratio, (problems on above ratio only).

Unit 5: Budgetary Control

Definitions - Budget, Budgetary control, objectives, Basic concepts, key factors. Types of Budgets, problems on Flexible Budget, Cash Budget and Sales Budget.

Unit 6: Standard Costing

Meaning, Definition, Difference between standard costing and budgetary control, Advantages and limitations, Variance analysis. Simple problems on material and labour variances.

References

1. Maheshwari, S.N., and Mittal, S.N. Cost Accounting: Theory and Problems, Shree Mahavir Book Depot (Publishers), Delhi.
2. M.N.Arora, Management Accounting, Theory, Problems and Solutions, Himalaya Publishing House
3. Horngren, C.T., Foster, G, and Datar, S.M., Cost Accounting: A Managerial Emphasis, Prentice Hall of India Pvt. Ltd., New Delhi.
4. Henke, E.O., and Spoede, C.W., Cost Accounting: Managerial Use of Accounting Data,PWS-KENT Publishing Company, Boston.

Note: Latest edition of the text books should be used.

CDE21001

V SEMESTER

COMPANY LAW– DSC -14

L:T:P - 3:1:0

Course Outcome:

On successful completion of this course the students can:
CO1: Understand in depth Memorandum and Articles of Association and able to draft them
CO2: Learn in details the Formation of a Joint Stock Company
CO3: Write down the details of conducting the Board of Directors and Subcommittee meetings
CO4: Identify the provisions relating to Membership of a company
CO5: Learn in details Company frauds and their prevention
CO6: Understand in depth characteristics of different types of company and corporate veil

Unit 1: Company
Company – Definition – Features – Types - Corporate Veil and lifting of Corporate Veil (as per Companies Act of 2013).

Unit 2: Company Formation
Company Formation –Stages – CIN - Corporate Social Responsibility - Meaning Scope - Constitution of CSR Committee – CSR expenditure.

Unit 3: Company Documents
Memorandum of Association - Articles of Association – Meaning – Contacts –Prospectors – Meaning – Types - Liabilities towards misstatements in Prospects.

Unit 4: Membership
Membership – Modes - Rights Key Managerial Personnel as per Companies Act 2013- Secretary Directors - Rights and Duties Meeting – Types - Terms.

Unit 5: One Person Company
One Person Company - LLP Limited Liability Partnership - Ministry of Company Affairs – Setup – Scope – Objectives - Company Frauds and Scams –Types – Prevention – Credit Rating.

References:

1. M.C. Kuchhal, and VivekKuchhal, *Business Law*, Vikas Publishing House, New Delhi.
2. Avtar Singh, *Business Law*, Eastern Book Company, Lucknow.
3. Ravinder Kumar, *Legal Aspects of Business*, Cengage Learning
4. SN Maheshwari and SK Maheshwari, *Business Law*, National Publishing House, New Delhi.

Note: Latest edition of the text books should be used.

CDE22001

V SEMESTER

BUSINESS STATISTICS - I – DSC -15

L:T:P - 4:1:0

Course Outcome:

On successful completion of this course the students can:
CO1: Understand in depth the characteristics of statistics and data collection
CO2: Learn in details with examples Measures of Central tendency
CO3: Understand the classification and characteristics of Measures of dispersion
CO4: Learn in detail the correlation and determine the relation between two variables
CO5: Understand in depth regression and able to find unknown variable value based on known variable value

Unit 1: Statistics
Statistics – Meaning – Definition, characteristics, advantages and limitations-Collection of data-methods of collecting primary data and sources of secondary data-Classification and Tabulation of data. Bar diagram, Histogram and Pie chart

Unit 2: Measures of central tendency
Measures of central tendency-Arithmetic Mean, Median, quartiles and Mode. Geometric Mean and Harmonic Mean (Individual series only)

Unit 3: Measures of Dispersion
Measures of Dispersion – Quartile Deviation – Standard deviation – Co-efficient of variation. Skewness-Karl Pearson and Bowley's co-efficient of skewness

Unit 4: Correlation
Correlation-Meaning-types-Karl Pearson's co-efficient of correlation-Spearman's Rank correlation co-efficient. Probable error

Unit 5: Regression Analysis
Regression analysis-Construction of regression equations-Estimation

References:

1.Statistical Methods—S P Gupta
2. Fundamentals of Statistics—D N Elhance
3. Statistics—Sancheti and Kapoor
4. Statistics---R S N Pillai and Bhagavathi

Note: Latest edition of the text books should be used.

CDE23001

V SEMESTER

TAX MANAGEMENT– I – DSC -16

L:T:P - 4:1:0

Course Outcome:

On successful completion of this course the students can:

CO1: Learn in depth Income Tax Act of 1961 and able to practice as Tax Consultant and Tax Practitioner

CO2: Identify the different heads of income and able to compute assessable income

CO3: Identify in detail different sections of IT Act to reduce tax liability

CO4: Deliberate in details with examples and appear before IT tribunal on behalf of his clients

CO5: Understand in details with examples IT Authorities and able to work in different position of CBDT

Unit 1: Introduction to Income Tax

Introduction to Income Tax-Income Tax-Income-Person-Income-Person-Assessment year-Previous year- Assessee - Gross Total Income-Total Income-Exempted Income- Agricultural Income –Residential Status and Incidence of Tax (Individuals Only)

Unit2: Income from Salary

Income from Salary-Meaning of salary- Allowances- Perquisites-Valuations of perquisites-Provident fund-Deductions and U/S 24-Computation of Income from House Property.

Unit 3: Income from House Property

Income from House Property-Basis of Charge –Exempted Income from House Property– Annual Value-Determination of Annual Value- Deduction U/S 24- Computation of Income from House Property.

Unit 4: Profits and Gains of Business and Profession

Profits and Gains of Business and Profession-Meaning and Definition of Business and Profession, Expenses and Losses, Expressly allowed expenses and Losses Expressly Disallowed – Computation of Income from Business and Profession.

Unit 5: Deduction Under Chapter VI A

Deduction under Chapter VI A-Deductions from section 80C TO 80U (Applicable to Individual only)

Unit 6: Income Tax Authorities:

Income Tax Authorities - Structure-Functions and Powers of various Income Tax Authorities.

References:

1. Income Tax Law and Practice – S P Goyal and Meharotra
2. Problems and solutions in Income Tax -S P Goyal and Meharotra
3. Income Tax Law and Accounts – S P Goyal and Meharotra
4. Law and Practice of Income Tax - S P Goyal and Meharotra

Note: Latest edition of the text books should be used.

CDE24001

V SEMESTER

BUSINESS RESEARCH METHODS – SEC -1

L:T:P - 3:1:0

Course Outcome:

On successful completion of this course the students can:

CO1: Learn in depth different methods of research, methodology, data collection, analysis and interpretation of data to become a good business researcher

CO2: Understand and able to report about various issues of different organisations through research report

CO3: Understand the details of types of Business Research and Research design

CO4: Identify and contribute to the discipline of commerce and management through the research

CO5: Deliberate the details of Data analysis and methods of analysis

CO6: Specify in detail the sampling with examples

Unit 1: Business Research

Nature and Scope of Business Research, Types, Role of Business Research in decision making. Applications of Business Research; The Research process – Steps in the research process; the research proposal; Problem Formulation: Management decision problem vs. Business Research problem.

Unit 2: Research Design:

Research Design: Exploratory, Descriptive & Causal. Validity in experimentation internal validity and external validity. Secondary Data Research: Advantages & Disadvantages of Secondary Data, Criteria for evaluating secondary sources, secondary sources of data in Indian Context, Syndicated Research (in India) Primary Data Collection: Survey Vs Observations.

Unit 3:Measurement & Scaling:

Measurement & Scaling: Primary scales of Measurement-Nominal, Ordinal, and Interval &Ratio. Scaling techniques-paired comparison, rank order, constant sum, semantic differential, itemized ratings, Likert Scale; Questionnaire-form & design.

Unit 4: Sampling:

Sampling: Sampling techniques, determination of sample size using statistical techniques.

Unit 5: Methods of Analysis:

Methods of Analysis: Analysis of Variance (ANOVA) One-Way & Two-Way, Chisquare test (goodness of Fit). Multivariate Data Analysis: Factor Analysis (Principal Component Analysis), Discriminant Analysis (only theory)

References:

1. Chawla, D, &Sondhi,N. (2011) Research Methodology Concepts and Cases (1st ed.). Vikas Publishing House
2. Malhotra, N & Dash. S (2010) Marketing Research An Applied Orientation (6th ed.). Pearson, Prentice Hall of India.
3. Zikmund, W.G., Babin, B.J., Carr, J.C. & Griffin, M. (2013). Business Research Methods (9th ed.). Cengage Learning.
4. Johnson, R.A. &Wichern, D.W. (1997) Business Statistics-Decision Making with Data (1st ed.). John Wiley & Sons.

Note: Latest edition of the text books should be used.

CDE25001

V SEMESTER

PROJECT MANAGEMENT –SEC -1

L:T:P - 3:1:0

On successful completion of this course the students can:

CO1: Learn in depth the classification of projects, stages in project cycle, identification, formulation and implementation.

CO2: Understand and able to report about the role and responsibilities of project manager.

CO3: Understand the details of Project formulation, formulation stages and feasibility report

CO4: Identify the Administrative agencies for project approval, Ministry of Finance, Bureau of public enterprises planning commission Public Investment Board.

CO5: Understand and able to Estimate the Project Cost

CO6: Understand and able to prepare the project report.

Unit 1: Project

Project – meaning, definition, characteristics, importance, types, steps in identification ofprojects - features – classification of projects - stages in project cycle – identification, formulation and implementation.

Unit 2: Project Management

Meaning and scope, Technical appraisal, Environmental appraisal, Managerial appraisal Concepts of project management**:** concept of a project, categories of projects – tools and techniques for project management. The project manager - roles and responsibilities of project manager.

Unit 3: Appraisal of Projects

Market feasibility, technical feasibility, financial feasibility - different types of appraisal to determine feasibility – feasibility report. Project formulation: formulation stages -bottlenecks - feasibility report - financing arrangements - finalization of project implementation schedule.

Unit4: Financial Appraisal of a Project

Evaluation Techniques – traditional and modern (theoretical aspects only). Administrative agencies for project approval: Ministry of Finance - Bureau of public enterprises planning commission public investment board.

Unit 5: Estimation of Project Cost

Preliminary expenses – cost of acquisition of fixed assets, cost on technical knowhow, acquisition of patents and licenses – documentation charges – preparation of project report. Organizing systems and procedures: working of systems - design of systems - project worksystem' design - work break down structure - project execution plan - project procedure manual project control system - planning scheduling and monitoring - monitoring contracts and project diary. Project evaluation and its objectives, types and methods.

References:

1. Entrepreneurship – Tata MC Graw hill
2. Entrepreneurship and Small Business – New Jersey: Palgrave
3. Creativity and Entrepreneurship – Jhon Kao
4. Corporate Creativity Tata MC Graw hill

Note: Latest edition of the text books should be used.

CDE26001

V SEMESTER

Marketing Management – DSE -1

Elective I - Principles of Marketing

L:T:P - 4:1:0

Course Outcome:

On successful completion of the course students can:

CO1: Learn in depth characteristics of marketing

CO2: Write down the characteristics of a new product and able to launch a new product

CO3: Learn in depth and apply the strategies for pricing the product

CO4: Deliberate the factors influencing the consumer behavior

CO5: Understand the characteristics of online marketing and able to practice online marketing

CO6: Identify the future prospect and able to forecast demand for the products

Unit 1: Introduction

Marketing – meaning functions, importance. Marketing concepts, Marketing Mix, -Product, Price, Place and Promotion, Social Marketing.

Unit 2: Product Strategy

Product Strategy- Product Planning and Product development of New Product, Product Life cycle, Product Line and Mix, Product modification and elimination, Branding and Packing decisions.

Unit 3: Consumer Behaviour

Consumer Behaviour and the impact of behavioural science on marketing creations, Factors influencing the consumer Behaviour.

Unit 4: Pricing Policies and strategies

Pricing Policies and strategies, types of pricing, factors affecting pricing decisions Promotion, types of sales Promotion, Channels of distribution.

Unit 5: Social responsibility of Marketing

Social responsibility of Marketing, Marketing Ethics, Consumerism, Environmentalism.

References:

1. Kotler, Philip, Gary Armstrong, PrafullaAgnihotri and EhsanulHaque. *Principles of Marketing*.13th edition.Pearson Education.
2. Michael, J. Etzel, Bruce J. Walker, William J Stanton and Ajay Pandit. *Marketing: Concepts and Cases.* (Special Indian Edition)., McGraw Hill Education
3. William D. Perreault, and McCarthy, E. Jerome., *Basic Marketing*. Pearson Education.
4. Majaro, Simon. *The Essence of Marketing*. Pearson Education, New Delhi.

Note: Latest edition of text books may be used

CDE27001

V SEMESTER

HUMAN RESOURCE MANAGEMENT – DSE -1

Elective I - Human Resource Management

L:T:P - 4:1:0

Course Outcome:

On successful completion of this course the students can:

CO1: Learn in depth the Evolution and Development of HRM.

CO2: Understand the trade union movement era; social responsibility era; Human relations Era; behaviourial Science Era; systems approach era and contingency approach era.

CO3: Understand the details of need for and Importance of HRP- Human Resource Planning process; Human Resource information system and Barriers to HRP.

CO4: Identify the Recruitment practices in India

CO5: Understand the Selection process

CO6: Understand the ability tests, Aptitude tests, Achievement tests, Intelligence tests, Personality tests- interviews objectives.

Unit 1: Introduction

Meaning and Definition; Differences between Personnel Management and HRM; objectives; scope; functions; Evolution and Development of HRM- trade union movement era; social responsibility era; Human relations Era; Behaviourial Science Era; systems approach era contingency approach era.HRM in India- an overview.

Unit 2: Human Resource Planning

Definition, Man-power Planning vis-à-vis HR planning, objectives of HRP; Need for and Importance of HRP- Human Resource Planning process; Human Resource information system, Barriers to HRP.

Unit 3: Job-analysis and design; Job analysis- job description- job specification, job evlaution-uses of job analysis, process of Job Analysis- methods of data collection, concept of Job Design, factors affecting job design; Techniques of job Analysis-work simplification, job rotation, Job enrichment, Job Enlargement-ways to enrich job.

Unit 4: Recruitment

Meaning and definition; factors affecting recruitment-internal and external sources of recruitment-internal and external sources- evaluation of internal and external sources; recruitment process; Recruitment practices in India –an overview- Methods of Recruitment-direct, indirect and third party method.

Unit 5: Selection

Meaning and definition, differences between recruitment and Selection, Need for scientific selection, Selection process- preliminary interview, application blanks, Selection tests, Types oftests - ability tests, Aptitude tests, Achievement tests, Intelligence tests, Personality tests-interviews objectives, Types, Final selection, Induction, meaning objectives, Phases of induction.

References:

1. H.R.M – L.M Prasad
2. Fundamentals of Organisation & Management Y.K Bhushan
3 Fundamentals of Organisation & Management – M.C Shukla
4. Management of Human Resources – Rakesh K.Chopra

Note: Latest edition of the text books should be used.

CDE28001

V SEMESTER

FINANCIAL MANAGEMENT– DSE -1

Elective I - Financial Management

L:T:P - 4:1:0

Course Outcome:

On successful completion of this course the students can:

CO1: Learn in depth the concepts of Profit Maximization and Wealth Maximization.

CO2: Understand and able to identify the Sources of finance.

CO3: Understand the concepts of Cost of Debt, Cost of Preference Capital, Cost of Equity, Cost of Equity under CAPM, Cost of Retained Earnings, -Weighted Cost of Capital.

CO4: Understand the theories of Capital Structure-Net Income approach, Net operating Income theory, Traditional Approach, MM Hypothesis.

CO5: Understand and identify the Factors influencing Dividend decision

CO6: Understand the relevance of Dividend Policy.

Unit 1: Introduction to Financial Management

Nature, Scope, and objectives of Financial Management-Profit Maximization and Wealth Maximization, EVA- Risk and Return, Financial Engineering, Time value of Money.

Unit 2: Financing Decisions

Sources of long-term financing, Concept of Leverage- Operating Leverage, Financial Leverage, Combined Leverage, Computation of Cost of Capital- Cost of Debt, Cost of Preference Capital, Cost of Equity, Cost of Equity under CAPM, Cost of Retained Earnings, -Weighted Cost of Capital.

Unit 3: Capital Structure Theories

EBIT- EPS analysis, Financial Break-even point, Theories of Capital Structure-Net Income approach, Net operating Income theory, Traditional Approach, MM Hypothesis.

Unit 4: Capital budgeting Decisions

Meaning, Features, Significance, Problems of Capital budgeting-Techniques of Capital budgeting- Traditional Methods, ARR, Pay-back period-Discounted Cash flow techniques- NPV, IRR, Profitability Index.

Unit 5: Dividend Decisions

Concept and Significance, Factors influencing Dividend decision, Relevance of Dividend Policy-Walter's Model, Gordon's Model- Irrelevance of Dividend Policy-Residual theory, MM theory.

References:

1. Financial Management M Y Khan and P K Jain
2. Financial Management I M Pandey
3. Financial Management Prasanna Chandra
4. Financial Management Rustagi R P

Note: Latest edition of the text books should be used.

CDE29001

V SEMESTER

BANKING AND INSURANCE– DSE -1

Elective I - Indian Banking System

L:T:P - 4:1:0

Course Outcome:

On successful completion of this course the students can:
CO1: Learn in depth the structure of commercial banks in India.
CO2: Understand and identify the changing face of commercial banks,
CO3: Understand the cclassification of financial markets.
CO4: Understand and identify the obligations of a banker
CO5: Understand of types of accounts
CO6: Understand and identify theSpecial types of customers

Unit 1: Role and Function of banks
Definition of Banking, Services of banks, structure of commercial banks in India, public sector banks, New private sector banks, Local Area banks, status of scheduled banks, the changing face of commercial banks, Reserve bank of India constitution and management, functions Relationship between RBI and commercial banks.

Unit 2: Role and functions of Capital markets
Classification of financial markets, Regulatory role of SEBI, Mutual funds- benefits of mutual funds- types of schemes, Role of Insurance companies-IRDA-FUNCTIONS OF IRDA-BANCASSURANCE- meaning- Factoring companies-meaning- benefits- export factoring-forfeiting- Securitisation—meaning- advantages and disadvantages.

Unit 3: Banker and customer
Definition of Customer, General Relationship between customer and banker, obligations of a banker-obligation to honour the cheques- Garnishee order-meaning application to different accounts-Banker's Rights-Right of general lien,-exceptions to the right of general lien, Right of set-off, Right of appropriation, Right to charge interest, period of limitation.

Unit 4: Types of bank accounts
Types of deposit accounts- Fixed deposit-rate of interest on FD accounts, -opening and operation of fixed deposit account, payment of interest, renewal, change of name, loss of FD receipt, Savings bank Account- Minimum balance, Recurring Deposit, current accounts,- opening of current and savings account- proper introduction, KYC guidelines, Closing of a bank account.

Unit 5: Special types of customers
Minor- Married woman, pardanashin woman, illiterate persons, Lunatics, trustees, executors and administrators, customer's attorney, joint accounts, Partnership firm, precautions for opening account in the name of partner, borrowing power of a partner- Joint stock companies-examination of documents, copy of board's resolution, Borrowing powers of company-Clubs, Societies, and charitable institutions.

References:

1.Principles of banking P N Varshney S L Gupta, T D Malhotra
2.Principles and Practice of Banking Indian Institute of Banking and Finance
3.Principles of banking MooradChoudhary
4. Agarwal, O.P, Banking and Insurance, Himalaya Publishing House

Note: Latest edition of the text books should be used.

CDE30001

V SEMESTER

TOURISM MANAGEMENT– DSE -1

Elective I - Fundamentals of Tourism

L:T:P - 4:1:0

Course Outcome:

On successful completion of this course the students can:
CO1: Understand and identify the types of Tourism
CO2: Understand in depth the History of Tourism and Tourism in India
CO3: Able to identify the Infrastructure in Tourism
CO4: Learn in depth and identify the factors affecting tourism
CO5: Able to identify the trends in tourist statistics with respect to Karnataka and India
CO6: Understand the impact of tourism in India

Unit 1: Introduction to Travel and Tourism
Tourism: Meaning, Definition, Nature, Scope, Types: Leisure/ Holiday Tourism, Cultural Tourism, Adventure Tourism, Sports Tourism, Religious Tourism, Business Tourism, Health Tourism. Tourist, Traveller, Visitor, Tourist Visitor and Excursionist: Meaning, Definition and Differentiation.

Unit 2: History & Growth of Tourism
Developments in History of Tourism – Tourism in India: Post Independence Tourism and Modern Tourism – Tourism Industry – Recent Trends in Indian Tourism industry - Concept of Paid Holiday

Unit 3: Infrastructure in Tourism
Tourism infrastructure: Types, Forms and Significance-Accommodation: Forms and Types - Attractions, Telecommunications, Transport Sector, Modes and Relative Significance- Essential and Other Support Services -Hotel Industry- Major Hotel
Chains

Unit4: Tourism Demand and Supply
Concept of demand and supply in Tourism – Unique features of Tourist Demand – Factors affecting tourism supply – Creation of ideal destination for tourism: Significance and Constraints in creation of destination- Trends in tourist statistics with respect to Karnataka and India

Unit 5: Impact of Tourism
Economic impact- social impact – cultural impact – Environmental impact – Ecological impact – Negative impact of tourism – Impact of tourism in India: Positive and Negative

References:

1. Tourism Management and Principles - McIntosh
2. Tourism Management -Goeldner
3. Tourism Management and Principles- Rebecca Shepherd.
4 Tourism: Operations and Management -Stephen Wanhill and Alan Fyall

Note: Latest edition of the text books should be used.

CDE26201

V SEMESTER

MARKETING MANAGEMENT – DSE -2

Elective II - Rural Marketing and Consumer Behaviour

L: T: P - 4:1:0

Course Outcome:

On successful completion of this course the students can:
CO1: Understand and identify thefactors affecting rural consumer behaviour
CO2: Understand in depth the Product branding and promotion in rural market
CO3: Able to identify the importance of consumer behaviour in marketing decisions
CO4: Learn in depth and identify the influence of culture on consumer behaviour
CO5: Understand the concepts of Consumer reference groups and group dynamics
CO6: Able to identify the Consumer decision making process

Unit 1: Rural Marketing
Introduction, scope, evolution, classification of rural markets, rural vs. urban markets, need for rural marketing, types of rural customers, factors affecting rural consumer behaviour.

Unit 2: Product branding and promotion in rural market
Rural product categories – FMCGs –consumer durables-agriculture goods, services, branding in rural India: fake brands, look-alikes, spell-alikes, duplicates, product promotion through melas, haats, interactive games, folk media, puppet shows.

Unit 3: Consumer behaviour
Nature, scope, importance of consumer behaviour in marketing decisions, characteristics of consumer behaviour, models of consumer behaviour.

Unit 4: Consumer reference groups and group dynamics
Different types of reference groups, reference group influence on products & brands; determinants of social class, characteristics of social class; influence of culture on consumer behaviour, introduction to sub-cultural & cross-cultural influences; opinion leadership process.

Unit 5: Consumer decision making process
Problem recognition, pre-purchase search influences, information evaluation, purchase decision (compensatory decision rule, conjunctive decision, rule, lexicographic rule, affect referral, disjunctive rule), post-purchase evaluation; situational influences.

References:

1. Kotler, Philip, Gary Armstrong, PrafullaAgnihotri and EhsanulHaque. *Principles of Marketing*.13th edition.Pearson Education.
2. Michael, J. Etzel, Bruce J. Walker, William J Stanton and Ajay Pandit. *Marketing: Concepts and Cases.* (Special Indian Edition)., McGraw Hill Education
3. William D. Perreault, and McCarthy, E. Jerome., *Basic Marketing*. Pearson Education.
4. Majaro, Simon. *The Essence of Marketing*. Pearson Education, New Delhi.

Note: Latest edition of text books may be used.

CDE27201

V SEMESTER

HUMAN RESOURCE MANAGEMENT - DSE -2

Elective II - Human Resource Development

L:T:P - 4:1:0

Course Outcome:

On successful completion of this course the students can:

CO1:Understand in depth the techniques to manage Human Resources at work place and able to occupy a position of H R Manager

CO2:Specify the details of identifying causes and able to settle problems

CO3:Deliberate the methods and techniques of training to train the Human Resources and create assets for the organisation

CO4:Identify methods of wage payment and incentives and able to adopt different methods of wage payments and incentive plans

CO5:Understand the details of becoming a motivator and counsellor

Unit 1: Introduction to HRM

Concept, evolution and development of HRM, scope of HRM, function of HRM, role of HR executives – changing role of HR in India, emerging trends in HRM- competency mapping, business process outsourcing, right sizing of workforce, flexi time, talent management, employee engagement

Unit 2: Human Resource Development

Meaning and concept of HRD, training- objectives, methods, difference between training and development , advantages and limitations of training, evaluation of training, performance appraisal – concept, need, methods. Internal mobility and separations- promotion, transfer, demotion, separations. Employee misconduct and disciplinary procedure, grievances and grievances' redressal procedure.

Unit 3:Training and Development

Introduction, meaning and definition, objectives, need and importance, benefits of training to Individuals and organization, Steps in Systematic training plan, training methods—on the job training- Job instruction training, Coaching, Mentoring, position rotation, Apprenticeship,- Off the job training- vestibule training, Apprenticeship training, classroom training, internship training, conferences, role playing, computer based training.

Unit 4: Executive development

Introduction, meaning and definition, objectives, importance, process of executive development, methods of executive development- In basket exercise, management games, case study, interpersonal skills-Role playing, sensitivity training, behavioural training, transactional analysis, Multiple Management, Job Knowledge- on the job experience, coaching, understudy, organizational knowledge, Job rotation, General Knowledge.

Unit5: Career planning and development

Introduction, meaning, objectives, career planning v/smanpower planning, Individual career planning- factors to be considered – self awareness- elements ofcareer management programme- career Models- Pyramidal model, obsolescence model, Japanesemodel- benefits to individual and organizations, Steps in career Planning.- success in career –parametersof judging career success.

References:

1. H.R.M – L.M Prasad
2. Fundamentals of Organisation& Management Y.K Bhushan
3 Fundamentals of Organisation& Management – M.C Shukla
4. Management of Human Resources – RakeshK.Chopra

Note: Latest edition of the text books should be used.

CDE28201

V SEMESTER

FINANCIAL MANAGEMENT – DSE -2

Elective II – Working Capital Management

L: T: P - 4:1:0

Course Outcome:

On successful completion of this course the students can:
CO1: Understand and identify the nature and types of Working Capital
CO2: Understand in depth the approaches to Financing of Current assets and Working Capital Estimation
CO3: Able to identify the objectives of Cash Management
CO4: Learn in depth and identify Cost and Benefits of receivables
CO5: Able to identify the types of inventories
CO6: Understand the concept of Financing of Working Capital

Unit 1: Working Capital Planning and Management
Nature and types of Working Capital, Operating and Cash cycles, Factors influencing working capital, Types of working Capital- Permanent and temporary working capital, Approaches to Financing of Current assets- Working Capital Estimation.

Unit 2: Management of Cash
Introduction, motives for holding cash, Objectives of Cash Management, Cash budget, Optimum cash balance; Baumol's Model, Miller-orr model, Management of Marketable securities.

Unit 3: Receivables Management
Introduction- Cost and Benefits of receivables, Credit Policy, Credit evaluation, Evaluation of Credit Policies.

Unit 4: Inventory Management
Types of inventories, Motives for holding inventory, Techniques of inventory management- ABC analysis, E O Q, Levels of stock, JIT.

Unit 5: Financing of Working Capital
Sources - Trade credi t- Open account, Bills payable, Accrued expenses, Commercial Papers- Bank Credit for working capital- Types of bank credit- Overdraft, Cash credit, Bills purchased and Discounting, Letter of credit, Working capital term loan- Security for bank credit- Hypothecation, Pledge, Mortgage, Lien.

References:

1.Financial Management - M Y Khan and P K Jain
2.Financial Management - I M Pandey
3. Financial Management - Prasanna Chandra

Note: Latest edition of the text books should be used.

CDE29201

V SEMESTER

BANKING INSURANCE - DSE -2

ELECTIVE II - Banking Information Technology

L:T:P - 4:1:0

Course Outcome:

On successful completion of this course the students can:
CO1: Understand in depth the concept of bank mechanization

CO2: Understand in depth the concept of Electronic fund transfer system

CO3: Able to identify the objectives of Electronic Clearing System, procedure, cyber trading and mechanism

CO4: Learn in depth and identify Cyber crime and cyber laws, penalty for damage to computer and computer system, hacking with computer system

CO5: Able to identify the MICR based national clearing system and Code allotment under MICR,

CO6: Understand the concept of Security considerations

Unit 1: Bank Mechanization
Branch computerization- meaning, benefits, online systems with mini computer networking and with main frame computers, time sharing, duplication of data bases at various levels. Electronic payment system- ATM- advantages, disadvantages, safety measures in installing ATMs, electronic clearing service, credit clearing, process, benefits of the scheme, limitations of the scheme, debit clearing, process. Corporate and personalized banking, tele-banking.

Unit 2: Electronic fund transfer system
Transfer of funds- benefits of fund transfer system- society for worldwide internet bank financial tele-communications-SWIFT- facilities of SWIFT, bank net, RBInet, special features of RBINE, two level funds transfer, fedwire, bankwire, point of sale, chip card.

Unit 3:Document handling system
Magnetic ink character recognition (MICR)-features of MICR cheques, size quality of paper, MICR equipment, benefits of MICR technology, MICR based national clearing system. Code allotment under MICR, city codes, micro- filming, benefits of microfilming, microfiche, optical disk in documents handling, Documents transmission systems.

Unit 4: Banking technology
Electronic clearing service, objectives of ECS, procedure, cyber trading, mechanism, benefits-RTGS system, multimedia, application area of multimedia, voice mail, electronic mail, multimedia based FAX, digital signatures, Cyber crime and cyber laws, penalty for damage to computer and computer system, hacking with computer system.

Unit 5: Security Considerations

Computer security, power failure, accidental damage, human errors, malicious damage, measures to check damage to computers, security measures for computers, audit trails, computer audit system, computer virus- classification of viruses, types of viruses, safety from viruses, treatment of infection from virus.

References:

1. Agarwal, O.P, Banking and Insurance, Himalaya Publishing House.
2. Satyadevi. C, Financial Services Banking and Insurance, S Chand publications.
3. Suneja H.R, Practical and Law of Banking, Himalaya Publishing House.
4. Chabra T.N, Elements of Banking Law, Dhanpatrai& Sons.

Note: Latest edition of text books may be used.

CDE30201

V SEMESTER

TOURISM MANAGEMENT– DSE -2

ELECTIVE II – Tourism Planning and Organization

L:T:P - 4:1:0

Course Outcome:

On successful completion of this course the students can:

CO1: Understand in depth the concept of Planning approaches for different forms of Tourism

CO2: Understand the concept of Travel organization

CO3: Able to identify the Functions of a Travel Agency

CO4: Learn in depth and identify Evolution of Tour operation business – Functions of Tour Operators, Sources of Income of Travel Agency and Tour Operator

CO5: Able to identify the Duties and Responsibilities - Tour guiding - Tour escort - Tour managers –Tour guides

CO6: Understand the Procedure for setting up of Travel Agency and Tour Operating Enterprises

Unit 1: Planning

Planning: Its significance in Tourism – Planning approaches for different forms of Tourism: Eco tourism, Urban Tourism, Rural Tourism – Planning for Development of a tourist destination – Impact of unplanned tourism development on a tourist destination

Unit 2: Travel organization

Organization and Functions of UNWTO, TAAI, IATA and PATA. Govt organizations in India – ITDC – Dept of Tourism – With special reference to Karnataka - Computerized Reservation System - Introduction to Computerized Reservation System - change over from Manual booking to CRS - difference between CRS & GDS

UNIT 3: Understanding Travel Agency

Travel Agency and Tour Operation Business: Definition, types, forms of organizations. Genesis and Growth of travel agency– Functions of a Travel Agency: Travel information, Documentation, Tour Counselling, Ticketing, Reservation and Itinerary, Immigration related Services

Unit 4: Tour Operation business

Definition and Differentiation, Types and Forms of Organisations – Evolution of Tour operation business – Functions of Tour Operators, Sources of Income of Travel Agency and Tour Operator - Tour Packaging : Definition, Types and Designing a tour Package - Tourist Guide : Duties and Responsibilities - Tour guiding - Tour escort - Tour managers - Tour guides - Skills and Qualities of guides - Certification of guides - How to manage tourists – Tour analysis - Pre tour and Post tour analysis – Tourist retention programs.

Unit 5: Approval, Travel Formalities

Procedure for setting up of Travel Agency and Tour Operating Enterprises: Their Role in Development of Tourism Industry - Approval from Depat of Tourism – International Air Transport Association. Travel Formalities: Passport, Visa, Health Regulation along with Travel Documents required for visiting NE region of India: Restricted Area Permit and Inner Line Permit

References:

1. Tourism Management and Principles - McIntosh
2. Tourism Management -Goeldner
3. Tourism Management and Principles- Rebecca Shepherd.
4 Tourism: Operations and Management -Stephen Wanhill and Alan Fyall

Note: Latest edition of the text books should be used.

CDF21001

VI SEMESTER

ENTREPRENEURSHIP DEVELOPMENT – DSC -17

L: T: P - 3:1:0

Course Outcome:

On successful completion of this course the students can:

CO1: Learn in depth qualities of an entrepreneur and able to become an entrepreneur

CO2: Write down the details of financial schemes offered by banks and government agencies and able to access them easily

CO3: Learn the details of mobilization of resources

CO4: Learn in depth the characteristics of customer and able to identify the customer

Unit 1: Entrepreneurial Development Perspective

Concept of entrepreneurship development and their dynamics. importance of skill, knowledge and motivation in ED. Entrepreneurial Competition, generation of business, ideas and final selection of an activity. Market survey report and business plan preparation. Pooling of resources, forms enterprise ownership and their details.

Unit 2: Enterprise Management

Logistics and launching formalities, probable pitfalls, managing money, men, machinery, material and marketing. Support organization, entrepreneurial growth, following the law of the land and social obligation. Managing organization for innovation and creativity. Importance of leadership, business ethics and business skills on good team building

Unit 3: Running a Family Business

Concept, structure and kinds of family firms. Understanding its reputation and brand. Enhancing the knowledge and skill. Managing family and shareholders relationship. Managing leadership succession and understanding the group dynamics, encouraging family women into business. Identifying the changed customer needs and encouraging growth and change in the family business.

Unit 4: Social Entrepreneurship

Introduction, Role and Characteristics of Social Entrepreneurs, Starting of a Non-profits Organization innovatively through local resources in a social context, sustainability, Business Strategies and Scaling up.

Unit 5: Role of Government and Financial Institutions

Role of Central and State Government in promoting entrepreneurship. Types of schemes, loans, incentives, grants and subsidies. Different types of financial institutions, role of commercial banks, types of loans for MSMEs schemes, appraisal, sanctions, repayment.

References:

1. Entrepreneurship – Tata MC Graw hill
2. Entrepreneurship and Small Business – New Jersey: Palgrave
3. Creativity and Entrepreneurship – Jhon Kao
4. Corporate Creativity Tata MC Graw hill

Note: Latest edition of the text books should be used.

CDF22001

VI SEMESTER
BUSINESS STATISTICS - II – DSC -18

L:T:P - 3:1:0

Course Outcome:

On successful completion of this course the students can:

CO1: Understand in depth the components of time series analysis and measurement of trend

CO2: Learn in detail the features of linear programming and apply to solve business problem

CO3: Understand the statistical decision making process under certainty and uncertainty

CO4: Learn in detail the theories of probability

CO5: Understand in depth the properties of theoretical distributions and their application to business problem

Unit 1: Business forecasting

Time series analysis-components-measurement of trend by the method of least squares.

Unit 2: Linear programming

Meaning -features-applications-graphical method of finding solution to linear programming problem (two variables only).limitations.

Unit 3: Statistical decision theory

Decision making process-decision making under certainty and under uncertainty-mini-max, maxi-min, Laplace and Hurwicz's criterion-expected opportunity loss criterion.

Unit 4: Probability

Meaning-Uses-Random Experiment- Sample space- Event-Mutually exclusive events-Equally likely events-Independent and Dependent events. Addition and Multiplication theorem.

Unit 5: Theoretical distributions

Binomial, Poisson and Normal distribution. Properties of each distribution and their application

References:

1. Business Statistics – S.P. Gupta
2. Business Statistics – Sancheti&Kapoor
3. Business Statistics – M. Wilson
4. Business Statistics – C. B. Gupta

Note: Latest edition of the text books should be used.

CDF23001

VI SEMESTER

TAX MANAGEMENT – II – DSC -19

L:T:P - 3:1:0

Course Outcome:

On successful completion of this course the students are able to:
CO1:Understand the concept of Depreciation and rates of depreciation

CO2: Understand and identify the types of Capital Assets.

CO3: Understand in detail the concept of Income from other Sources

CO4: Learn in depth the computation of Total Income and Tax Liability

CO5: Learn in depth the concept of Tax deducted at Source
CO6: Understand in detail the concept of Goods and Service Tax

Unit 1: Depreciation
Meaning – Conditions – Block of Assets – Rates of Depreciation –Problems on computations of depreciation U/S 32.

Unit 2: Computation of Income from Capital Gains
Capital Gains – Types of Capital Assets –Transfer – Cost of Acquisition – Cost of Improvement – Types of Capital Gains – Exemption forIndividual Assessee – Computations.

Unit 3: Income from other Sources
Items of Income chargeable – Kinds of Securities – BondWashing Transaction – Deductions – Computations – Set of Losses and Carry forward and setoff of losses – Assessment of Individuals.

Unit 4: Assessment of Companies
Meaning-Types of Companies -Computations of Total Incomeand Tax Liability (Normal Computation Only)

Unit 5: Tax deducted at Source
Tax Deduction at Source-Advance Payment of Tax -Interest U/S234C- Assessment Procedure – Kinds of Assessment – E Filing of Returns.

Unit 6: Goods and Service Tax
Short title- Extent and Commencement –Features-Important definitions- Authority agrees – aggregate Turnover – Business Vertical Goods -Capital goods –CGST-SGST-Common portal-Input -Input Service-Input Tax-Input audit-Outward Supply-Output Tax, etc… Advantages and Disadvantages of GST.

References:

1. GST and Customs Duty – H.C. Mehotra and S.P Goyal
2. GST and Customs Duty– Dr. Manuel Tauro

Note: Latest edition of the text books should be used.

CDF24001

VI SEMESTER

BUSINESS POLICY –SEC – 2

L:T:P - 3:1:0

Course Outcome:

On successful completion of this course the students are able to:
CO1:Understand the concept of Business policy and Strategic Management
CO2: Understand and identify the Strategic planning in Organisation
CO3: Understand in detail the concept of Strategy Formulation. Strategic & Situational Analysis
CO4 :Learn in depth the concept of SWOT Analysis
CO5: Learn in depth the concept of Financial Strategy and Production Strategy
CO6: Understand in detail the Human Resource Strategy

Unit 1: Introduction
Meaning and Nature; Business policy and Strategic Management; Imperative, Vision, Mission, and Objectives, Strategic Levels in Organisation.

Unit 2: Strategic Planning
Meaning, Stages, Alternatives, Strategy Formulation. Strategic& Situational Analysis – SWOT Analysis, TOWS Matrix, Portfolio Analysis, BCG Matrix.

Unit 3: Marketing Strategy
Financial Strategy, Production Strategy, Logistics Strategy, Human Resource Strategy.

Unit 4: Organisational Structures
Establishing Strategic Business Units, Establishing Profit Centres by Business, Product or Service, Market Segment or Customer, Leadership and Behavioural Challenges.

Unit 5: Case studies
Case studies in business policy and strategic management.

References:

1. Kazmi A, Business Policy & Strategic Management, Tata McGraw hill, New Delhi.
2. Upendra K, Strategic Management Concepts & Cases, Excel Publications, New Delhi.
3. Glueck W.F., Strategic Management & Business Policy, McGraw Hill, Newyork.
4. Thompson & Strickland, Strategic management Concept & Cases, Tata McGraw Hill, New Delhi.

Note: Latest edition of the text books should be used.

CDF25001

VI SEMESTER

Project Report– SEC - 2

L: T: P–1:0:3

C1 – Proposal of Project Work - 15 Marks
C2 – Progress of Project Work - 15 Marks
Viva - 20 Marks
Valuation of Report – 50 Marks

Course Outcome:

On successful completion of the project work the students are able to:
CO1: Understand in depth the gap between theory and practical through internship
CO2: Understand in detail with examples the procedure and able to write a report on the various issues of an organisation
CO3: Specify the details in depth and able to communicate effectively
CO4: Learn in detail and able to absorb as an employee by the employer
CO5: Specify and analyse the components of project report and prepare the report effectively

CDF26401

VI SEMESTER

MARKETING MANAGEMENT– DSE -3

Elective III – Advertising

L:T:P - 4:1:0

Course Outcome:

On successful completion of this course the students are able to:
CO1: Understand the objectives, Scope and Growth of Modern Advertising

CO2: Understand and identify types of Advertising

CO3: Understand in detail the concept of Elements of Advertisement

CO4:Learn in depth the eessentials of good advertisement copy

CO5: Understand and identify the Factors influencing the choice of an Advertising agency – Types of agencies

CO6: Understand in detail the Advertising ethics

Unit1: Advertising:
Meaning, Definition, Objectives, Scope, Growth of Modern Advertising, Types of Advertising, Publicity v/s Advertising, AIDA.

Unit2: Advertising aids and Media
Trademark, Labelling and Package, Point of Purchase (POP), Display and below the line promotion, Advertising media, Types, Media Planning and Scheduling.

Unit3: Art and Layout of Advertising
Elements of Advertisement copy, visualisation, Types, Essentials of good advertisement copy, Layout- Balancing in layout, Technical aspect of layout Illustrations, advertise ability of a product and Slogan.

Unit4: Advertising Agency and Budget
Factors influencing the choice of Advertising agency – Types of agencies- Advertising Budget- Approaches to Advertising Budget.

Unit 5: Ethical and Legal Framework
Advertising ethics, Social responsibility and self regulation, Need for advertising laws, Types of advertising laws in India, Advertising Standards Council of India, Laws relating to advertising and article 19(1) & 2 of constitution, sections relating to advertising in IPO Code 1868 and Indian Contract Act 1872.

References:

1.Aaker, Myers &Batra : Advertising Management , Prentice Hall.
2.Aren&Bovee: Contemporary Advertising, Tata McGraw Hill.
3.Chunawala: Theory and Practice of Advertising Management .
4.Dawar S. R: Salesmanship and Advertisement.

Note: Latest edition of the text books should be used.

CDF27401

VI SEMESTER

HUMAN RESOURCE MANAGEMENT– DSE -3

Elective III –Performance Appraisal and Compensation Management

L:T:P - 4:1:0

Course Outcome:

On successful completion of this course the students are able to:

CO1: Understand and identify the objectives, principles, factors influencing wage and salary Administration

CO2: Understand the concept of wage policy in India

CO3: Learn in depth the objectives of fringe benefits.

CO4:Learn in depth the Methods of performance appraisal

CO5: Understand and identify the essentials of an effective appraisal system

CO6: Understand in detail the concept of m**otivation**

Unit 1: Wage and Salary Administration

introduction, meaning, objectives, principles, factors influencing wage and salary administration, wage and salary determination process, theories of wages, methods of wage payments, wage policy in India, concept of wages – minimum wage, fair wage, Living wage, Wage Differentials, significance of wage differentials.

Unit 2: Incentive Plans

Introduction, meaning, characteristics, benefits of incentive plans, Limitations, Essentials of a good incentive plan, types of wage incentive plans- Halsey plan- merits and demerits, Rowan Plan-merits and demerits, Emerson plan, Taylor's differential piece rate system, Gant's Task and Bonus Plan, types of Group incentive plans- priest man's plan, Scalon plan, Co-partnership plan, Profit sharing- meaning, merits and demerits. Fringe benefits- Definition, objectives.

Unit 3: Performance Appraisal

Meaning, definition, objectives, features, benefits, limitations, performance appraisal process-Methods of performance appraisal- traditional methods-confidential report, graphic sales method, straight ranking method, Paired comparisons method, grading system, Forced distribution method, check list method-critical incident method, free essay method, Group appraisals , Field Interview method.

Unit 4: Performance Appraisal Methods

Modern methods- Assessment centre, Human resource accounting, Behaviourally anchored rating scales. Management by objectives, 360 degree performance appraisal, computerized and web based performance appraisal, suggestions to improve performance appraisals, essentials of an effective appraisal system

Unit 5: Motivation

Meaning and Definition, types of motivation, importance of motivation, financial motivators, Non-financial Motivators, Theories of Motivation- Maslow's Need Hierarchy method, Herzberg's Theory, McGregor's theory X and Theory Y, theory Z, Alderfer's ERG Theory, Vroom's Expectancy theory.

References:

1. HRM – L.M. Prasad.
2. BOM Fundamentals – Y.K. Bhushan
3. Business Organisation – M.C. Shukla
4. HRM – M.V. Murthy.

Note: Latest edition of the text books should be used.

CDF28401

VI SEMESTER

FINANCIAL MANAGEMENT– DSE -3

Elective III – Financial Services

L:T:P - 4:1:0

Course Outcome:

On successful completion of this course the students are able to:

CO1: Understand and identify the features, importance, contribution of financial service in promoting industry and service

CO2: Understand the concept of money market and capital market.

CO3: Learn in depth the growth of merchant banking in India

CO4:Learn in depth the Scope of merchant banking services

CO5: Understand the concept of Mutual Funds

CO6: Understand in detail the concept of Factoring

Unit 1: Financial Services

Meaning-Features, Importance, Contribution of financial service in promoting industry and service sector-financial assets- types- financial markets-organized and unorganized- money market and capital market.

Unit 2: Merchant Banking

Meaning, Origin, and growth of merchant banking in India, Scope of merchant banking services-Merchant bankers and management of public issues- merchant banking practices in India, Weaknesses in the functioning of merchant bankers in India

Unit 3: Mutual Funds

Meaning, Evolution of mutual funds, types of mutual funds, differences between mutual funds and hedge funds-periodic plans for investors- Systematic investment Plan(SIP),Systematic Transfer Plan(STP),Systematic withdrawal plan(SWP),Mutual fund Myths.

Unit 4: Lease Financing

Meaning-types of leasing- Finance lease- direct lease, leveraged lease, sale and lease back-operating lease- factors influencing lease, Treatment of lease transactions –lease v/s buy-Evaluation of Lease-buy decision-Lease financing critical evaluation – problems on lease financing.

Unit 5: Factoring

Introduction need for factoring-types- factoring mechanism- securitization of debt- concept and mechanism.

References:

1.Fiancial Services	MY Khan
2.Financial Management	Dr R P Rustagi
3. Financial service in India	Rajesh Kothari
4.Financial services	Shashi K Gupta &NishaAgarwal

CDF29401

VI SEMESTER

BANKING AND INSURANCE– DSE -3

Elective III –Principles of Insurance

L:T:P - 4:1:0

Course Outcome:

On successful completion of this course the students are able to:

CO1: Understand and identify the nature of business risk, causes of business risk, types of business risk and methods of handling risk,

CO2: Understand and identify the characteristics, purpose, need and benefits of insurance

CO3: Learn in depth the principles of insurance

CO4: Understand the concept of Life insurance

CO5: Understand the concept ofStructure and operation of insurance business

CO6: Understand in detail the concept of Life Insurance Agency

Unit 1: Risk Management

Importance- concept of risk, meaning of business risk, nature of business risk, causes of business risk, types of business risk, methods of handling risk, enterprise risk management

Unit 2: Introduction to Insurance

characteristics, purpose, need, benefits of insurance, functions of insurance, importance of insurance, principles of insurance, nature of insurance contract, types of insurance contract, fundamentals of insurability, insurance v/s wagering, assurance vs insurance gambling vs insurance

Unit 3: Life insurance

meaning, features, advantages, types of life insurance plans-Term policies . Endowment Policies .Money back policies .with or without profit policies . Pension schemes Their features and purposes.

Unit 4: Insurance Business

Structure and operation. Life Insurance Corporation . LIC Act of 1956 .LIC of India .Structure and performance .LIC as a non-banking financial Intermediary.

Unit 5: Life Insurance Agency

Rules of agency .Types of agency .Qualities of Insurance salesman, Commission and benefits to agents.

References:

1.Elements of banking and insurance	-	JyothsnaSethi and Nishwan Bhatia PHI learning pvt ltd
2.Insurance theory and practice	-	Tripathy N P
3. Insurance Institute of India	-	Hand book on General Insurance
4. Insurance- principles and practice	-	M.N. Mishra and S B Mishra

Note: Latest edition of the text books should be used.

CDF30401

VI SEMESTER

TOURISM MANAGEMENT– DSE -3

Elective III –Tourism Management

L:T:P - 4:1:0

Course Outcome:

On successful completion of this course the students are able to:
CO1: Understand the concept of Managing of Services in tourism
CO2: Understand the concept of Front Office organization structure
CO3: Learn in depth the Role of State Tourism Development Corporation in the development of tourism in Karnataka.
CO4: Understand the concept of increasing competitiveness for globalization
CO5: Understand and identify the National Parks and Wildlife sanctuaries,
CO6: Understand and identify the types of Accommodation

Unit 1: Managing Tourism

Meaning of Tourism Management – Importance – Managing of Services in tourism -Customer Relationship Management in Tourism –Meaning and importance - Front Office and Other Departments - Front Office organization structure - Functions - Baggage handling upon arrivals & checkouts - Mails and Message Handling - luggage handling and arrival records - Methods of Communication - Importance – Methods - Managing risk involved in tourism management - Sustainable Tourism Management.

Unit 2: Hospitality industry

Introduction - Types of Accommodation – Hotels - Commercial &Non commercial hotels - Various departments in hotels: House Keeping Department - Engineering Department - HRD Department - Accounts Department . Hotel classification - supplementary accommodation - sector- Resorts - Guest House - Caravans, Lodges - Inns - Youth Hostels –Home stays - Serviced villas. Safety and Precautions - Importance - Fire Precautions - The accident book - Security & Safety Instruction.

Unit 3: Tourism Organisations

Inter -Governmental, National and International: Inter governmental organizations and tourism industry – coordination of the tourism industry with government departments : Tourism, Civil Aviation, Transport, Forest, Archaeology, Culture, Museum and Health – Role of State Tourism Development Corporation in the development of tourism in Karnataka – National Tourism organizations : NTD, IRDC, FHRAI, TAAI and their Role.

Unit 4: Destination Management

Tourist Destination, Management of the Destination: Measuring the infrastructure, Environmental Quality preservation of attractions through tourism–Future of the destination: increasing competitiveness for globalization and satisfying the tourist needs

Unit 5: Management of Natural Resources of India

Need for managing natural resources and their significance; National Parks and Wildlife sanctuaries , Bird Sanctuaries, Tiger and Crocodile Project sites of India – Major Hill stations, Islands, River & River Islands of India, Important Sea Beaches of India – Mumbai,Puri, Goa, Chennai, Trivandrum and Kerala. Adventure Sports: Existing trends and places of importance for Land based, Water based, and aero based adventure sports of India -

References:

1. Tourism Management and Principles - McIntosh
2. Tourism Management -Goeldner
3. Tourism Management and Principles- Rebecca Shepherd.
4 Tourism: Operations and Management -Stephen Wanhill and Alan Fyall

Note: Latest edition of the text books should be used.

CDF26601

VI SEMESTER

MARKETING MANAGEMENT– DSE -4

Elective VI –Retail and Supply Chain Management

L:T:P - 4:1:0

Course Outcome:

On successful completion of this course the students are able to:
CO1: Understand the concept of evolution of Retailing in India
CO2: Understand the concept of Emerging Trends in Retailing,
CO3: Learn in depth the Role of Design & Layout, Location Planning and its importance,
CO4: Understand the concept of Floor Space Management
CO5: Understand and identify the Elements/Components of Retail Store Operation
CO6: Understand the Concepts and importance of a Supply Chain

Unit 1: Introduction to Retailing
Definition, Characteristics, Evolution of Retailing in India, Emerging Trends in Retailing, Factors Behind the change of Indian Retail Industry, Retail Formats.

Unit 2: Store Planning
Design & Layout, Location Planning and its importance, retailing image mix, Effective Retail Space Management, Floor Space Management.

Unit 3: Retail Operation
Elements/Components of Retail Store Operation, Store Administration, Store Manager – Responsibilities, Inventory Management, Management of Receipts, Management of Retail Outlet/Store, Store Maintenance, Store Security.

Unit 4-Customer Relation Management(CRM)
Introduction, Benefits of RM, Principles, Strategies, Components, Customer Service in retailing.

Unit 5- Supply Chain Management
Concepts and importance of a Supply Chain (SC), Key issues of Supply Chain Management, SC strategies, Push-based, Pull-based and Push-Pull based supply chain, Demand Forecasting in a Supply Chain, Managing inventory in SC environment: Transportation in SC environment.

References:

1.Aaker, Myers &Batra : Advertising Management , Prentice Hall.
2.Aren&Bovee: Contemporary Advertising, Tata McGraw Hill.
3.Chunawala: Theory and Practice of Advertising Management .
4.Dawar S. R: Salesmanship and Advertisement.

Note: Latest edition of the text books should be used.

CDF27601

VI SEMESTER

Human Resource Management– DSE -4

Elective VI – Employee Empowerment and Industrial Relations

L:T:P - 4:1:0

Course Outcome:

On successful completion of this course the students are able to:
CO1: Understand and identify conditions necessary for employee empowerment
CO2: Understand the concept of Quality circles
CO3:Learn in depth the types of social Security
CO4: Understand the concept of trade unions and problems of Trade Union.
CO5: Understand and identify the measures to strengthen trade Union movement in India
CO6: Understand the concept of Strategic HRM

Unit 1: Employee Empowerment
Meaning, Conditions Necessary for Empowerment, Forms of Empowerment-Quality circles, features, Developing quality circles in organizations, problems of Quality circles-Empowered Teams, Workers' Participation in Management-, Definition and Objectives, Forms of Workers' Participation, Evaluation of WPM Scheme.

Unit 2: Employee Health and Safety
Meaning of Health, Importance, occupational Hazards and Diseases,-Types- protection Against hazards- preventive measures, Curative Measures, Accidents- types and Causes, Social Security, Meaning, objectives, Scope, Need for social security Types, Types of social Security

Unit 3: Industrial relations
Concept, objective, , Approach Industrial Relations,- causes of Poor Industrial Relations, Steps for Good Industrial Relations, Trade Union- Meaning, Reasons for joining trade unions, problems of Trade Union and Measures to strengthen trade Union movement in India.

Unit 4: Industrial Disputes
Definition, forms of Industrial disputes- primary strikes, secondary strikes, Lock-outs, Gherao, Picketing and Boycott- Causes of Disputes-Settlement of Industrial disputes- Conciliation, Arbitration, Labour court, Industrial Tribunal, National tribunal.

Unit 5: Strategic HRM
HRM effectiveness and business success- Michael Porter's theory of competitive strategy- types of strategies-corporate strategies- competitive strategies, functional strategies-strategic management process, Approaches to SHRM- Resource based Approach, Strategic Fit, Universalistic Approach, Configurational Approach, Contingency Approach.

References:

1.Human Resource Management - V S P Rao
2.Human Resource Management - K Ashwathappa
3.Human Resource Management - L M Prasad
4.Human Resource Management - Shashi K. Gupta &Rosy Joshi

Note: Latest edition of the text books should be used.

CDF28601

VI SEMESTER

FINANCIAL MANAGEMENT– DSE -4

Elective IV – Investment Analysis and Portfolio Management

L:T:P - 4:1:0

Course Outcome:

On successful completion of this course the students are able to:
CO1: Understand the concept of Investment
CO2: Understand the concept of Portfolio Management Process- Approaches to Investment Decision making Portfolio Management Process- Approaches to Investment Decision making
CO3:Learn in depth theCapital Market instruments
CO4: Understand the concept of Risk and Return
CO5: Understand the concept of Portfolio Return and Risk-Measurement
CO6: Understand the concept of Markowitz model.

Unit 1: Investment
Meaning, Alternatives, financial Markets, Portfolio Management Process- Approaches to Investment Decision making, Common errors in investment management- qualities for successful investing.

Unit 2: Investment Instruments
Capital Market instruments -shares, debentures, bonds, mutual funds- Money market instruments-Call Money, Treasury bills, Certificate of deposit, Commercial paper, Inter-corporate deposits- derivative instruments-futures, forwards, options and swaps.

Unit 3: Analysis of investments
fundamental analysis- Industry analysis-Equity analysis-problems on equity valuation, technical analysis-price chart- Dow theory, efficient market hypothesis-Elliot theory.

Unit 4: Risk and Return
meaning-current return and capital return-Risk- Sources of risk- interest rate risk, market risk, business risk, Measuring total return- average return- measuring risk-variance and standard deviation- Expected rate of return and risk.

Unit 5: Portfolio theory
diversification and portfolio risk- Portfolio Return and Risk-Measurement of co-variance, Co-efficient of correlation, calculation of Portfolio risk with two and three securities- Markowitz model.

References:

1.Investment analysis and Portfolio Management- Prasanna Chandra
2.Security Analysis and Portfolio Management-PuneethavathiPandian,
3. Security analysis and portfolio management-Sasidharan
4. Security analysis and Portfolio Management- Avadhani V A

Note: Latest edition of the text books should be used.

CDF29601

VI SEMESTER

BANKING AND INSURANCE– DSE -4

Elective IV – General Insurance

L:T:P - 4:1:0

Course Outcome:

On successful completion of this course the students are able to:
CO1: Understand the concept of General Insurance business in India
CO2: Understand the concept of GIC of India and its subsidiaries
CO3:Learn in depth the Classification of General Insurance
CO4: Understand the concept of Marine Insurance
CO5: Understand and identify the Types of marine insurance policies
CO6: Understand the concept of Health insurance

Unit 1: Introduction
History of general Insurance business in India . Scope and functions of general Insurance, GIC Act of 1972 ,GIC of India and its subsidiaries.

Unit 2: Classification of General Insurance
Cover note. Reinsurance contribution. Calculation of contribution.

Unit 3: Fire Insurance; Meaning and Scope, types of policies. Perils covered. Special perils and special policies. Excluded perils, property and losses fire policy rating and tariff declaration and floating policy. Problems.

Unit 4: Marine Insurance
Meaning and Scope of marine insurance, fundamental principles of marine insurance, types of marine insurance losses, Types of marine insurance policies.

Unit 5: Health **insurance**
importance of health - concept of health - determinants of health - levels of healthcare - legal provisions - healthcare – stakeholders in India - – health insurance products: classification of health insurance products - health insurance products - fixed benefit insurance plans - clauses in health policies.

References:

1.Elements of banking and insurance- JyothsnaSethi and Nishwan Bhatia PHI learning pvt ltd
2.Insurance theory and practice- Tripathy N P
3. Insurance Institute of India- Hand book on General Insurance
4. Insurance- principles and practice - M.N. Mishra and S B Mishra

Note: Latest edition of the text books should be used.

CDF30601

VI SEMESTER

TOURISM MANAGEMENT– DSE -4

Elective IV – TOURISM MARKETING

L:T:P - 4:1:0

Course Outcome:

On successful completion of this course the students are able to:
CO1: Understand the concept of Tourism Marketing
CO2: Understand the concept of State tourism offices and Local Bodies, Private Organizations, Non-Governmental Organizations in Tourism
CO3:Learn in depth the Tourism Marketing Environment
CO4: Understand the concept of Tourism Pricing and Promotion
CO5: Understand and identify the factors influencing Tourism Pricing, Methods of Price fixation, Pricing Strategies
CO6: Understand and identify the Promotional Tools in Tourism

Unit 1: Introduction to Tourism Marketing
Tourism Marketing: Nature, Process and Growth. Services and their Marketing, Tourism Marketing and Development: Socially Responsible Marketing, Social Marketing, Participants in Socially Responsible Marketing and their Roles. Government Bodies- National Tourism-offices, State tourism offices and Local Bodies, Private Organizations, Non-Governmental Organizations in Tourism.

Unit 2: Challenges of Tourism Marketing
Nature and Characteristics of Tourism Offers: Tangibility and Intangibility, Non-perishability and Perish ability, Homogeneity and Heterogeneity, Separability and Inseparability, Ownership and Non-ownership. Issues and Challenges in Tourism Marketing, Marketing strategies to overcome limitations of Tourism

Unit 3: Tourism Marketing Environment
Concept of Marketing Mix, Developing Marketing Mix, Tourism Markets, Types of Tourism Markets, Tourist behavior, Tourist Buying Process, Factors Influencing Tourists' Buying Process, Tourism Product and Distribution- Concept of Tourism Product, Tourism as a packaged Product, Destination as a Product, Managing Products, New Product Development, Product Life Cycle.

Unit 4:Tourism Pricing and Promotion
Concept, Importance and Process of Pricing, Factors influencing Tourism Pricing, Methods of Price Fixation, Pricing Strategies, Price Fixation. Tourism Promotion and Communication: Objectives of Promotion, Promotion Mix, Factors affecting Promotion Mix, Components of Promotion Mix, Important Promotional Tools in Tourism- Brochures, Events, Movies and Cinema.

Unit 5: Catalyst of Tourism Development in India

Tourism promotional festivals of India, Museum and art galleries of India, Tourist Trains in India, Important tourism Circuits, Important hotel chains in India .

References:

1. Tourism Management and Principles - McIntosh
2. Tourism Management -Goeldner
3. Tourism Management and Principles- Rebecca Shepherd.
4 Tourism: Operations and Management -Stephen Wanhill and Alan Fyall

Note: Latest edition of the text books should be used.

BBA

Question Paper Pattern

(For all courses except Quantitative Techniques and Management Information system)

PART-A

Answer the following. Each question carries 15 marks. 2X15=30

1. …… ……

OR

2. ……..…….

3. ……..……..

OR

4. ……..…….……

PART-B

Answer the following. Each question carries 10 marks. 2X10=20

5. …….…….

OR

5. …….……...……

7. …….…….

OR

8. …….…….

PART-C

Answer any four of the following. Each question carries 5 marks. 4X5=20

9. …….……

10. …….…….…….

11. …….…….…….

12. …….…….…….

13. …….……...

14 ……..

****

BBA

Question Paper Pattern
Quantitative Techniques

Time: 3 hrs **Max. Marks: 70**

Part-A

Answer the following. Each question carries two marks 10X2=20

1. a. …….
   b. …….
   c.……...
   d. ……......
   e.……..
   f.…….
   g.…….
   h. …….
   i. ……..
   j. ……..

Part-B

Answer any four of the following. Each question carries five marks 4X5=20

2. ……...

3. ……..……..

4. ……..……..

5. ……

6. ……...……

Part-C

Answer any three of the following. Each question carries ten marks 3X10=30

7. ….……

8. …….

9. ……..……

10. ……..…….

BBA
Question Paper Pattern
Management Information System

Time: 3 hrs **Max. Marks: 70**

Part-A

Answer the following. Each question carries two marks. 10X2=20

1. a. ……..……..
b. ……..……..
c. ……..……..
d. ……..……..
e. ……..……..
f. ……..……..
g. ……..……..
h. ……..……..
i. ……..……..
j. ……..……..

Part-B

Answer any four of the following. Each question carries five marks. 4X5=20

2. ……..……..
3. ……..……..
4. ……..……..
5. ……
6. ……

Part-C

Answer any three of the following. Each question carries ten marks 3X10=30

5. ……
6. ……
7. ……
8. ……

JSS COLLEGE OF ARTS COMMERCE & SCIENCE

(Autonomous)

Ooty Road, Mysuru – 25

DEPARTMENT OF COMMERCE AND MANAGEMENT

B.Com Pragramme

(I Year)

Syllabus as per NEP 2021-22 Scheme

SYLLABUS FOR B.COM DEGREE AS PER NEP – 2020 REGULATIONS IMPLEMENTED FROM THE ACADEMIC YEAR 2021-22

I. OBJECTIVES:

1. To develop the skills required for the application of accounting concepts andtechniques learned in the classroom at the workplace.
2. To provide competent and technical skills personnel to the industry in the area of Accounting, Finance, Taxation, Cost and Management Accounting.
3. To enhance the employability skills of the commerce students.
4. To enhance the capability of the students improve their decision-making skills.
5. To enhance the capability of the students to make decisions at personal andprofessional level.
6. To encourage entrepreneurship among students pursuing education in the field of Commerce.
7. To empower students for pursuing professional courseslike CharteredAccountancy, Cost and Management Accountancy, Company Secretary, etc.,
8. To ensure holistic development of Commerce students.

II. ELIGIBILITY FOR ADMISSION:

Candidates who have passed Two Year Pre University Course of Karnataka State in any discipline or its equivalent (viz., 10+2 of other states, ITI, Diploma etc.) are eligible for admission into this program.

III. DURATION OF THE PROGRAM:

The program of study is Four years of Eight Semesters. A candidate shall complete his/her degree within eight academic years from the date of his/her admission to the first semester. The NEP 2020 provides multiple exit options for students as specified below:

EXIT OPTION:

a. The students who successfully complete ONE year/ 2 Semesters and leave the program, will be awarded Certificate in Commerce.
b. The students who successfully complete TWO years/ 4 Semesters and leave the program, will be awarded Diploma in Commerce.
c. The students who successfully complete THREE years/ 6 Semesters and leave the program, will be awarded Bachelors Degree in Commerce (B.COM)
d. An option is given to the students to continue their education to the Fourth year and those who successfully complete FOUR years/ 8 Semesters will be awarded Bachelors Degree in Commerce (Hons) . [B.COM (Hons)]

IV. MEDIUM OF INSTRUCTION

The medium of instruction shall be English. However a candidate will be permitted to write the examination either in English or in Kannada.

V. ATTENDANCE

a. For the purpose of calculating attendance, each semester shall be taken as a Unit.
b. A student shall be considered to have satisfied the requirement of attendance for the semester, if he/she has attended not less than 75% in aggregate of the number of working periods in each of the subjects compulsorily.
c. A student who fails to complete the course in the manner stated above shall not be permitted to take the University Examination.

VI. TEACHING AND EVALUATION

M.Com graduates with B.Com, BBM/BBA and BBS as basic degree from a recognized university are only eligible to teach and to evaluate all the Commerce courses including Digital Fluency (except Languages, Constitution of India, Environmental Studies, Health Wellness/Social and Emotional learning, Sports/NCC/NSS/Other)

VII. SKILL DEVELOPMENT / RECORD MAINTENANCE

a. Every college is required to establish a dedicated business lab for the purpose of conducting practical/ assignments to be written in the record.

b. In every semester, the student should maintain a record book in which a minimum of 5 exercise or activities per course are to be recorded.

VIII. SCHEME OF EXAMINATION

a. There shall be an University examination at the end of each semester. The maximum marks for the university examination in each paper shall be 60 marks for DSC, DSE, Vocational, SEC and OEC.

b. Internal Assessment 40 marks for DSC, DSE, Vocational, SEC and OEC.

Guidelines for Continuous Internal Evaluation and Semester End Examination:

The CIE and SEE will carry 40% and 60% weightage each, to enable the course to be evaluated for a total of 100 marks, irrespective of its credits. The evaluationsystem of the course is comprehensive & continuous during the entire period of the Semester. For a course, the CIE and SEE evaluation will be on the following parameters:

Sl. No.	Parameters for the Evaluation	Marks
	Continuous Internal Evaluation (CIE)	
1	Continuous & Comprehensive Evaluation (CCE) – (A)	20 Marks
2	Internal Assessment Tests (IAT) –(B)	20 Marks
	Total of CIE (A+B)	40 Marks
3	Semester End Examination (SEE) – (C)	60 Marks
	Total of CIE and SEE (A + B + C)	100 Marks

Continuous Internal Evaluation:

a. **Continuous & Comprehensive Evaluation (CCE):** The CCE will carry a maximum of 20% weightage (20 marks) of total marks of a course. Before the start of the academic session in each semester, a faculty member should choose for his/her course, minimum of two of the following assessment methods with 10 marks each (2x10=20 marks)

   i. Individual Assignments/Group Assignments
   ii. Seminars/Class Room Presentations/ Quizzes
   iii. Participatory activities & Industry-Integrated Learning/ Industrial visits
   iv. Practical activities / Problem Solving Exercises

b. **Internal Assessment Tests (IAT):** The IAT will carry a maximum of 20% weightage (20 marks) of total marks of a course. Under this component, two tests will have to be conducted in a semester for 30 marks each and the same is to be scaled down to 10 marks each.

Internal Assessment Test

Course Code: **Name of the Course:**

Duration: 1 Hour **Total Marks: 30**

PART-A

Answer any one of the following questions. 5 marks (1x 5 = 5)

1.----------

2.----------

PART- B

Answer any one of the following questions. 10 marks (1x 10 = 10)

3.----------

4.----------

SECTION- C

Answer any one of the following questions. 15 marks (1x 15 = 15)

5,----------

6.----------

SEMESTER END EXAMINATION (SEE):

The Semester End Examination for all the courses for which students who get registered during the semester shall be conducted. SEE of the course shall be conducted after fulfilling the minimum attendance requirement as per the University norms. The BOS of the University has prepared the SEE framework and the question paper pattern for SEE is presented below for 60 marks.

PATTERN OF QUESTION PAPER

TIME : 2 HOURS MARKS: 60

PART – A

Answer any FIVE of the following questions. Each question carries 2 marks.

(5x2= 10)

1. .....
2. .....
3. .....
4. .....
5. .....
6. .....
7. .....

PART – B

Answer any TWO of the following questions. Each question carries 10 Marks.

(2x10 =20)

8. .....
9. .....
10. .....
11. .....

PART – C

Answer any TWO of the following questions. Each question carries 15 Marks

(2x15=30)

12. .....
13. .....
14. .....
15. .....

Minimum Marks for a Pass:

Candidates who have obtained a minimum of 35% marks in semester end examination i.e. 21 marks out of 60 marks of theory examination and 40% in aggregate i.e. total 40 marks out of 100 marks of Semester End Examination marks and Continuous Internal Evaluation marks.

Notes:

- One Hour of Lecture is equal to 1 Credit.
- One Hour of Tutorial is equal to 1 Credit (Except Languages).
- Two Hours of Practical is equal to 1 Credit

Acronyms Expanded

- AECC : Ability Enhancement Compulsory Course
- DSC © : Discipline Specific Core (Course)
- SEC-SB/VB : Skill Enhancement Course-Skill Based/Value Based
- OEC : Open Elective Course
- DSE : Discipline Specific Elective
- SEE : Semester End Examination

- **CIE** : Continuous Internal Evaluation
- L+T+P : Lecture+Tutorial+Practical (s)

Note: Practical Classes may be conducted in the Business Lab or in Computer Lab or in Class room depending on the requirement. One batch of students should not exceed half (i.e., 50 or less than 50 students) of the number of students in each class/section. 2 Hours of Practical Class is equal to 1 Hour of Teaching, however, whenever it is conducted for the entire class (i.e., more than 50 students) 2 Hours of Practical Class is equal to 2 Hours of Teaching

PROGRAM STRUCTURE
Proposed Scheme of Teaching and Evaluation for B.Com (Basic/Hons)
with Commerce as Core Subject

I SEMESTER B.COM								
Sl. No.	**Course Code**	**Title of the Course**	**Category of Courses**	**Teaching Hours per week (L+T+P)**	**SEE**	**CIE**	**Total Marks**	**Credits**
1	Lang 1.1	Language – I	AECC	3+1+0	60	40	100	3
2	Lang 1.2	Language - II.	AECC	3+1+0	60	40	100	3
3	B.Com 1.1	Financial Accounting – I	DSC	3+0+2	60	40	100	4
4	B.Com 1.2	Management Principles and Applications	DSC	4+0+0	60	40	100	4
5	B.Com 1.3	Principles of Marketing	DSC	4+0+0	60	40	100	4
6	B.Com 1.4	Digital Fluency **OR** Environmental Studies	SEC-SB AECC	1+0+2 2+0+0	60	40	100	2
7	B. Com1.5	Across the Faculty:* 1. Basics of Accounting **OR** 2. Managing Workforce	OEC	3+0+0	60	40	100	3
8	B.Com 1.6	Yoga **OR** Sports	SEC-VB	0+0+1	-	-	-	1
9	B.Com 1.7	Health and Wellness **OR** NCC/NSS/R&R (S&G)/Culture	SEC-VB	0+0+1	-	-	-	1
	Sub-Total (A)				**420**	**280**	**700**	**25**

Note :

*Across the Faculty: These Courses are meant for other department students and shall be taught by commerce teachers.

	II SEMESTER B.COM							
10	Lang 2.1	Language –I	AECC	3+1+0	60	40	100	3
11	Lang 2.2	Language –II	AECC	3+1+0	60	40	100	3
12	B.Com 2.1	Financial Accounting – II	DSC	3+0+2	60	40	100	4
13	B.Com 2.2	Company Law	DSC	4+0+0	60	40	100	4
14	B Com 2.3	Law and Practice of Banking	DSC	4+0+0	60	40	100	4
15	B.Com 2.4	Digital Fluency **OR** Environmental Studies	SEC-SB AECC	1+0+2 2+0+0	60	40	100	2
16	B.Com 2.6	Across the Faculty:* 1. Financial Literacy **OR** 2. Retail Management	OEC	3+0+0	60	40	100	3
17	B.Com 2.7	Yoga / Sports	SEC-VB	0+0+1	-	-	-	1
18	B.Com 2.8	Health and Wellness **OR** NCC/NSS/R&R (S&G)/Culture	SEC-VB	0+0+1	-	-	-	1
	Sub-Total (B)				**420**	**280**	**700**	**25**

Note :

* Across the Faculty: These courses are meant for other departments students and shall be taught by commerce teachers.

Semester III								
Sl. No.	**Course Code**	**Title of the Course**	**Category of Courses**	**Teaching Hours per Week (L + T + P)**	**SEE**	**CIE**	**Total Marks**	**Credits**
19	Lang.1.1	Language - I	AECC	3+1+0	60	40	100	3
20	Lang.1.2	Language – II	AECC	3+1+0	60	40	100	3
21	B.Com.3.1	Corporate Accounting	DSC	3+0+2	60	40	100	4
22	B.Com.3.2	Business Statistics	DSC	3+0+2	60	40	100	4
23	B.Com.3.3	Cost Accounting	DSC	3+0+2	60	40	100	4
24	B.Com.3.4	Artificial Intelligence	SEC	1+0+2	50	50	100	2
25	B.Com.3.5	Advertising Skills/Entrepreneurial Skills	OEC	3+0+0	60	40	100	3
Sub –Total (C)					410	290	700	23

Semester IV								
Sl. No.	**Course Code**	**Title of the Course**	**Category of Courses**	**Teaching Hours per Week (L + T + P)**	**SEE**	**CIE**	**Total Marks**	**Credits**
26	Lang.1.1	Language - I	AECC	3+1+0	60	40	100	3
27	Lang.1.2	Language – II	AECC	3+1+0	60	40	100	3
28	B.Com.4.1	Advanced Corporate Accounting	DSC	3+0+2	60	40	100	4
29	B.Com.4.2	Costing Methods & Techniques	DSC	3+0+2	60	40	100	4
30	B.Com.4.3	Business Regulatory Framework	DSC	4+0+0	60	40	100	4
31	B.Com.4.4	Constitution of India	AECC	2+0+0	50	50	100	2
32	B.Com.4.5	NCC/NSS/Culture/Health Wellness/ Social & Emotional learning/others	SEC-VB	1+0+2	-	100	100	2
33	B.Com.4.6	Business Ethics / Corporate Governance	OEC	3+0+0	60	40	100	3
Sub –Total (D)					410	390	800	25

I Semester Discipline Specific Course (DSC)

FINANCIAL ACCOUNTING – I

LTP: 3+0+2 More than 50 students -5 Hours per week
Less than 50 students – 4 Hours per week

OBJECTIVE:

- To enable the students to understand the system of preparing financial statement of sole trading concern and to create an awareness in the students about Financial Reporting Standards.

OUTCOME:

- The students will be able to prepare and analyse financial statements of sole trading concerns.

UNIT – I Introduction to Financial Accounting: Meaning, Definition and scope of Accounting – Objectives of Accounting – Functions of Accounting – Branches of Accounting – Accounting Principles - Accounting Concepts and Conventions – Accounting Standards: Meaning and Objectives - Indian Accounting Standards, IND AS, IFRS – Distinction between IND AS and IFRS.

UNIT – II Accounting for Hire Purchase System: Meaning – Features of Hire purchase system – Calculation of interest under different methods – ascertainment of cash price of an asset – repossession (theory) - problems on hire purchase system (assets accrual method only)

UNIT – III Accounting for Instalment System: Meaning – Features of instalment system – differences between hire purchase and instalment system – problems on instalment system.

UNIT – IV Royalty Accounts: Meaning and Definition – Terms used – Royalty – Minimum rent – Short workings – surplus royalty – recoupment of short workings – stoppage of work due to abnormal causes – problems on royalty including minimum rent account.

UNIT – V Final accounts of Sole Trading Concern: Financial statements – Preparation of Trading and Profit and loss account and Balance sheet with adjustments.

SKILL DEVELOPMENT

1. Visit three Sole Trading Concerns and Collect the Financial Statements of a Sole Trading concerns.
2. Collect a copy of Hire Purchase agreement.
3. Identify the businesses where Royalty accounting is applied
4. Prepare Royalty Analytical Table with imaginary figures.
5. Identify the differences between IND AS and IFRS with respect to IAS 1, IAS 16, IAS 36, IAS 37 and IAS 38

Books for Reference:

1. Accounting Principles; Anthony, R.N. and Reece, J.S.: Richard Irwin Inc.
2. Financial Accounting; Gupta, R.L and Radhaswamy, M: Sultan Chand and Sons, New Delhi.
3. Financial Accounting; Prof B.H Suresh and Dr. G.H Mahadevaswamy
4. Advanced Accounts; Shukla. M.C., Grewal T.S., and Gupta, S.C.: S. Chand & Co. New Delhi.
5. Compendium of Statement and Standards of Accounting: The Institute of Chartered Accountants of India, New Delhi.

I Semester **Discipline Specific Course (DSC)**

Management Principles and Applications

LTP: 4+0+0 4 Hours per week

OBJECTIVE:

- To enable the students to understand the various functions of management• various types of organisations and to create an awareness in the students about application of management principles in business organizations.

OUTCOMES:

- The students will be able to understand and identify the different theories of organization, which are relevant in the present context.
- Compare and chose the different types of motivation factors and leadership styles.

UNIT – I Introduction to Management: Meaning and Definition – Nature and Characteristics of Management – Scope of Management – Levels of Management - Administration Vs. Management – Functions of Management – Evolution of management thought: contributions of F.W. Taylor and Henry Fayol.

UNIT – II Planning: Meaning and Definition – Characteristics of Planning, Importance and Benefits of Planning – Steps in planning – Types of Planning – Limitations of Planning – Decision making concept.

UNIT – III Organizing: Meaning and Definition – Principles of Organisation – Formal Vs. Informal Organisation - Types of Orgnisation - Functional Organisation – Matrix Organisation – Team based Organisation – Departmentation – Decentralisation and Delegation of authority.

UNIT – IV Leadership: Meaning – Qualities of a good leader – Types of Leadership styles – Motivation concept and theories – Maslow's hierarchy of needs – Herzberg's dual factor theory – McGregor's theory X and theory Y.

UNIT – V Controlling: Meaning and Definition – Importance of control – Steps in controlling - techniques of control – PERT, CPM, JIT – Co-ordination – Need for Co-ordination - Principles of Co-ordination.

SKILL DEVELOPMENT

1. Visit any business organization and collect the type of planning adopted by them.
2. Collect bio-data and photographs of any two leading contributors of management thoughts.
3. Analyse the leadership styles of any selected five companies of different sectors.
4. Visit any manufacturing unit and identify the controlling system followed.
5. Draw the Organisation chart of any two business concern.

Books for Reference:

1. Principles of Management by Koontz and O'Donnell, McGraw Hill Education.
2. Business Management by C.B.Gupta, Sultan Chand and sons
3. Principles and practice of Management by L.M. Prasad, Sultan Chand and Sons
4. Management, Stoner A F and Freeman R.E, Prentice Hall
5. P.C. Tripathi & P N Reddy, Principles of Management, TMH Publications
6. Management: Principles and Practices by Ricky W. Giffin.

I Semester **Discipline Specific Course**

(DSC)Principles of Marketing

OBJECTIVE:

LTP: 4+0+0 4 Hours per week

- To enable students to understand the basic concepts and principles of Marketing

OUTCOME:

- Students will be able to learn the application of Principles of marketing by business firms

UNIT – I Introduction to Marketing: Meaning and Definition of Market, Marketing- Core Marketing Concepts - Marketing Mix - Marketing environment - Functions of Marketing. 4Ps and 7Ps of marketing mix. Online Marketing- Relationship between Technology, Globalisation , Social Responsibility and online marketing.

UNIT – II Product : Meaning of a Product - Product Plan -–Diffusion (Adoption) of Innovations- New Product idea - Stages in New Product Development- Causes for Failure of a new product - Product life cycle and Marketing strategy.

UNIT – III Price and Promotion: Price: Meaning – Pricing Strategy – Types of Pricing Strategies. Promotion: Meaning and Role of Promotion – Types of Promotion – Personal selling – Advertising – Publicity and Sales promotion - Elements of Promotional mix – Factors affecting Promotion Mix.

UNIT - IV Place in Marketing mix : Channels of Distribution – Types of Channels of Distribution - Middlemen and Distribution- Selection of the type of Channel - Retailing –Nature and Importance –Non-store retailing-Wholesaling and Physical Distribution-Nature and Importance of Wholesaling and Physical Distribution.

UNIT – V Consumer Behaviour: Meaning - Features – Scope- Importance- Models of Consumer Behaviour - Consumer reference groups and their types – Consumer behavior in Online marketing.

SKILL DEVELOPMENT

1. Name any five FMCG companies in India and identify the pricing strategy used by each one of them.
2. Select any five firms in automobile industry and identify the promotional methods used by each of the firm.
3. Identify any five products that failed in the market and identify the causes of failure for each of the products.
4. Select any five products and identify the various channels of distribution used for each of them.
5. Identify a product in the growth stage and write about 4Ps of marketing in it.

Books for Reference

1. Principle of Marketing- Philip Kotler, Gary Armstrong and Prafulla Agnihotri, Pearson Publication
2. Principles of Marketing – Robert H. Utaraid and Brajendra Kr Gupta
3. Principles of Marketing – Charles W Lamb, Cengage India Learning P Ltd
4. Principles of Marketing – Dr Amit Kumar, Sahitya Bhawan Publications

5. Marketing – Grewal and Levy, Mc Graw Hill Publication.

I Semester Open Elective Course (OEC)

1.5 1. Basics ofAccounting

(Across the Faculty)

LTP: 3+0+0 3 Hours per week

OBJECTIVE:

- To enable the students to understand the basics of accounting, need for accounting in business and the system of preparing financial statements - to create an awareness in the students about Financial Reporting Standards

OUTCOME:

- The students will be able to prepare subsidiary books and to prepare and analyse financial statements of sole trading concern.

UNIT – I. Introduction to Accounting: Meaning – Need for accounting – Internal and External users of Accounting – Accounting Concepts and Conventions – Indian Accounting Standards (IND AS) – International Financial Reporting Standards (IFRS) Distinction between IND AS and IFRS.

UNIT – II – Accounting Systems and Process: Nature of accounting – Systems of accounting: Single entry and Double entry – Process of accounting – Business transactions – Journal entries - Ledger (simple problems)

UNIT – III. Subsidiary Books: Sales book – Sales returns book – Purchases book – Purchase returns book – Bills Receivable book – Bills Payable book – Cash book – Petty Cash book – Journal proper – Problems on preparation of Sales book, Sales returns book, Purchases book, Purchase returns book, Cash book (single column, double column, three column) and Petty Cash book (simple problems)

UNIT – IV. Final Accounts of Sole Trading Concern: Preparation of Trial Balance – Preparation of Trading and Profit and Loss account and Balance sheet (simple problems)

SKILL DEVELOPMENT

1. Collect the final accounts of a Sole Trading concern.
2. Prepare Subsidiary books with imaginary figures.
3. Collect Cash book prepared by Sole Trading Concern.
4. Identify the businesses where Single entry and Double entry systems of Book-keeping is followed.

Books for Reference:

1. Accounting Principles; Anthony, R.N. and Reece, J.S.: Richard Irwin Inc.
2. Financial Accounting; Gupta, R.L and Radhaswamy, M: Sultan Chand and Sons, New Delhi.
3. Accountancy; B.S.Raman, United Publishers, Mangalore.
4. Advanced Accounts; Shukla. M.C., Grewal T.S., and Gupta, S.C.: S. Chand & Co. New Delhi.
5. Compendium of Statement and Standards of Accounting: The Institute of Chartered Accountants of India, New Delhi.

I Semester Open Elective Course (OEC)

1.5 2. Managing Workforce

(Across the Faculty)

LTP: 3+0+0 3 Hours per week

OBJECTIVE:

- To enable the students to understand the basics of managing workforce at work place and know the process of selection, training and development.

OUTCOME:

- The students will be able to manage themselves at work place and know the nuances of managing human resources.

UNIT – I Introduction: Concepts of human resource management- Meaning - Objectives-Scope and functions.

UNIT – II Human Resources Planning and Procurement: Human resource planning - importance- objectives and problems. Recruitment-meaning - recruitment policy - sources – factors affecting recruitment - selection decision - selection procedure.

UNIT - III Human Resource development: Meaning-concepts of HRD-objectives of training-organization of training programmers – methods of training - advantages and limitations of training

UNIT - IV Compensation: Meaning - Factors determining employee compensation and rewards - dearness allowance - employee benefits-bonus and social security - managerial compensation. Performance Appraisal: concepts - objectives - Types

SKILL DEVELOPMENT

1. Collect information regarding the recruitment and selection process adopted by any one of the Companies/organisations located in your District.
2. Visit and collect the training method adopted by a company.
3. Visit and collect the methods of compensation adopted by any company.
4. Identify the methods of Performance appraisal adopted by any company.

Books for Reference:

1. Human Resource Management- P.Subba Rao
2. Human Resource Management -Dr.Ashwathappa
3. Personnel and Human Resource Management -D.A. Deonz and F.P. Robins
4. Human Resource Management – Prasanna Chandra.

II Semester Discipline Specific Course (DSC)

FINANCIAL ACCOUNTING – II

OBJECTIVE:

LTP: 3+0+2More than 50 students -5 Hours per week
Less than 50 students – 4 Hours per week

- To enable the students to understand the maintaining of accounts for various types of business firms including non- profit organizations.

OUTCOME:

- The students will be able to prepare the final accounts of business firms and NPO and theywill be able to account for loss of stock.

UNIT – I Branch Accounts: Meaning – Objectives – Types of Branches – Dependent Branches – Features – Goods Sent to branch at Cost price and Invoice price – Preparation of Branch account and other relevant ledger accounts in the books of Head Office (Debtors system only)

UNIT – II Departmental Accounts: Meaning – Objectives – Basis of apportionment of expenses and incomes – Preparation of Trading and Profit and loss account in columnar method and Common Balance sheet (Sole trading concerns only)

UNIT – III Consignment Accounts: Meaning – Consignor – Consignee – Goods consigned at Cost price and Invoice price – Commission – Types of Commission - Abnormal loss – Valuation of Stock – creation of stock reserve account – Problems on Consignment both Cost price and Invoice price.

UNIT – IV Fire Insurance Claims: Meaning of fire insurance – need – Loss of stock by fire – steps involved in the computation of fire claims – Average clause – Treatment of abnormal line goods – Problems on computation of fire insurance claims including average clause and abnormal line of goods.

UNIT – V Final accounts of Non-Profit Organisations: Meaning of Non-profit organisations – objectives – need – capital receipts and capital expenditure - revenue receipts and revenue expenditure – treatment of special items – Problems on preparation of Income and Expenditure account and Balance sheet from Receipts and Payments account.

SKILL DEVELOPMENT

1. Preparation of account sales with imaginary figures.
2. Calculation of fire insurance claims with imaginary figures.
3. Collection of final accounts of a Non-Profit Organisation and identifying Capital and revenue items
4. Visit any branch and collect the financial statements of the branch.
5. Preparation of Departmental Trading and Profit/Loss account with imaginary figures.

Books for Reference:

1. Accounting Principles; Anthony, R.N. and Reece, J.S.: Richard Irwin Inc.
2. Financial Accounting; Gupta, R.L and Radhaswamy, M: Sultan Chand and Sons.
3. Financial Accounting; Prof B.H Suresh and Dr. G.H Mahadevaswamy
4. Compendium of Statement and Standards of Accounting: The Institute of Chartered Accountants of India, New Delhi.

5. Financial Accounts, Mishra A.K.: Sahitya Bhawan Publishers and Distributors.
6. Financial Accounting – II: S.Anil kumar, V. Rajesh kumar and B.Mariappa, HPH

II Semester **Discipline Specific Course (**

DSC)Company Law

LTP: 4+0+0 4 Hours per week

OBJECTIVE:

- To enable the students to understand the types of companies incorporated in India and the promoters involved in forming a company and Company administration till its Liquidation.

OUTCOMES:

- The students will understand the frame work of Companies Act of 2013.
- Identify the stages of formation and documents involved in the formation of a company.
- Role of Managerial Personnel and procedure of conducting company meetings.

UNIT – I Introduction to Company: Meaning and Definition – Features of Companies Act of 2013 – Types of Companies –Private Company - Public Company - Company Limited by Shares – Company Limited by Guarantee – Unlimited Companies – One Person Company – Holding and Subsidiary Companies – Government Company - Associate Company.

UNIT – II Formation of Companies: Introduction – Steps involved in formation of a company – Position and Functions of Promoters – Meaning and contents of Prospectus, Memorandum of Association and Articles of Association – Alteration of MOA and AOA - Certificate of Commencement of Business – Formation of Global Companies – Features – Legal formalities.

UNIT – III Company Administration: Managerial Personnel – Managing director appointment, powers, duties and responsibilities – Whole time Director – Independent Director – Auditor's appointment: Qualification, duties and responsibilities – Company Secretary: Qualifications, Appointment, Rights, Duties, Liabilities and Removal.

UNIT – IV Company Meetings: Meaning – Types of company meetings – Importance — Requisites of a valid meeting – Notice – Quorum – Resolutions – Voting - Proxy – Role of a Company Secretary in convening the meetings.

UNIT – V Liquidation of Companies: Meaning – Modes of Liquidation – Consequence of Liquidation – Appointment of Official Liquidator – Duties and Responsibilities of Liquidator.

SKILL DEVELOPMENT

1. Collect the Prospectus, Memorandum of Association and Articles of Association of a Company.
2. Collect a notice of a meeting from any company.
3. List the names of Directors and Managing Director of any five companies.
4. List the names of full time company secretaries in India.
5. Name any five companies liquidated during last 2 years in India.

Books for Reference:

1. Company Law and Secretarial Practice by N.D. Kapoor, Sultan Chand and Sons
2. Company Law and Secretarial Practice by S.C. Kuchal
3. Elements of Corporate Law by S.N.Maheshwari, Himalaya Publication House
4. Corporate Administration by K.Venkataramana, SHBP
5. Business Law for Management by Balachandran, Himalaya Publishing House.

II Semester **Discipline Specific Course (DSC)Law and Practice of Banking**

LTP: 4+0+0 4 Hours per week

OBJECTIVE: To enable students to acquire specialized knowledge of law and practice relating to Banking.

OUTCOME: Students will understand the conceptual frame work of Banking, classification of Banking, banker and customer relationship and E-Banking services.

UNIT – I Introduction to Banking: Origin and Evolution of banks - Meaning and definition of banking - Classification of Banks – Commercial Bank, Investment/Industrial Bank- Co-operative Bank - Land Development Bank -Exchange Bank - Central Bank -Saving Bank. Banking system – Branch Banking, Unit Banking, Group Banking, Chain Banking, Mixed Banking, Narrow Banking, Universal Banking and offshore Banking

UNIT – II Reserve Bank of India: – Constitution – Nationalisation – Management of RBI – organisation restructuring – Main functions of RBI – Measures of Credit control. RBI and Agricultural credit – RBI and Industrial Finance. Demonetisation and its impact.

UNIT – III Banking Regulation Act, 1949: Origin of the Act - objectives and features. Banking sector reforms - Narasimhan Committee Report I and II – Prudential norms: Capital Adequacy norms. NPA: – Meaning - factors contributing to NPAs- remedies available- recent measures.

UNIT – IV Banker and Customer: – Banker - Customer – the relationship between a banker and a customer: general relationship and special relationship. Cheque: – statutory obligation to honour cheques- bankers lien- A bankers duty to maintain secrecy of customer's account-right to claim incidental charges- right to charge compound interest.

UNIT – V E –Banking: Meaning - traditional banking v/s E- banking- Electronic delivery channels- facets of E –banking- E-banking transactions – Truncated cheque and Electronic Cheque – Mobile Banking – Inter Bank Mobile Payment Service (IMPS) – Virtual Currency – Models for E-banking – Advantages of E-Banking – Constraints in E-Banking – Security Measures – Real Time Gross Settlement (RTGS) – National Electronic Fund Transfer (NEFT).

SKILL DEVELOPMENT

1. Identify the Commercial Banks in your area
2. List out the Investment Banks in your District
3. Visit a Bank and list out the steps followed to avail E-Banking facility
4. Visit a Bank and prepare a report with respect to NPA
5. Identify the beneficiaries of MUDRA Scheme in your locality

Books for Reference:

1. Banking Theory, Law and Practice **-** E.Gordan and K.Natarajan
2. Money, Banking, International Trade and Public Finance – M L Jhingan
3. Indian Financial System - Vasanth Desai
4. Marketing of Financial Services - V.A. Avadhani

5. Indian Financial System - Varshenoy and Mittal
6. The Law and Practice of Banking – J M Holden

II SEMESTER Open Elective Course (OEC)

2.6 1. Financial Literacy(Across the Faculty)

L+T+P: 3+0+0 3 Hours per week

OBJECTIVE:

- To create awareness in student about the need for possessing financial literacy education.

OUTCOMES:

- The students will be able to understand the importance of financial literacy and prepare financial plans and budgets.
- The student will be able to describe the importance of insurance services as social security measures.

UNIT – I Introduction: Financial Literacy- Meaning and Importance - Components of Financial Literacy- Financial Institutions : Meaning, Banking and Non Banking Financial Institutions, Post offices . Investment: Meaning, Difference between Investment Vs Gambling- Risk and Return **-** Principles of investment - Investment Avenues –Financial Planning and Budgets , Family Budget, Business Budget and National Budget. Budget deficit and Surplus.

UNIT – II Banking: Meaning and Types of Banks, Various services offered by banks, types of bank deposit accounts, Formalities to open various types of bank accounts, KYC norms. Various types of Loans: Short-term, Medium term and Long term loans. Cashless banking, e-banking, ATM, Debit and Credit cards, banking Complaints.

UNIT – III Financial Services from Post Office: Post office Savings Schemes: Savings account - Recurring deposit -Term Deposit - Monthly Income Scheme - Kissan Vikas Pathra – NSC – PPF - Senior Citizen Savings Scheme - Sukanya Samriddhi Yojana/Account - Indian Post Payments Bank - Money Transfer - Money Order.

UNIT – IV Insurance Services: Life Insurance – Life Insurance Policies - Term Insurance and Endowment Policies - Pension Policies - Health Insurance Plans – ULIP - Property Insurance - General Insurance - Types, Postal Life Insurance Schemes- Housing Loans - Institutions providing Housing Loans, Pradhanmantri Awas Yojana: Rural and Urban.

SKILL DEVELOPMENT

1. Visit a nationalized bank near your area and collect information regarding services offered by the bank.
2. Visit a post office in your area and collect information about various deposit schemes available.
3. Collect an account opening form from a nationalized bank and fill up the form with necessary enclosures. Collect an account opening form from a post office and fill the form.
4. Prepare an annualfamily budget considering the income of your family. Also prepare a personal budget for six months.
5. Visit a LIC branch in your area and collect information regarding any five insurance policies (with its features)

Books for Reference:

1. Avadhani, V A (2019), Investment Management , Mumbai: Himalaya Publishing House Pvt Ltd
2. Chandra, P (2012), Investment Game: How to Win . New Delhi: Tata McGraw Hill Education.
3. Kothari , R (2010), financial Services in India: Concept and application. New Delhi: Sage Publication India Pvt td
4. Milling B. E, (2003), The Basics of Finance: Financial Tools for Non Financial Managers, Indiana : Universe Company.
5. Zokaityte , A (2017), Financial Literacy Education. London: Palgrave Macmillan.

II SEMESTER Open Elective Course (OEC)

2.6 2. Retail Management(Across the Faculty)

L+T+P: 3+0+0 3 Hours per week

OBJECTIVE:

- To enable students to understand how the retail business functions and highlight the scope of retail business in India and across the world

OUTCOME:

- Students will be able to acquire skills required for managing retail business and start their own retail business in the future

UNIT I Retailing: Meaning –Definition - Nature - Importance - Functions of Retailing - Factors influencing retailing - Types of Retailing – Forms of Retail Business ownership, Theory of Retail Development - Wheel of Retailing - Retail Life Cycle - Retail Business in India - Globalization of Retailing - Reasons for globalization - Problems in Globalisation of Retailing .

UNIT II Retail Organisation and Management: Introduction - Classification of Retail Organization. Store Operations: Retail Store Planning - Factors influencing location of a store - Store Layout – Merchandise Management - Category Management - Shelf Management - POS (Point of Sale) /Cash Process.

UNIT III Human Resource Management in Retailing: Manpower Planning – Recruitment in Retail sector - Problems in Retail Recruitment - Retail Training - Retail Managers : Roles – Skill - Employment Opportunities in Retail Industry.

UNIT IV E-Retailing: Meaning of E Retailing - Types of Technology in Retailing - Factors Influencing use of IT in Retailing - Electronic Article Surveillance – Electronic Shelf Labels - Effective Management of Online catalogues - Customer Relationship Management: Customer data base - Identifying information - Analysing customer data base and identifying target customers - Customer pyramid - Customer retention.

SKILL DEVELOPMENT

1. Visit a modern retail store in your area and identify its organization structure
2. Visit a mall and identify the various types of shops in the mall
3. Name any ten e-retailers in the world
4. Visit a super market in your area and collect information about the roles andresponsibilitiesof the manager
5. Name any Ten Global retailers.

Books for Reference:

1. Suja R Nair , Retail Management, V Edition, HPH, Mumbai, 2006
2. Swapna Pradhan , Retailing Management -Text and Cases, II Edition, Tata Mc GrawHill,India, 2007
3. S. K. Pradhan and Others, Retail Management , VPH.
4. Piyush Kumar Sinha and Dwarika Prasad Uniyal- Managing Retailing, OxfordUniversityPress, Delhi
5. R. S. Tiwari, Retail Management , Himalaya Publishing House.
6. Levy Michael,Weitz Barton - Retailing Management, V Edition, Tata McGraw Hill,NewYork, 2006
7. Lucas G.H., Bush Robert, Gresham Larry- Retailing, Houghton Mifflin Company,Boston,1994.

SYLLABUS FOR B.COM DEGREE AS PER NEP – 2020 REGULATIONS IMPLEMENTED FROM THE ACADEMIC YEAR 2021-22

I. OBJECTIVES:

1. To develop the skills required for the application of accounting concepts andtechniques learned in the classroom at the workplace.
2. To provide competent and technical skills personnel to the industry in the area of Accounting, Finance, Taxation, Cost and Management Accounting.
3. To enhance the employability skills of the commerce students.
4. To enhance the capability of the students improve their decision-making skills.
5. To enhance the capability of the students to make decisions at personal andprofessional level.
6. To encourage entrepreneurship among students pursuing education in the field of Commerce.
7. To empower students for pursuing professional courseslike CharteredAccountancy, Cost and Management Accountancy, Company Secretary, etc.,
8. To ensure holistic development of Commerce students.

II. ELIGIBILITY FOR ADMISSION:

Candidates who have passed Two Year Pre University Course of Karnataka State in any discipline or its equivalent (viz., 10+2 of other states, ITI, Diploma etc.) are eligible for admission into this program.

III. DURATION OF THE PROGRAM:

The program of study is Four years of Eight Semesters. A candidate shall complete his/her degree within eight academic years from the date of his/her admission to the first semester. The NEP 2020 provides multiple exit options for students as specified below:

EXIT OPTION:

a. The students who successfully complete ONE year/ 2 Semesters and leave the program, will be awarded Certificate in Commerce.
b. The students who successfully complete TWO years/ 4 Semesters and leave the program, will be awarded Diploma in Commerce.
c. The students who successfully complete THREE years/ 6 Semesters and leave the program, will be awarded Bachelors Degree in Commerce (B.COM)
d. An option is given to the students to continue their education to the Fourth year and those who successfully complete FOUR years/ 8 Semesters will be awarded Bachelors Degree in Commerce (Hons) . [B.COM (Hons)]

IV. MEDIUM OF INSTRUCTION

The medium of instruction shall be English. However a candidate will be permitted to write the examination either in English or in Kannada.

V. ATTENDANCE

a. For the purpose of calculating attendance, each semester shall be taken as a Unit.
b. A student shall be considered to have satisfied the requirement of attendance for the semester, if he/she has attended not less than 75% in aggregate of the number of working periods in each of the subjects compulsorily.
c. A student who fails to complete the course in the manner stated above shall not be permitted to take the University Examination.

VI. TEACHING AND EVALUATION

M.Com graduates with B.Com, BBM/BBA and BBS as basic degree from a recognized university are only eligible to teach and to evaluate all the Commerce courses including Digital Fluency (except Languages, Constitution of India, Environmental Studies, Health Wellness/Social and Emotional learning, Sports/NCC/NSS/Other)

VII. SKILL DEVELOPMENT / RECORD MAINTENANCE

a. Every college is required to establish a dedicated business lab for the purpose of conducting practical/ assignments to be written in the record.

b. In every semester, the student should maintain a record book in which a minimum of 5 exercise or activities per course are to be recorded.

VIII. SCHEME OF EXAMINATION

a. There shall be an University examination at the end of each semester. The maximum marks for the university examination in each paper shall be 60 marks for DSC, DSE, Vocational, SEC and OEC.

b. Internal Assessment 40 marks for DSC, DSE, Vocational, SEC and OEC.

Guidelines for Continuous Internal Evaluation and Semester End Examination:

The CIE and SEE will carry 40% and 60% weightage each, to enable the course to be evaluated for a total of 100 marks, irrespective of its credits. The evaluationsystem of the course is comprehensive & continuous during the entire period of the Semester. For a course, the CIE and SEE evaluation will be on the following parameters:

Sl. No.	Parameters for the Evaluation	Marks
	Continuous Internal Evaluation (CIE)	
1	Continuous & Comprehensive Evaluation (CCE) – (A)	20 Marks
2	Internal Assessment Tests (IAT) –(B)	20 Marks
	Total of CIE (A+B)	40 Marks
3	Semester End Examination (SEE) – (C)	60 Marks
	Total of CIE and SEE (A + B + C)	100 Marks

Continuous Internal Evaluation:

a. **Continuous & Comprehensive Evaluation (CCE):** The CCE will carry a maximum of 20% weightage (20 marks) of total marks of a course. Before the start of the academic session in each semester, a faculty member should choose for his/her course, minimum of two of the following assessment methods with 10 marks each (2x10=20 marks)

   i. Individual Assignments/Group Assignments
   ii. Seminars/Class Room Presentations/ Quizzes
   iii. Participatory activities & Industry-Integrated Learning/ Industrial visits
   iv. Practical activities / Problem Solving Exercises

b. **Internal Assessment Tests (IAT):** The IAT will carry a maximum of 20% weightage (20 marks) of total marks of a course. Under this component, two tests will have to be conducted in a semester for 30 marks each and the same is to be scaled down to 10 marks each.

Internal Assessment Test

Course Code: **Name of the Course:**

Duration: 1 Hour **Total Marks: 30**

PART-A

Answer any one of the following questions. 5 marks (1x 5 = 5)

1.----------

2.----------

PART- B

Answer any one of the following questions. 10 marks (1x 10 = 10)

3.----------

4.----------

SECTION- C

Answer any one of the following questions. 15 marks (1x 15 = 15)

5,----------

6.----------

SEMESTER END EXAMINATION (SEE):

The Semester End Examination for all the courses for which students who get registered during the semester shall be conducted. SEE of the course shall be conducted after fulfilling the minimum attendance requirement as per the University norms. The BOS of the University has prepared the SEE framework and the question paper pattern for SEE is presented below for 60 marks.

PATTERN OF QUESTION PAPER

TIME : 2 HOURS MARKS: 60

PART – A

Answer any FIVE of the following questions. Each question carries 2 marks.

(5x2= 10)

1. .....
2. .....
3. .....
4. .....
5. .....
6. .....
7. .....

PART – B

Answer any TWO of the following questions. Each question carries 10 Marks.

(2x10 =20)

8. .....

9. .....

10. .....
11. .....

PART – C

Answer any TWO of the following questions. Each question carries 15 Marks

(2x15=30)

12. ..... 13. .....

14. .....
15. .....

Minimum Marks for a Pass:

Candidates who have obtained a minimum of 35% marks in semester end examination i.e. 21 marks out of 60 marks of theory examination and 40% in aggregate i.e. total 40 marks out of 100 marks of Semester End Examination marks and Continuous Internal Evaluation marks.

Notes:

- One Hour of Lecture is equal to 1 Credit.
- One Hour of Tutorial is equal to 1 Credit (Except Languages).
- Two Hours of Practical is equal to 1 Credit

Acronyms Expanded

- AECC : Ability Enhancement Compulsory Course
- DSC © : Discipline Specific Core (Course)
- SEC-SB/VB : Skill Enhancement Course-Skill Based/Value Based
- OEC : Open Elective Course
- DSE : Discipline Specific Elective
- SEE : Semester End Examination

- **CIE** : Continuous Internal Evaluation
- L+T+P : Lecture+Tutorial+Practical (s)

Note: Practical Classes may be conducted in the Business Lab or in Computer Lab or in Class room depending on the requirement. One batch of students should not exceed half (i.e., 50 or less than 50 students) of the number of students in each class/section. 2 Hours of Practical Class is equal to 1 Hour of Teaching, however, whenever it is conducted for the entire class (i.e., more than 50 students) 2 Hours of Practical Class is equal to 2 Hours of Teaching

PROGRAM STRUCTURE
Proposed Scheme of Teaching and Evaluation for B.Com (Basic/Hons)
with Commerce as Core Subject

I SEMESTER B.COM								
Sl. No.	**Course Code**	**Title of the Course**	**Category of Courses**	**Teaching Hours per week (L+T+P)**	**SEE**	**CIE**	**Total Marks**	**Credits**
1	Lang 1.1	Language – I	AECC	3+1+0	60	40	100	3
2	Lang 1.2	Language - II.	AECC	3+1+0	60	40	100	3
3	B.Com 1.1	Financial Accounting – I	DSC	3+0+2	60	40	100	4
4	B.Com 1.2	Management Principles and Applications	DSC	4+0+0	60	40	100	4
5	B.Com 1.3	Principles of Marketing	DSC	4+0+0	60	40	100	4
6	B.Com 1.4	Digital Fluency **OR** Environmental Studies	SEC-SB AECC	1+0+2 2+0+0	60	40	100	2
7	B. Com1.5	Across the Faculty:* 1. Basics of Accounting **OR** 2. Managing Workforce	OEC	3+0+0	60	40	100	3
8	B.Com 1.6	Yoga **OR** Sports	SEC-VB	0+0+1	-	-	-	1
9	B.Com 1.7	Health and Wellness **OR** NCC/NSS/R&R (S&G)/Culture	SEC-VB	0+0+1	-	-	-	1
	Sub-Total (A)				**420**	**280**	**700**	**25**

Note :

*Across the Faculty: These Courses are meant for other department students and shall be taught by commerce teachers.

	II SEMESTER B.COM							
10	Lang 2.1	Language –I	AECC	3+1+0	60	40	100	3
11	Lang 2.2	Language –II	AECC	3+1+0	60	40	100	3
12	B.Com 2.1	Financial Accounting – II	DSC	3+0+2	60	40	100	4
13	B.Com 2.2	Company Law	DSC	4+0+0	60	40	100	4
14	B Com 2.3	Law and Practice of Banking	DSC	4+0+0	60	40	100	4
15	B.Com 2.4	Digital Fluency **OR** Environmental Studies	SEC-SB AECC	1+0+2 2+0+0	60	40	100	2
16	B.Com 2.6	Across the Faculty:* 1. Financial Literacy **OR** 2. Retail Management	OEC	3+0+0	60	40	100	3
17	B.Com 2.7	Yoga / Sports	SEC-VB	0+0+1	-	-	-	1
18	B.Com 2.8	Health and Wellness **OR** NCC/NSS/R&R (S&G)/Culture	SEC-VB	0+0+1	-	-	-	1
	Sub-Total (B)				**420**	**280**	**700**	**25**

Note :

* Across the Faculty: These courses are meant for other departments students and shall be taught by commerce teachers.

I Semester Discipline Specific Course (DSC)

FINANCIAL ACCOUNTING – I

LTP: 3+0+2 More than 50 students -5 Hours per week
Less than 50 students – 4 Hours per week

OBJECTIVE:

- To enable the students to understand the system of preparing financial statement of sole trading concern and to create an awareness in the students about Financial Reporting Standards.

OUTCOME:

- The students will be able to prepare and analyse financial statements of sole trading concerns.

UNIT – I Introduction to Financial Accounting: Meaning, Definition and scope of Accounting – Objectives of Accounting – Functions of Accounting – Branches of Accounting – Accounting Principles - Accounting Concepts and Conventions – Accounting Standards: Meaning and Objectives - Indian Accounting Standards, IND AS, IFRS – Distinction between IND AS and IFRS.

UNIT – II Accounting for Hire Purchase System: Meaning – Features of Hire purchase system – Calculation of interest under different methods – ascertainment of cash price of an asset – repossession (theory) - problems on hire purchase system (assets accrual method only)

UNIT – III Accounting for Instalment System: Meaning – Features of instalment system – differences between hire purchase and instalment system – problems on instalment system.

UNIT – IV Royalty Accounts: Meaning and Definition – Terms used – Royalty – Minimum rent – Short workings – surplus royalty – recoupment of short workings – stoppage of work due to abnormal causes – problems on royalty including minimum rent account.

UNIT – V Final accounts of Sole Trading Concern: Financial statements – Preparation of Trading and Profit and loss account and Balance sheet with adjustments.

SKILL DEVELOPMENT

1. Visit three Sole Trading Concerns and Collect the Financial Statements of a Sole Trading concerns.
2. Collect a copy of Hire Purchase agreement.
3. Identify the businesses where Royalty accounting is applied
4. Prepare Royalty Analytical Table with imaginary figures.
5. Identify the differences between IND AS and IFRS with respect to IAS 1, IAS 16, IAS 36, IAS 37 and IAS 38

Books for Reference:

1. Accounting Principles; Anthony, R.N. and Reece, J.S.: Richard Irwin Inc.
2. Financial Accounting; Gupta, R.L and Radhaswamy, M: Sultan Chand and Sons, New Delhi.
3. Financial Accounting; Prof B.H Suresh and Dr. G.H Mahadevaswamy
4. Advanced Accounts; Shukla. M.C., Grewal T.S., and Gupta, S.C.: S. Chand & Co. New Delhi.
5. Compendium of Statement and Standards of Accounting: The Institute of Chartered Accountants of India, New Delhi.

I Semester **Discipline Specific Course (DSC)**

Management Principles and Applications

LTP: 4+0+0 4 Hours per week

OBJECTIVE:

- To enable the students to understand the various functions of management• various types of organisations and to create an awareness in the students about application of management principles in business organizations.

OUTCOMES:

- The students will be able to understand and identify the different theories of organization, which are relevant in the present context.
- Compare and chose the different types of motivation factors and leadership styles.

UNIT – I Introduction to Management: Meaning and Definition – Nature and Characteristics of Management – Scope of Management – Levels of Management - Administration Vs. Management – Functions of Management – Evolution of management thought: contributions of F.W. Taylor and Henry Fayol.

UNIT – II Planning: Meaning and Definition – Characteristics of Planning, Importance and Benefits of Planning – Steps in planning – Types of Planning – Limitations of Planning – Decision making concept.

UNIT – III Organizing: Meaning and Definition – Principles of Organisation – Formal Vs. Informal Organisation - Types of Orgnisation - Functional Organisation – Matrix Organisation – Team based Organisation – Departmentation – Decentralisation and Delegation of authority.

UNIT – IV Leadership: Meaning – Qualities of a good leader – Types of Leadership styles – Motivation concept and theories – Maslow's hierarchy of needs – Herzberg's dual factor theory – McGregor's theory X and theory Y.

UNIT – V Controlling: Meaning and Definition – Importance of control – Steps in controlling - techniques of control – PERT, CPM, JIT – Co-ordination – Need for Co-ordination - Principles of Co-ordination.

SKILL DEVELOPMENT

1. Visit any business organization and collect the type of planning adopted by them.
2. Collect bio-data and photographs of any two leading contributors of management thoughts.
3. Analyse the leadership styles of any selected five companies of different sectors.
4. Visit any manufacturing unit and identify the controlling system followed.
5. Draw the Organisation chart of any two business concern.

Books for Reference:

1. Principles of Management by Koontz and O'Donnell, McGraw Hill Education.
2. Business Management by C.B.Gupta, Sultan Chand and sons
3. Principles and practice of Management by L.M. Prasad, Sultan Chand and Sons
4. Management, Stoner A F and Freeman R.E, Prentice Hall
5. P.C. Tripathi & P N Reddy, Principles of Management, TMH Publications
6. Management: Principles and Practices by Ricky W. Giffin.

I Semester **Discipline Specific Course (**

DSC)Principles of Marketing

OBJECTIVE:

LTP: 4+0+0 4 Hours per week

- To enable students to understand the basic concepts and principles of Marketing

OUTCOME:

- Students will be able to learn the application of Principles of marketing by business firms

UNIT – I Introduction to Marketing: Meaning and Definition of Market, Marketing- Core Marketing Concepts - Marketing Mix - Marketing environment - Functions of Marketing. 4Ps and 7Ps of marketing mix. Online Marketing- Relationship between Technology, Globalisation , Social Responsibility and online marketing.

UNIT – II Product : Meaning of a Product - Product Plan -–Diffusion (Adoption) of Innovations- New Product idea - Stages in New Product Development- Causes for Failure of a new product - Product life cycle and Marketing strategy.

UNIT – III Price and Promotion: Price: Meaning – Pricing Strategy – Types of Pricing Strategies. Promotion: Meaning and Role of Promotion – Types of Promotion – Personal selling – Advertising – Publicity and Sales promotion - Elements of Promotional mix – Factors affecting Promotion Mix.

UNIT - IV Place in Marketing mix : Channels of Distribution – Types of Channels of Distribution - Middlemen and Distribution- Selection of the type of Channel - Retailing –Nature and Importance –Non-store retailing-Wholesaling and Physical Distribution-Nature and Importance of Wholesaling and Physical Distribution.

UNIT – V Consumer Behaviour: Meaning - Features – Scope- Importance- Models of Consumer Behaviour - Consumer reference groups and their types – Consumer behavior in Online marketing.

SKILL DEVELOPMENT

1. Name any five FMCG companies in India and identify the pricing strategy used by each one of them.
2. Select any five firms in automobile industry and identify the promotional methods used by each of the firm.
3. Identify any five products that failed in the market and identify the causes of failure for each of the products.
4. Select any five products and identify the various channels of distribution used for each of them.
5. Identify a product in the growth stage and write about 4Ps of marketing in it.

Books for Reference

1. Principle of Marketing- Philip Kotler, Gary Armstrong and Prafulla Agnihotri, Pearson Publication
2. Principles of Marketing – Robert H. Utaraid and Brajendra Kr Gupta
3. Principles of Marketing – Charles W Lamb, Cengage India Learning P Ltd
4. Principles of Marketing – Dr Amit Kumar, Sahitya Bhawan Publications

5. Marketing – Grewal and Levy, Mc Graw Hill Publication.

I Semester Open Elective Course (OEC)

1.5 1. Basics of Accounting(Across the Faculty)

LTP: 3+0+0 3 Hours per week

OBJECTIVE:

- To enable the students to understand the basics of accounting, need for accounting in business and the system of preparing financial statements - to create an awareness in the students about Financial Reporting Standards

OUTCOME:

- The students will be able to prepare subsidiary books and to prepare and analyse financial statements of sole trading concern.

UNIT – I. Introduction to Accounting: Meaning – Need for accounting – Internal and External users of Accounting – Accounting Concepts and Conventions – Indian Accounting Standards (IND AS) – International Financial Reporting Standards (IFRS) Distinction between IND AS and IFRS.

UNIT – II – Accounting Systems and Process: Nature of accounting – Systems of accounting: Single entry and Double entry – Process of accounting – Business transactions – Journal entries - Ledger (simple problems)

UNIT – III. Subsidiary Books: Sales book – Sales returns book – Purchases book – Purchase returns book – Bills Receivable book – Bills Payable book – Cash book – Petty Cash book – Journal proper – Problems on preparation of Sales book, Sales returns book, Purchases book, Purchase returns book, Cash book (single column, double column, three column) and Petty Cash book (simple problems)

UNIT – IV. Final Accounts of Sole Trading Concern: Preparation of Trial Balance – Preparation of Trading and Profit and Loss account and Balance sheet (simple problems)

SKILL DEVELOPMENT

1. Collect the final accounts of a Sole Trading concern.
2. Prepare Subsidiary books with imaginary figures.
3. Collect Cash book prepared by Sole Trading Concern.
4. Identify the businesses where Single entry and Double entry systems of Book-keeping is followed.

Books for Reference:

1. Accounting Principles; Anthony, R.N. and Reece, J.S.: Richard Irwin Inc.
2. Financial Accounting; Gupta, R.L and Radhaswamy, M: Sultan Chand and Sons, New Delhi.
3. Accountancy; B.S.Raman, United Publishers, Mangalore.
4. Advanced Accounts; Shukla. M.C., Grewal T.S., and Gupta, S.C.: S. Chand & Co. New Delhi.

5. Compendium of Statement and Standards of Accounting: The Institute of Chartered Accountants of India, New Delhi.

I Semester Open Elective Course (OEC)

1.5 2. Managing Workforce

(Across the Faculty)

LTP: 3+0+0 3 Hours per week

OBJECTIVE:

- To enable the students to understand the basics of managing workforce at work place and know the process of selection, training and development.

OUTCOME:

- The students will be able to manage themselves at work place and know the nuances of managing human resources.

UNIT – I Introduction: Concepts of human resource management- Meaning - Objectives-Scope and functions.

UNIT – II Human Resources Planning and Procurement: Human resource planning - importance- objectives and problems. Recruitment-meaning - recruitment policy - sources – factors affecting recruitment - selection decision - selection procedure.

UNIT - III Human Resource development: Meaning-concepts of HRD-objectives of training-organization of training programmers – methods of training - advantages and limitations of training

UNIT - IV Compensation: Meaning - Factors determining employee compensation and rewards - dearness allowance - employee benefits-bonus and social security - managerial compensation. Performance Appraisal: concepts - objectives - Types

SKILL DEVELOPMENT

1. Collect information regarding the recruitment and selection process adopted by any one of the Companies/organisations located in your District.
2. Visit and collect the training method adopted by a company.
3. Visit and collect the methods of compensation adopted by any company.
4. Identify the methods of Performance appraisal adopted by any company.

Books for Reference:

1. Human Resource Management- P.Subba Rao
2. Human Resource Management -Dr.Ashwathappa
3. Personnel and Human Resource Management -D.A. Deonz and F.P. Robins
4. Human Resource Management – Prasanna Chandra.

II Semester Discipline Specific Course (DSC)

FINANCIAL ACCOUNTING – II

OBJECTIVE:

LTP: 3+0+2More than 50 students -5 Hours per week
Less than 50 students – 4 Hours per week

- To enable the students to understand the maintaining of accounts for various types of business firms including non- profit organizations.

OUTCOME:

- The students will be able to prepare the final accounts of business firms and NPO and theywill be able to account for loss of stock.

UNIT – I Branch Accounts: Meaning – Objectives – Types of Branches – Dependent Branches – Features – Goods Sent to branch at Cost price and Invoice price – Preparation of Branch account and other relevant ledger accounts in the books of Head Office (Debtors system only)

UNIT – II Departmental Accounts: Meaning – Objectives – Basis of apportionment of expenses and incomes – Preparation of Trading and Profit and loss account in columnar method and Common Balance sheet (Sole trading concerns only)

UNIT – III Consignment Accounts: Meaning – Consignor – Consignee – Goods consigned at Cost price and Invoice price – Commission – Types of Commission - Abnormal loss – Valuation of Stock – creation of stock reserve account – Problems on Consignment both Cost price and Invoice price.

UNIT – IV Fire Insurance Claims: Meaning of fire insurance – need – Loss of stock by fire – steps involved in the computation of fire claims – Average clause – Treatment of abnormal line goods – Problems on computation of fire insurance claims including average clause and abnormal line of goods.

UNIT – V Final accounts of Non-Profit Organisations: Meaning of Non-profit organisations – objectives – need – capital receipts and capital expenditure - revenue receipts and revenue expenditure – treatment of special items – Problems on preparation of Income and Expenditure account and Balance sheet from Receipts and Payments account.

SKILL DEVELOPMENT

1. Preparation of account sales with imaginary figures.
2. Calculation of fire insurance claims with imaginary figures.
3. Collection of final accounts of a Non-Profit Organisation and identifying Capital and revenue items
4. Visit any branch and collect the financial statements of the branch.
5. Preparation of Departmental Trading and Profit/Loss account with imaginary figures.

Books for Reference:

1. Accounting Principles; Anthony, R.N. and Reece, J.S.: Richard Irwin Inc.
2. Financial Accounting; Gupta, R.L and Radhaswamy, M: Sultan Chand and Sons.
3. Financial Accounting; Prof B.H Suresh and Dr. G.H Mahadevaswamy
4. Compendium of Statement and Standards of Accounting: The Institute of Chartered Accountants of India, New Delhi.

5. Financial Accounts, Mishra A.K.: Sahitya Bhawan Publishers and Distributors.
6. Financial Accounting – II: S.Anil kumar, V. Rajesh kumar and B.Mariappa, HPH

II Semester **Discipline Specific Course (**

DSC)Company Law

LTP: 4+0+0 4 Hours per week

OBJECTIVE:

- To enable the students to understand the types of companies incorporated in India and the promoters involved in forming a company and Company administration till its Liquidation.

OUTCOMES:

- The students will understand the frame work of Companies Act of 2013.
- Identify the stages of formation and documents involved in the formation of a company.
- Role of Managerial Personnel and procedure of conducting company meetings.

UNIT – I Introduction to Company: Meaning and Definition – Features of Companies Act of 2013 – Types of Companies –Private Company - Public Company - Company Limited by Shares – Company Limited by Guarantee – Unlimited Companies – One Person Company – Holding and Subsidiary Companies – Government Company - Associate Company.

UNIT – II Formation of Companies: Introduction – Steps involved in formation of a company – Position and Functions of Promoters – Meaning and contents of Prospectus, Memorandum of Association and Articles of Association – Alteration of MOA and AOA - Certificate of Commencement of Business – Formation of Global Companies – Features – Legal formalities.

UNIT – III Company Administration: Managerial Personnel – Managing director appointment, powers, duties and responsibilities – Whole time Director – Independent Director – Auditor's appointment: Qualification, duties and responsibilities – Company Secretary: Qualifications, Appointment, Rights, Duties, Liabilities and Removal.

UNIT – IV Company Meetings: Meaning – Types of company meetings – Importance — Requisites of a valid meeting – Notice – Quorum – Resolutions – Voting - Proxy – Role of a Company Secretary in convening the meetings.

UNIT – V Liquidation of Companies: Meaning – Modes of Liquidation – Consequence of Liquidation – Appointment of Official Liquidator – Duties and Responsibilities of Liquidator.

SKILL DEVELOPMENT

1. Collect the Prospectus, Memorandum of Association and Articles of Association of a Company.
2. Collect a notice of a meeting from any company.
3. List the names of Directors and Managing Director of any five companies.
4. List the names of full time company secretaries in India.
5. Name any five companies liquidated during last 2 years in India.

Books for Reference:

1. Company Law and Secretarial Practice by N.D. Kapoor, Sultan Chand and Sons
2. Company Law and Secretarial Practice by S.C. Kuchal
3. Elements of Corporate Law by S.N.Maheshwari, Himalaya Publication House
4. Corporate Administration by K.Venkataramana, SHBP
5. Business Law for Management by Balachandran, Himalaya Publishing House.

II Semester **Discipline Specific Course (DSC)Law and Practice of Banking**

LTP: 4+0+0 4 Hours per week

OBJECTIVE: To enable students to acquire specialized knowledge of law and practice relating to Banking.

OUTCOME: Students will understand the conceptual frame work of Banking, classification of Banking, banker and customer relationship and E-Banking services.

UNIT – I Introduction to Banking: Origin and Evolution of banks - Meaning and definition of banking - Classification of Banks – Commercial Bank, Investment/Industrial Bank- Co-operative Bank - Land Development Bank -Exchange Bank - Central Bank -Saving Bank. Banking system – Branch Banking, Unit Banking, Group Banking, Chain Banking, Mixed Banking, Narrow Banking, Universal Banking and offshore Banking

UNIT – II Reserve Bank of India: – Constitution – Nationalisation – Management of RBI – organisation restructuring – Main functions of RBI – Measures of Credit control. RBI and Agricultural credit – RBI and Industrial Finance. Demonetisation and its impact.

UNIT – III Banking Regulation Act, 1949: Origin of the Act - objectives and features. Banking sector reforms - Narasimhan Committee Report I and II – Prudential norms: Capital Adequacy norms. NPA: – Meaning - factors contributing to NPAs- remedies available- recent measures.

UNIT – IV Banker and Customer: – Banker - Customer – the relationship between a banker and a customer: general relationship and special relationship. Cheque: – statutory obligation to honour cheques- bankers lien- A bankers duty to maintain secrecy of customer's account-right to claim incidental charges- right to charge compound interest.

UNIT – V E –Banking: Meaning - traditional banking v/s E- banking- Electronic delivery channels- facets of E –banking- E-banking transactions – Truncated cheque and Electronic Cheque – Mobile Banking – Inter Bank Mobile Payment Service (IMPS) – Virtual Currency – Models for E-banking – Advantages of E-Banking – Constraints in E-Banking – Security Measures – Real Time Gross Settlement (RTGS) – National Electronic Fund Transfer (NEFT).

SKILL DEVELOPMENT

1. Identify the Commercial Banks in your area
2. List out the Investment Banks in your District
3. Visit a Bank and list out the steps followed to avail E-Banking facility
4. Visit a Bank and prepare a report with respect to NPA
5. Identify the beneficiaries of MUDRA Scheme in your locality

Books for Reference:

1. Banking Theory, Law and Practice **-** E.Gordan and K.Natarajan
2. Money, Banking, International Trade and Public Finance – M L Jhingan
3. Indian Financial System - Vasanth Desai
4. Marketing of Financial Services - V.A. Avadhani

5. Indian Financial System - Varshenoy and Mittal
6. The Law and Practice of Banking – J M Holden

II SEMESTER Open Elective Course (OEC)

2.6 1. Financial Literacy(Across the Faculty)

L+T+P: 3+0+0 3 Hours per week

OBJECTIVE:

- To create awareness in student about the need for possessing financial literacy education.

OUTCOMES:

- The students will be able to understand the importance of financial literacy and prepare financial plans and budgets.
- The student will be able to describe the importance of insurance services as social security measures.

UNIT – I Introduction: Financial Literacy- Meaning and Importance - Components of Financial Literacy- Financial Institutions : Meaning, Banking and Non Banking Financial Institutions, Post offices . Investment: Meaning, Difference between Investment Vs Gambling- Risk and Return **-** Principles of investment - Investment Avenues –Financial Planning and Budgets , Family Budget, Business Budget and National Budget. Budget deficit and Surplus.

UNIT – II Banking: Meaning and Types of Banks, Various services offered by banks, types of bank deposit accounts, Formalities to open various types of bank accounts, KYC norms. Various types of Loans: Short-term, Medium term and Long term loans. Cashless banking, e-banking, ATM, Debit and Credit cards, banking Complaints.

UNIT – III Financial Services from Post Office: Post office Savings Schemes: Savings account - Recurring deposit -Term Deposit - Monthly Income Scheme - Kissan Vikas Pathra – NSC – PPF - Senior Citizen Savings Scheme - Sukanya Samriddhi Yojana/Account - Indian Post Payments Bank - Money Transfer - Money Order.

UNIT – IV Insurance Services: Life Insurance – Life Insurance Policies - Term Insurance and Endowment Policies - Pension Policies - Health Insurance Plans – ULIP - Property Insurance - General Insurance - Types, Postal Life Insurance Schemes- Housing Loans - Institutions providing Housing Loans, Pradhanmantri Awas Yojana: Rural and Urban.

SKILL DEVELOPMENT

1. Visit a nationalized bank near your area and collect information regarding services offered by the bank.
2. Visit a post office in your area and collect information about various deposit schemes available.
3. Collect an account opening form from a nationalized bank and fill up the form with necessary enclosures. Collect an account opening form from a post office and fill the form.
4. Prepare an annualfamily budget considering the income of your family. Also prepare a personal budget for six months.
5. Visit a LIC branch in your area and collect information regarding any five insurance policies (with its features)

Books for Reference:

1. Avadhani, V A (2019), Investment Management , Mumbai: Himalaya Publishing House Pvt Ltd
2. Chandra, P (2012), Investment Game: How to Win . New Delhi: Tata McGraw Hill Education.
3. Kothari , R (2010), financial Services in India: Concept and application. New Delhi: Sage Publication India Pvt td
4. Milling B. E, (2003), The Basics of Finance: Financial Tools for Non Financial Managers, Indiana : Universe Company.
5. Zokaityte , A (2017), Financial Literacy Education. London: Palgrave Macmillan.

II SEMESTER Open Elective Course (OEC)

2.6 2. Retail Management(Across the Faculty)

L+T+P: 3+0+0 3 Hours per week

OBJECTIVE:

- To enable students to understand how the retail business functions and highlight the scope of retail business in India and across the world

OUTCOME:

- Students will be able to acquire skills required for managing retail business and start their own retail business in the future

UNIT I Retailing: Meaning –Definition - Nature - Importance - Functions of Retailing - Factors influencing retailing - Types of Retailing – Forms of Retail Business ownership, Theory of Retail Development - Wheel of Retailing - Retail Life Cycle - Retail Business in India - Globalization of Retailing - Reasons for globalization - Problems in Globalisation of Retailing .

UNIT II Retail Organisation and Management: Introduction - Classification of Retail Organization. Store Operations: Retail Store Planning - Factors influencing location of a store - Store Layout – Merchandise Management - Category Management - Shelf Management - POS (Point of Sale) /Cash Process.

UNIT III Human Resource Management in Retailing: Manpower Planning – Recruitment in Retail sector - Problems in Retail Recruitment - Retail Training - Retail Managers : Roles – Skill - Employment Opportunities in Retail Industry.

UNIT IV E-Retailing: Meaning of E Retailing - Types of Technology in Retailing - Factors Influencing use of IT in Retailing - Electronic Article Surveillance – Electronic Shelf Labels - Effective Management of Online catalogues - Customer Relationship Management: Customer data base - Identifying information - Analysing customer data base and identifying target customers - Customer pyramid - Customer retention.

SKILL DEVELOPMENT

1. Visit a modern retail store in your area and identify its organization structure
2. Visit a mall and identify the various types of shops in the mall
3. Name any ten e-retailers in the world
4. Visit a super market in your area and collect information about the roles andresponsibilitiesof the manager
5. Name any Ten Global retailers.

Books for Reference:

1. Suja R Nair , Retail Management, V Edition, HPH, Mumbai, 2006
2. Swapna Pradhan , Retailing Management -Text and Cases, II Edition, Tata Mc GrawHill,India, 2007
3. S. K. Pradhan and Others, Retail Management , VPH.
4. Piyush Kumar Sinha and Dwarika Prasad Uniyal- Managing Retailing, OxfordUniversityPress, Delhi
5. R. S. Tiwari, Retail Management , Himalaya Publishing House.
6. Levy Michael,Weitz Barton - Retailing Management, V Edition, Tata McGraw Hill,NewYork, 2006
7. Lucas G.H., Bush Robert, Gresham Larry- Retailing, Houghton Mifflin Company,Boston,1994.

JSS COLLEGE OF ARTS COMMERCE & SCIENCE

(Autonomous)

Ooty Road, Mysuru – 25

DEPARTMENT OF COMMERCE AND MANAGEMENT

Syllabus

CHOICE BASED CREDIT SYSYTEM

B.COM Programme

(II & III Year)

2019-20 Scheme

ENC22001

SEMESTER III

DISCIPLINE SPECIFIC COURSE - 8

3.4 INCOME TAX-I

L:T:P-3:1:0

Course Outcome:

On successful completion of this course the students able:

CO1: Learn in depth Income Tax Act of 1961 and able to practice as Tax Consultant and Tax Practitioner

CO2: Understand in detail the provisions for computation of taxable salary

CO3: Learn the provisions of IT Act relation to income from house property and able compute income from house property

CO4: Learn in detail the provisions of depreciation under IT ACT

CO5: Identify in detail the different expenses allowable and inadmissible for computation of Business income

CO6: Compute Taxable income from business

Unit 1: Introduction

Brief History of Income Tax Act, Finance Act, Scheme of Income Tax, Basic Concepts- Income, Assessee, person, Assessment year, Previous Year, Gross Total Income, Total Income, Marginal rate of Tax—Agricultural Income-Residential Status of individual, Incidence of Tax (including problems)- Incomes which do not form part of Total Income U/S 10.

Unit 2: Heads of Income

Income from Salary -features of salary income-allowances, perquisites, provident fund, computation of Taxable salary income

Unit 3: Income from Salary: Retirement benefits

Gratuity, Commutation of Pension, Leave encashment - problems

Unit 4: **Income from House Property**

Basis of charge - deemed ownership - exemptions determination of annual value- Deductions u/s 24-computation of income from house property.

Unit 5: - **a) Depreciation**- Meaning, computation of Deprecation

b) Profits and gains of Business and profession (Individual Assessees)- Expenses expressly allowable and inadmissible, General Deductions/ expenditures u/s 37, losses, deemed profits, Method of accounting-computation of taxable income from business. Computation of Income from profession in Case of Advocates, Doctors, Chartered Accountant.

References:

1.Direct Taxation-T.N.Manoharan
2.Direct Taxation- Girish Ahuja, & Ravi Gupta
3.Direct Taxation- Dr. Vinod.k.singania
4.Income Tax law and practice-Gaur & Narang
5.Income Tax Law- Dinakar Pagare
6.Income Tax Law & Accounts-Bhagavati Prasad
7.Income Tax Law and Accounts – H.C. Mehrothra

ENC23001

SEMESTER III

DISCIPLINE SPECIFIC COURSE - 9

3.5 CORPORATE GOVERNANCE

L:T:P-3:1:0

Course Outcome:

On successful completion of this course the students can:

CO1: Deliberate in depth to uphold ethics and morality in business

CO2: Learn the details of practicing good corporate governance

CO3: Learn the characteristics of theories of corporate governance

CO4: Understand the details of Corporate Governance in India

CO5: Learn in depth the 4ps of corporate governance

Unit 1: Introduction to corporate governance

Meaning, Definition, need and importance. Benefits of corporate governance. Cadbury Committee Report in UK.

Unit 2: Business Ethics

Concept, importance & benefits – corporate philosophy & ethics – Managing ethics & legal compliance.

Unit 3: Theories of Corporate Governance

Agency theory, Stewardship theory & Stakeholders theory.

Unit 4: Mechanism & Control

4 ps of corporate governance (people, purpose, process & performance) – wealth creation, management & distribution – disclosure in office documents – A brief note on clause 49 of listing agreements of company with stock exchanges. Compliance aspect of corporate governance.

Unit 5: Corporate Governance in India

Reforming constitution of Board of Directors – A brief study of Kumara Birla Mangalam Committee – Naresh Chandra Committee – Narayanmurthy Committee – Corporate Governance code- Board subcommittee for compliance with Corporate Governance regulation.

References:

1. Corporate Governance – Subhash Chandra Das
2. Corporate Governance – Kesho Prasad
3. Corporate Governance – Ashwathappa

END21001

SEMESTER IV

DISCIPLINE SPECIFIC COURSE - 10

4.3 CORPORATE ACCOUNTING- II

L:T:P-5:1:0

Course Outcome:

On successful completion of this course the students can:
CO1: Learn in depth the latest regulation of Insurance for the preparation of final accounts
CO2: Understand the characteristics of Human Resource Accounting
CO3: Identify the characteristics of intermediate in stock exchange and start career as stock Broker
CO4: Prepare final accounts of life insurance as per latest regulations
CO5: Understand the details of Inflation accounting
CO6: Learn in depth about Holding and Subsidiary company and play a vital role in preparation of consolidated Balance Sheet
CO7: Learn the details of Electricity Supply Act 2003 and able to prepare final accounts of electricity companies

Unit 1: Accounting for General Insurance Companies
Fire and marine insurance, preparation of final accounts as per latest regulations

Unit 2: Accounting for Life Insurance
Preparation of valuation balance sheet, preparation of final accounts as per latest regulations.

Unit 3: Final accounts of Electricity Companies
Forms of financial statements, differences between depreciation as per companies act and as per tariff policy under Electricity supply act 2003

Unit 4: Holding Company Accounts
Accounting for Holding Company: Preparation of Consolidated Balance Sheet, Minority interest, Computation of Goodwill/ Capital Reserve, Revaluation of assets of subsidiary Company.

Unit 5: Human Resource Accounting
Accounting Aspects of Human Capital –Meaning, Basic Premises, Need and Significance of HRA, Advantages and Limitation of HRA; Monetary and Non-Monetary Models; Cost Based Models- Acquisition Cost Method, Replacement Cost Model, Opportunity Cost Method, standard cost method, Current Purchasing Power Method (C.P.P.M.).

Unit 6: Inflation accounting and income measurement

Inflation Accounting: Concept – Limitations of historical based-cost financial statements – Methods of Inflation Accounting: Current Purchasing Power Method – Current Cost Accounting Method (Including problems). Income Concepts for financial reporting – Measurement and Reporting of Revenues, Expenses, Gains and Losses (Theory only) – Analysis of Changes in Gross Profit (Including problems).

References:

1. Accounting Principles; Anthony, R.N. and Reece, J.S.: Richard Irwin Inc.
2. Advanced Accounting ; Gupta, R.L and Radhaswamy, M: Sultan Chand and Sons, New Delhi.
3. Advanced Accounts; Shukla. M.C., Grewal T.S., and Gupta,S.C.: S. Chand & Co. New Delhi.
4. Higher Sciences of Accountancy : Agarwala A.N. Agarwala, K.N.:Kitab Mahal, Allahabad.
5. Financial Accounts, MishraA.K :Sahitya Bhawan Publishers and Distributers
6. Chakraborty, S.K., Human Asset Accounting: The Indian Context in Topics in Accounting and Finance, Oxford University Press.

END22001

SEMESTER IV

DISCIPLINE SPECIFIC COURSE - 11

4.4 INCOME TAX-II

L:T:P-3:1:0

Course Outcome:

On successful completion of this course the students can:

CO1: Understand in detail the provisions for computation of capital gain and income from other sources

CO2: Learn in depth the provisions of IT Act for the Assessment of firm and company

CO3: Learn the details of set off and carry forward of losses

CO4: Identify in detail different sections of IT Act to reduce tax liability

CO5: Deliberate in details with examples and appear before IT tribunal on behalf of his clients

CO6: Understand in details with examples IT Authorities and able to work in different position of CBDT

CO7: Learn to compute the taxable capital gain and income from other sources

Unit 1: Capital Gain

Capital Asset, Transfer, cost of acquisition, cost of improvement, indexation, types of Capital gain- exemptions for individual assessee u/s 54-54GB-problmes

Unit 2: Income from other sources

Income from other sources. Set off and carry forward of losses (theory only)

Unit 3: Assessment of Individual

Application of Deductions u/s 80C-80U, Section 87A computation of Tax liability. (Available software package for computation of tax liability, computation using Excel-Work sheet)

Unit 4: Assessment of Partnership Firm

Definition of Firm, Partner U/S 2(23) Residential Status -conditions u/s 184, Provisions u/s 40(b)-Deductions from 80G80JJA- Alternate Minimum Tax(AMT)-Computation of tax liability of Firms (Use of available software package for computation of tax liability, Related Forms and Challans-Computation using excel work- sheet)

Unit 5: Assessment of Company

Definition of Company, Closely-held company, Widely-held Company, Indian Company, Foreign Company-Residential Status of company-Applicable Deductions u/s 80G -80JJA-

Computation of Tax Liability (Including Minimum Alternate Tax) (Use of Software package- Quick Books/ Electrocom)

References:

1.Direct Taxation-T.N.Manoharan
2.Direct Taxation- Girish Ahuja, & Ravi Gupta
3.Direct Taxation- Dr. Vinod.k.singania
4.Income Tax law and practice-Gaur & Narang
5.Income Tax Law- Dinakar Pagare
6.Income Tax Law & Accounts-Bhagavati Prasad
7.Income Tax Law and Accounts – H.C. Mehrothra

END23001

SEMESTER IV

DISCIPLINE SPECIFIC COURSE - 12

4.5 QUANTITATIVE TECHNIQUES

L:T:P-3:1:0

Course Outcome:

On successful completion of this course the students can:
CO1: Understand in depth the classification and operation of matrices and determinants
CO2: Learn the details of progression and their application to business
CO3: Understand in detail the concept of Ratio, proportion and variation
CO4: Learn in depth the Laws of indices and logarithms and its application to solve business problem
CO5: Understand the details of simple interest and compound interest
CO6: Find the value of present worth, bankers gain, banker's and true discount

Unit 1: Indices and logarithms
Meaning-Basic laws of Indices and their application for simplification, laws of logarithms-common logarithms, application of log table for simplification.

Unit 2: Progression
Meaning of sequence, progression; types of progressions; arithmetic progression and geometric progression-general terms and sum of 'n' term of Arithmetic progression and Geometric progression-Application problems on Arithmetic progression and geometric progression.

Unit 3: Ratio, proportion, variation, and percentages
Meaning and their application to business

Unit 4: Simple interest and compound interest-Bills discounting-
Meaning-concepts; Bankers discount, true discount, bankers' gain and present worth of bill.

Unit 5: Matrices and determinants
Meaning and types of matrices, matrix operation - addition, subtraction and multiplication Determinants of a matrix and its evaluation; solutions of linear equations by using cramer's rule.

References:

1. Dr. B H Suresh and Mahadevaswamy G H, Quantitative Techniques,Nithya Publications, Mysore.
2. P.R. Vittal, Business Mathematics, Revised Edition,Margham Publications, New Delhi, 2001.
3. V.K.Kapoor, Introductory to Business Mathematics, S.CHAND, New Delhi, 2009.
4. Sancheti and Kapoor, Business Mathematics, Sultan chand and Sons, New Delhi-42.
5. G.K.Ranganath and T.V. Narsimha Rao Basic Mathematics- Volume II.

ENE21001

SEMESTER V

DISCIPLINE SPECIFIC COURSE - 13

5.1 ENTREPRENEURSHIP DEVELOPMENT

L: T: P-3:1:0

Course Outcome:

On successful completion of this course the students can:

CO1: Understand in depth the required characteristics and procedure to become an young entrepreneur

CO2: Specify in details with application, if applicable, easily access different financial scheme to small business

CO3: Identify in detail with examples to easily different financial schemes offered by Banks and Government Agencies

CO4: Understand in depth and identify the social responsibility of an entrepreneur towards different sectors

CO5: Learn in depth the Self employment opportunities

CO6: Learn in detail the ethics in business

CO7: Identify the content of project report

CO8: Understand in depth the procedure of setting up of new business

Unit 1: Introduction

Meaning, definition of Entrepreneur, Enterprise, Entrepreneurship, Characteristics of successful entrepreneur, Functions, Role of entrepreneur in economic development, women entrepreneur, Rural entrepreneur, Agricultural entrepreneur-meaning and challenges.

Unit 2: Entrepreneurship Development Program (EDP)

Meaning, objective, importance, institutions doing EDP in India, DIC, CEDOCK, SSI, NSIC, EDII, AWAKE, KVIC,RUDSET, Industrial estate-Meaning and importance.

Unit 3: Financing of Small Business in India

Institutional and non institutional assistance SFCs, banks, SIDBI, NBFC-meaning and schemes; venture capital, bills discounting, factoring, state and central government subsidies and incentives for SSI (existing) - recent industrial policy(2011), PM MUDRA YOJANA- meaning, objectives, procedures for obtaining loan under MUDRA.

Unit 4: Setting up of new business, forms for small business

Small proprietorship, partnership, private company, cooperative society-meaning and nature, project formulation, project report-meaning, importance, general format of project

report, project appraisal, financial, technical, marketing, social feasibility study, obtaining license, clearance certificate, registration procedure.

Unit 5: Business Ethics

Meaning, ethics in business, importance, various social responsibility of an entrepreneur towards customers, suppliers, government and society, self- employment-recent trends in the areas of self employment-event management-meaning and areas of business in event management (party organizing , catering, wedding plan and corporate event plan) tourism-meaning, tourism products, E-marketing as self employment opportunity.

Reference:

1.Entrepreneurship And Small Business Management- C B Guptha And S S Khanka
2.Entrepreneruship Development – C B Guptha And Srinivasan 3.Entreprenership development development –Shankaraiah
4.Entrepreneurship development-S S Khanka

ENE22001

SEMESTER V

DISCIPLINE SPECIFIC COURSE -14

5.2 IFRS (IND - AS)

L:T:P-3:1:0

Course Outcome:

On successful completion of this course the students can:

CO1: Deliberate the characteristics of IFRS
CO2: Understand in depth frame work for the preparation and presentation of financial statement
CO3: Learn in details with examples Accounting for assets and liabilities
CO4: Learn in details with examples IND AS on business combination
CO5: Understand the details of IND AS in relation to accounting for Revenue and Expenses

Unit 1: IFRS

Meaning, Need for IFRS, IASB, IASB Current Structure, IFRS Due Process, Benefits and limitations of IFRS; Introduction to Indian Accounting Standards (IND-ASs - Converged IFRSs), Accounting Regulations in New Companies Act – 2013, IFRSs issued by IASB (1-17),List of IND-ASs.

Unit 2: Framework for the Preparation and Presentation of Financial Statements

Meaning of Framework, Purpose and status - Scope - Application - Uses and their information and needs – objectives - Underlying assumptions – Qualitative characteristics – Elements of Financial statements – Recognition and Measurement of the elements of financial statement Balance sheet, Statement of changes in Equity, Statement of Profit and Loss consolidated financial statements, other comprehensive income as per schedule III of the Companies Act, 2013 – **Simple problems on each statement**.

Unit 3: Accounting for Assets and Liabilities

Recognition and Measurement criteria for Investment Property (IND-AS 40) – Borrowing Cost (IND-AS 23) –– Provisions, Contingent Assets and Contingent Liabilities (IND-AS 37) - Share-based Payment (IND-AS 102) - . Recognition and Measurement for Property, Plant and Equipment (IND-AS 16) – Intangible Assets (IND-AS 38) - Inventories (IND-AS 2) - Leases (IND-AS 17) – Impairment of Assets (IND-AS 36) - **Theory and Simple Problems only**

Unit 4: Accounting for Revenue and Expenses

Income Taxes (IND-AS 12) – Employee Benefits (IND-AS 19) -Construction contracts (IND-AS 11) - Revenue (IND-AS 18) - Revenue from Contracts with Customers (IND-AS 115).

Unit 5: IND-AS on Business Combination

IND-AS on Business Combination, Consolidation and Disclosure-Consolidated Financial Statements (IND-AS 110) – Joint Arrangements (IND-AS 111) – Business Combinations (IND-AS 103) - Related Party Disclosures (IND-AS 24) – Operating Segments (IND-AS 108) – First-time adoption of International Financial Reporting Standards (IND-AS101)– Financial Instruments: Disclosures (IND-AS 107) – Disclosure of interests in Other Entities (IND-AS 112) –Earning Per Share (IND-AS 33) – Interim Financial Reporting (IND-AS34)– Insurance Contracts (IND-AS 104)– **Theory and Simple Problems only**.

References:

1. A Quick Guide to Indian Accounting Standards (Ind-AS) by Chethan N. Patel and BhupendraMantri, Taxmann Publication (P.) Ltd.
2. Students' Guide to Ind ASs – Converged IFRSs by Dr. D.S. Rawat, Taxmann Publication (P.) Ltd.
3. IFRS for India, Dr.A.L. Saini, Snow white publications
4. Roadmap to IFRS and Indian Accounting Standards by CA ShibaramaTripathy
5. IFRS concepts and applications by Kamal Garg, Bharath law house private limited
6. IFRS: A quick reference guide by Robert J Kirk, Elsevier Ltd.

ENF21001

SEMESTER VI

DISCIPLINE SPECIFIC COURSE - 15

6.1 PRINCIPLES AND PRACTICE OF AUDITING

L:T:P-3:1:0

Course Outcome:

On successful completion of this course the students can:

CO1: Learn in depth to practice as an Auditor

CO2: Learn the characteristics of errors and frauds and minimize them in maintenance of books of accounts

CO3: Identify in detail the importance of Internal Control and Internal Check

CO4: Identify the details of audit planning

CO5: Learn in depth verification and valuation of Assets and Liabilities

CO6: Deliberate in details with examples audit of different types of organizations

Unit 1: Introduction

Meaning and definition of auditing- Nature and importance of auditing objectives of auditing-advantages, different types of audit, qualities of an auditor- audit report-auditing in a computerized environment.

Unit 2: Audit planning and control

Factors affecting audit planning - audit programme advantages-audit note book-appointment of a company auditor- qualifications, disqualifications-rights and duties of a company auditor.

Unit 3: Internal check and internal control

Meaning and objective-internal check for various transactions-limitations of internal control. Vouching-meaning and importance – vouching of cash transactions.

Unit 4: verification and valuation of assets and liabilities

Meaning- problems in valuation of assets, verification and valuation of assets and liabilities- goodwill, Stock in trade, Investments, Patents, Copy rights and trademarks, plant and machinery- capital, creditors, debentures, outstanding expenses, contingent liabilities.

Unit 5: Audit of different types of organizations

Audit of sole trader, audit of partnership firms, audit of hotels, audit of educational institutions, audit of trust, audit of co-operative societies.

References:

1. Auditing T R Sharma
2. Practical auditing B N Tandon
3. Practical auditing- Spicer and Spegler
4. Auditing Jagadeesh prakash

ENF22001

SEMESTER VI

DISCIPLINE SPECIFIC COURSE -16

6.2: BUSINESS LAWS

L:T:P-3:1:0

Course Outcome:

On successful completion of this course the students can:

CO1: Understand in details various laws related to business and able to work as legal adviser of business enterprises

CO2: Understand the characteristics of legal environment and practice business ethics

CO3: Learn in depth and apply the basic legal knowledge to business enterprises

CO4: Understand the characteristics of different intellectual properties and protect them

CO5: Identify and appointed as member of various commerce and legal boards / committee

CO6: Specify the details of Information technologies Act

CO7: Learn the provisions of Special Contract

Unit 1: Introduction

Concept of law, Sources Of Law- Mercantile Law; Agreement, Contract-Definition, Essentials Of a Contract, Legal Rules As To Valid Offer And Acceptance; Termination Of An Offer.

Unit 2: Contractual Capacity

Minor's Agreement, Consideration-Definition, Essentials and Exceptions. Free Consent-Coercion, Undue Influence, Fraud, Misrepresentation, Mistake, Definition and Features only.

Unit 3: Special Contract

Contingent contract, quasi contracts, Wagering Agreement, Discharge of a Contract, Remedies for Breach of Contract.

Unit 4: Intellectual Property Act

Definition and Registration Procedure for Patent, Copy Right, Trademarks.

Unit 5: Information Technology Act 2000

Definition of Information-Digital Signature, Legal Recognition of Electronic Records, License to issue Digital Signature Certificate And Acceptance Of Digital Signature.

References:

1. Mercantile Law - N.D.Kapoor P C Tulsian and Bharat
2. Business Law - Tulsian
3. Mercantile Law - P P S Gogna .

ENC24001 / END24001

GROUP A1

SKILL ENHANCEMENT COURSE-1

COMPUTERIZED ACCOUNTING SYSTEM

L: T: P- 2:0:2

Course Outcome:

On successful completion of this course the students can:
CO1: Learn in depth the characteristics of computerized accounting system
CO2: Identify the reason for differences between cash book and bank statement
CO3: Learn in details with examples computerised accounting software
CO4: Specify in details with examples periodic reports
CO5: Learn the classification and characteristics of data entry system
CO6: Prepare the quotation, purchase order etc., using computer software

Unit 1: a) – Computerised Accounting System
Meaning of computerised Accounting Traditional / Manual System of Accounting; process of Computerised Accounting; features of Computerised Accounting; difference between manual accounting system and computerised accounting. Process/Steps in Computerised Financial Accounting; Advantages of the Computerised Financial Accounting System; Various Components of a Computerised Financial Accounting System
b) - Voucher Types of Voucher; Bank Payment Voucher; Bank Receipt Voucher; Cash Payment Voucher ; Cash Receipt Voucher ; General Voucher.

Unit 2: - Bank Reconciliation Statement
Common transactions with bank; Cashbook and bank statement ; Reasons for difference between cash book and bank statement ; Bank reconciliation statement

Unit 3: Computerized Accounting
Scope of Computerized Accounting; Computerized Accounting Software; Creating a Corporation in Computerized Accounting Software. Chart of Accounts ; Creating Chart of Accounts ; Update Chart of accounts ; Charts of accounts Beginning Balances ; Organizational codes ; Editing charts of accounts;

Unit 4: Periodic Reports
General Journal ; Ledger; Trial Balance ; Income Statement ; Balance Sheet Inventory report; Account Receivable report; Account Payable report

Unit 5: Data Entry System

Voucher and Entry of vouchers ; Sales Entries ; Purchase Entries; Cash Receipt Entries ; Cash Payment Entries ; Bank transaction Entries Maintain the Records of Sales &

Customers ; Quotations to customers ; Sales orders ; Sales Invoices ; Sales receipts ; Record of Customers ; Sales report ; Customer Report.

Unit 6: Maintain the Records of Purchases and Vendors/ Suppliers

Preparing the Quotations; Purchase orders; Payment to vendors; Record of vendors; Utility Bills Payable; Purchase Report; Vendors Report.

References:

1.Computer Accounting (Accounting & Finance) Paperback – Michael Fardon
2.Computerized Accounting Spiral-bound – 2008- Arens and Ward (Author)
3.Computerized Accounting -Prof.C.M.Tembhurnekar, Dr.Alok Dwivedi
4.https://margcompusoft.com/Free_accounting_software.html

ENC25001 / END25001

GROUP A1

SKILL ENHANCEMENT COURSE-2

E-FILLING OF RETURNS

L:T:P-2:0:2

Course Outcome:

On successful completion of this course the students can:
CO1: Learn in depth the types of e-filing and e-verification of returns
CO2: Specify in details with examples E-filling of returns
CO3: Understand the details of steps involved in e- filling of different forms of IT Return
CO4: Learn the details of E-filling of returns under GST
CO5: Learn the details of returns to be filled by composition tax payer

Unit 1: **E-filing of Returns**
Meaning- objectives- advantages, features of E-filing; Types of e- filing, e-filing Process flow, Types of e-Verification of Returns, How to e-file, who should file e-return;

Unit 2: ITR-1 and ITR2- ITR-3- ITR-4 introduction
Format- Heads of income covered- contents- filling the return- steps involved in filing of ITR-1, ITR-2, ITR-3, ITR-4

Unit 3: ITR-5- ITR-6; ITR-7- introduction
Format- Heads of income covered- contents- filling the return- steps involved in filing of ITR-5, ITR-6, ITR 7.

Unit 4: E-filing of returns under GST
GSTR-1- GSTR-1A, GSTR-2, GSTR 2A; GSTR-3, GSTR 3A, GSTR-3B, GSTR 9, Assesses required to file, contents to be filled, Documents required, steps in filing the above returns;

Unit 5: **Returns to be filed by composition tax payers**
GSTR-4A, GSTR-4, GSTR-9; Returns to be submitted by an input service distributor-GSTR 6, GSTR-6A; Returns to be filed by Tax Deductor-GSTR-7, GSTR-7A;Contents- steps to be followed in filing the above returns

References:

1.https://incometaxindiaefiling.gov.in/eFiling/Portal

2.https://www.bankbazaar.com/tax/step-by-step-guide-efile-income-tax-return-online.html

3.https://www.icicibank.com/knowledge-base/tax/steps-for-e-filing

4.https://taxguru.in/income-tax/download-free-ebook-the-process-efiling-income-tax-returns.html

5.Students Guide To e-Returns- vinod K singhania- taxmann

6.https://www.profitbooks.net/gst-returns/

ENC26001 / END26001

GROUP A1

SKILL ENHANCEMENT COURSE -3

PRINCIPLES AND PRACTICE OF GENERAL INSURANCE

L: T: P-3:1:0

Course Outcome:

On successful completion of this course the students can:

CO1: Identify the classification and characteristics of General insurance

CO2: Learn the details of fire insurance policies, insurance coverage and consequential loss

CO3: Deliberate in details with examples underwriting and settlement of claims

CO4: Understand in depth the details of claim procedure and Settlement limitation

CO5: Learn in detail with examples non life miscellaneous insurance

Unit 1: **Introduction**

Meaning of General Insurance – The Evolution and Growth of General Insurance – Types of General Insurance – Fundamentals of General Insurance –Recent innovations. Organization and Management of General Insurance Companies – Regulatory Framework for General Insurance in India.

Unit 2: **Fire Insurance**

Standard policies – Fire Insurance coverage – Consequential loss (fire) Insurance policies – Declaration policies, Marine Insurance: Marine Cargo policies – Hull policies – Institute cargo clauses – Institute hull clauses – Open policies – Accumulation of risk per location - Motor Insurance: Types of policies – Third party Insurance – Comprehensive coverage – Conditions and Exclusions – premium.

Unit 3: **Non life miscellaneous insurances**

Personal Accident Insurance, Health Insurance and Mediclaim policies, Liability Insurance, Burglary Insurance other Miscellaneous Insurances, Rural Insurance covers, Engineering Insurance and its Consequential loss covers, Aviation hull and Aviation liability.

Unit 4: **Underwriting and Settlement of Claims**

Proposal forms, Cover notes, Certificates of Insurance, Endorsements, Moral and Physical Hazards, Statistics Spreading of Risks, Premium Rating, Premium Loading.

Unit 5: **Settlement of Claims**

Claim procedure, TPAs: Claim forms, Investigation / Assessment, Essential Claim Documents, Settlement Limitation, Arbitration, Loss Minimization and Salvage.

References:

1. Insurance Institute of India – IC 34 – General Insurance
2. Insurance Institute of India – IC 45- General Insurance Underwriting
3. Module I, Principles and Practice of General Insurance, The Institute of Chartered Accountants of India: New Delhi.
4. H Narayanan, Indian Insurance: A Profile, Jaico Publishing House: Mumbai.
5. K.C. Mishra and G.E. Thomas, General Insurance - Principles and Practice, Cengage Learning: New Delhi

ENC27001 / END27001

GROUP A1

SKILL ENHANCEMENT COURSE - 4

LOGISTICS AND SUPPLY CHAIN MANAGEMENT

L: T: P-3:1:0

Course Outcome:

On successful completion of this course the students can:

CO1: Understand in depth supply chain management

CO2: Write down the details of designing the supply chain network

CO3: Learn in details with examples designing and planning transportation network

CO4: Learn the details of Information technology in supply chain

CO5: Identify the dimensions of logistics

CO6: Understand in depth the details of demand management and customer care

Unit 1: **Introduction to Supply Chain Management**

Supply chain – objectives, importance, decision phases, process view, competitive and supply chain strategies, achieving strategic fit, supply chain drivers, obstacles, framework, facilities, inventory, transportation, information, sourcing, pricing.

Unit 2: **Designing the Supply Chain Network**

Designing the distribution network, role of distribution, factors influencing distribution, design options – e-business and its impact, distribution networks in practice, network design in the supply chain, role of network, factors affecting the network design decisions, modelling for supply chain.

Unit 3: **Designing and Planning Transportation Networks**

Role of transportation, modes and their performance, transportation, infrastructure and policies, design options and their trade-offs, tailored transportation. SOURCING AND PRICING: Sourcing, In-house or Outsource – 3rd and 4th PLs – supplier scoring and assessment, selection, design collaboration, procurement process, sourcing planning and analysis. Pricing and revenue management for multiple customers, perishable products, seasonal demand, bulk and spot contracts.

Unit 4: **Information Technology in the Supply Chain - IT Framework**

Customer relationship management, internal supply chain management – supplier relationship management, transaction management, future of IT. Coordination in a supply chain: Lack of supply chain coordination and the Bullwhip effect, obstacle to coordination,

managerial levers, building partnerships and trust , continuous replenishment and vendor-managed inventories, collaborative planning, forecasting and replenishment.

Unit 5: **Dimensions of Logistics**

Introduction: A macro and micro dimension, logistics interfaces with other areas, approach to analysing logistics systems, logistics and systems analysis, techniques of logistics system analysis – factors affecting the cost and importance of logistics.

Unit 6: **Demand Management and Customer Service**

Outbound to customer logistics systems, Demand Management, Traditional Forecasting, CPFRP, customer service, expected cost of stock-outs, channels of distribution.

References:

1. Sunil Chopra and Peter Meindl, Supply Chain Management – Strategy, Planning and Operation, Pearson.
2. Coyle, Bardi, Longley, The management of Business Logistics – A supply Chain Perspective, Thomson Press.
3. Supply Chain Management by Janat Shah Pearson Publication.
4. Donald J Bowersox, Dand J Closs, M Bixby Coluper, Supply Chain Logistics Management, TMH, Second Edition.

ENE23001 / ENF23001

GROUP A2

SKILL ENHANCEMENT COURSE-5

CORPORATE TAX PLANNING

L: T: P-3:1:0

Course Outcome:

On successful completion of this course the students can:

CO1: Learn in depth and specify the tax saving strategies for decision making

CO2: Understand in depth the provisions and laws of tax and able to become tax consultant

CO3: Identify the tax provisions and deductions and able to become tax planner with reference to business restructuring

CO4: Write down the details and identify special provisions in respect of Free Trade Zone, Infrastructure Development and Backward areas

CO5: Learn in detail the provision of Income Tax Act relating to amalgamation

CO6: Understand the classification and characteristics of taxation relief

CO7: Deliberate the provisions of IT Act in relation to managerial decisions

Unit 1: Introduction:

Corporation tax, Tax Planning, Tax Evasion, Tax Avoidance, Tax Management, Dividend Tax, Domestic Company, Foreign Company.

Unit 2: a) **Tax Planning for new Business:** Location and Nature of Business, Forms of Business Organization

b)**Tax Planning and Financial Management Decisions**: Tax Planning relating to Capital Structure Decision, Dividend Policy, Inter-Corporate Dividends and Bonus Shares

Unit 3: **Tax Planning and Managerial Decisions**

Tax planning in respect of Own or Lease, sale of assets used for scientific research, make or buy decisions, repair, replace, renewal or renovation of an asset, shut-down or continue decisions.

Unit 4: Special Tax Provisions

Tax provisions in respect of Free Trade Zone, Tax provisions in respect of Infrastructure Development, Tax provisions in respect of Backward Areas, Tax provisions in respect of Tax Incentives to Exporters.

Unit 5: **Amalgamation**

Meaning of amalgamation under the Income-tax Act, Transactions not treated as amalgamation, Actual cost and written down value when assets are transferred in a scheme of amalgamation, When a capital asset (other than a block of assets) is transferred, When a block of asset is transferred, Assets in amalgamation not treated as transfer, Transfer of capital assets to amalgamated Indian company.

Unit 6: Tax Payment

Tax deduction at source, Tax collection at source, and Advance payment of tax, Relief for double taxation [Secs. 90, 90A and 91], ADT agreements [Sec. 90], Modes of granting relief under ADT agreements , Unilateral relief [Sec. 91], Double taxation relief in case of specified associations [Sec. 90A]

References:

1.Direct Tax Laws and Practices- Vibnod K. Singhania
2.Direct Taxes – H C Meharothra
3.Corporate tax planning & business tax procedures- Vinod K songhania

ENE24001 / ENF24001

GROUP A2

SKILL ENHANCEMENT COURSE-6

COMPANY LAW AND SECRETARIAL PRACTICE

L: T: P-3:1:0

Course Outcome:

On successful completion of this course the students can:

CO1: Understand in depth features of Companies Act -2013 and types of companies

CO2: Learn in details the promotion of a Joint Stock Company and conversion

CO3: Write down the details of conducting the Board of Directors and Subcommittee meetings

CO4: Understand the procedure for alteration of Articles of Association and Memorandum of Association

CO5: Learn in detail the appointment of company secretary

CO6: Learn the preparation of minutes of various meetings

Unit 1: **Companies Act**

Introduction- companies Act 2013- features of companies Act - 2013, Types of companies- Public companies, Pvt company, statutory corporation, One person company, Dormant company, Associate company, Small company, Limited Liability Partnership- Application of Company Law to banking/insurance sector- Registrar of companies- functions, Ministry of Corporate affairs-functions; SEBI-functions of SEBI.

Unit 2: **Secretary**

Definition, Who can be company secretary, Appointment, General Legal position, Duties of a Company Secretary, Rights of Company Secretary, Liabilities of Company Secretary, Qualification for Appointment as secretary, Dismissal of the Secretary, Secretary in the Whole time practice, Secretarial Compliance certificate, Specimen form

Unit 3: Company Formation and Conversion

Company Formation and Conversion Choice of the form of the business entity, Conversion/reconversion of one form of business entity into another, Procedure for incorporation of private/public companies, Companies limited by guarantee and unlimited companies and their conversion/re-conversion registration., Obtaining certificate of commencement of business, obtaining certificate of re-registration, Commencement of new business and certification,

Unit 4: **Procedure for alteration of various clauses of memorandum**

Procedures for alteration of articles, Effect of alteration, specimen forms: Procedure for issue of Shares – Public Issue, Rights Issue and Bonus Shares, Issue of Shares at Par/Premium/Discount; Issue of Shares on Preferential /Private Placement Basis – Allotment, Calls on Shares and Issue of Certificates – Issue of Sweat Equity Shares,

Employees Stock Option Scheme (ESOPs), Employees Stock Purchase Scheme (ESPS), Shares with Differential Voting Rights

Unit 5: Meetings

Collective Decision Making Forums, Authority, Accountability, Delegation and Responsibility ; Board Meetings , Convening and Management of Meetings of Board and Committees; Preparation of Notices and Agenda Papers, General Meetings, Convening and Management of Statutory Meeting, Annual and Extra-Ordinary General Meetings, Voting through Electronic Means; Conducting a Poll and Adjournment of a Meeting; Post-Meeting Formalities, Preparation of Minutes and Dissemination of Information and Decisions

References:

1. S. Srikanth , Shanti Rekha Rajagopal ,Revathy Blakrishnan, Corporate Laws and Secretarial Practice, Jain Book
2. M C Kuchhal, Secretarial Practice, Vikas Publishing House, New Delhi.
3. Sangeet Kedia, Advanced Company Law And Practice, Pooja Law Publishing Company,

ENE25001 / ENF25001

GROUP A2

SKILL ENHANCEMENT COURSE-7

QUANTITATIVE DECISION TOOLS

L: T: P-3:1:0

Course Outcome:

On successful completion of this course the students can:
CO1: Understand in depth the characteristics and features of statistics
CO2: Learn the details of methods and sources of collection of data
CO3: Understand in details with examples Measures of central tendency
CO4: Understand in detail the characteristics and application of correlation and regression
CO5: Understand in details the classification and application of correlation
CO6: Deliberate the characteristics of Index numbers
CO7: Learn the characteristics of Testing of hypothesis with application
CO8: Learn the creation of variables and entering data using SPSS

Unit 1: **Introduction**
Meaning and definition of statistics, functions, advantages, limitations- collection of data - methods of collecting primary data, and sources of secondary data - classification and tabulation-SPSS –Introduction, uses, creation of variables and entering data.

Unit 2: **Measure of central tendency**
Meaning and Definition of Averages-Arithmetic mean, Median, Mode [grouping method], standard deviation, Calculation of mean, median and Standard deviation using SPSS.

Unit 3: **Correlation**
Meaning and Definition, types of correlation, Methods of calculating correlation co-efficient [Karl pear sons and Spearman's correlation] calculation of correlation using SPSS; Regression-Meaning and Definition, Distinction between correlation and Regression, Regression equations and estimations Calculation of Regression using SPSS.

Unit 4: **Index Numbers**
Definition – Types – Methods of Construction and Problems in the Construction – Cost of living index numbers.

Note-Besides solving problems chapter-wise in class rooms, teach using SPSS in computer lab.

Unit 5: **Testing of Hypothesis**

Meaning of hypothesis, types of hypotheses, test of Significance Procedure of testing hypothesis – Z test, one sample t test, Chi square test.

References:

1. Fundamentals of Statistics: D. N. Elhance, Veena Elhance and B. M. Aggarwal
2.Statistical Methods: S. P Gupta.
3.Fundamentals of Statistics: S.C Gupta
4.Practical Statistics: R S N Pillai and Bhagavathi
5.Statistics (Theory, Methods and Application): D.C. Sancheti and V.K. Kapoor
6.Statistics for Management: Richard I. Levin and David S. Rubin
7. Statistics: Dr. B.H. Suresh, Dr. G.H. Mahadevaswamy, Nithya Publications, Mysore.

ENE26001 / ENF26001

GROUP A2

SKILL ENHANCEMENT COURSE-8

BUSINESS RESEARCH METHODS

L: T: P-3:1:0

Course Outcome:

On successful completion of this course the students can:

CO1: Learn in depth different methods of research, methodology, data collection, analysis and interpretation of data to become a good business researcher

CO2: Understand and able to report about various issues of different organisations through research report

CO3: Understand the details of types of Business Research and Research design

CO4: Identify and contribute to the discipline of commerce and management through the research

CO5: Deliberate the details of Data analysis

CO6: Identify the details of Research Report

CO7: Specify in details with examples sampling and hypothesis testing

Unit 1: **Introduction to Business Research**

Meaning, types, criteria of good research, scientific approach to research in physical and management science, limitations of applying scientific methods in business research problems, ethical issues in business research, research process, problem formulation, preparation of business research plan/proposal.

Unit 2: **Business Research Design**

Types of business research, Exploratory, Descriptive, and Causal research, Exploratory research: Meaning, suitability, collection, hypothesis, formulation, Descriptive research: Meaning, types of descriptive studies, data collection methods, Causal research: Meaning, various types of experimental designs, types of errors affecting research design.

Unit 3: **Data Collection**
Primary and Secondary data – Sources – advantages/disadvantages, Data collection Methods – Observations, Survey, Interview and Questionnaire design, Qualitative Techniques of data collection. Measurement and Scaling Techniques: Nominal Scale, Ordinal Scale, Interval Scale, Rating Scale, Criteria for good measurement, attitude measurement.

Unit 4: **Sampling and Hypothesis Testing**
Sampling: Meaning, Steps in Sampling process, Types of Sampling – Probability and non probability Sampling Techniques, Errors in sampling. Hypothesis: Meaning, Types, characteristics, sources, Formulation of Hypothesis, Errors in hypothesis testing.

Unit 5: **Data Analysis**
Editing, Coding, Classification, Tabulation, Univariate, Bivariate and multivariate Analysis, Interpretation.

Unit 6: **Research Report**
Types, advantages, disadvantages, Components of research reports, format, chapterisation, language, referencing.

References:

1. Marketing Research – Naresh K Malhotra – Pearson Education.
2. Business Research Methods- S.N.Murthy/U.Bhojanna- Excel Books.
3 .Business Research Methods–Donald R. Cooper & Pamela S Schindler,TMH.
4. Marketing research: Text and cases- Rajendra Nargundkar – TMH.
5. Business Research Methods – Alan Bryman & Emma Bell, Oxford.
6. Research Methodology – C R Kothari- Vishwa Prakashan.
7. Business Research Methods – William G Zikmund- Thomson,
8. Methodology of Research in Social Sciences – O R Krishnaswami, M Ranganatham, HPH.

ENE27001 / ENF27001

GROUP A2

SKILL ENHANCEMENT COURSE-9

PROJECT WORK

L:T:P- 1:0:3

C1 – Proposal of Project Work - 15 Marks
C2 – Progress of Project Work - 15 Marks
Viva - 20 Marks
Valuation of Report – 50 Marks

Course Outcome:

On successful completion of the project work the students are able to:
CO1: Understand in depth the gap between theory and practical through internship
CO2: Understand in detail with examples the procedure and able to write a report on the various issues of an organization
CO3: Convince and communicate effectively
CO4: Learn in detail and able to absorb as an employee by the employer
CO5: Specify and analyze the components of project report and prepare the report effectively
CO6: develop leadership qualities

ENE28001

GROUP B

SEMESTER V

DISCIPLINE SPECIFIC ELECTIVE

CONSUMER AFFAIRS

L: T: P-4:1:0

Course Outcome:

On successful completion of the project work the students are able to:
CO1: Learn conceptual frame work of consumer and consumer market
CO2: Understand in depth the characteristics of consumer protection law in India
CO3: Deliberate the details of role played by the advisory bodies at different level
CO4: Indentify the grievance redressal mechanism
CO5: Specify the details of role played by industry regulator in consumer protection
CO6: Understand in depth the consumer movement in India

Unit 1: Conceptual Framework
Consumer and Markets: Concept of Consumer, Nature of markets: Liberalization and Globalization of markets with special reference to Indian Consumer Markets, E-Commerce with reference to Indian Market, Concept of Price in Retail and Wholesale, Maximum Retail Price (MRP), Fair Price, GST, labelling and packaging along with relevant laws, Legal Metrology. Experiencing and Voicing Dissatisfaction: Consumer buying process, Consumer Satisfaction/dissatisfaction-Grievances-complaint, Consumer Complaining Behaviour: Alternatives available to Dissatisfied Consumers; Complaint Handling Process: ISO 10000 suite

Unit 2: The Consumer Protection Law in India
Objectives and Basic Concepts: Consumer rights and UN Guidelines on consumer protection, Consumer goods, defect in goods, spurious goods and services, service, deficiency in service, unfair trade practice, restrictive trade practice. Organizational set-up under the Consumer Protection Act

Unit 3: Advisory Bodies

Consumer Protection Councils at the Central, State and District Levels; Adjudicatory Bodies: District Forums, State Commissions, National Commission: Their Composition, Powers, and Jurisdiction (Pecuniary and Territorial), Role of Supreme Court under the CPA with important case law.

Unit 4: Grievance Redressal Mechanism

Grievance Redressal Mechanism under the Indian Consumer Protection Law , Who can file a complaint? Grounds of filing a complaint; Limitation period; Procedure for filing and hearing of a complaint; Disposal of cases, Relief/Remedy available; Temporary Injunction, Enforcement of order, Appeal, frivolous and vexatious complaints; Offences and penalties. Leading Cases decided under Consumer Protection law by Supreme Court/National

Commission: Medical Negligence; Banking; Insurance; Housing & Real Estate; Electricity and Telecom Services; Education; Defective Products; Unfair Trade Practices.

Unit -5: Role of Industry Regulators in Consumer Protection.

Banking: RBI and Banking Ombudsman. ii. Insurance: IRDA and Insurance Ombudsman iii. Telecommunication: TRAI iv. Food Products: FSSAI v. Electricity Supply: Electricity Regulatory Commission vi. Real Estate Regulatory Authority

Unit 6: **Contemporary Issues in Consumer Affairs**

Consumer Movement in India: Evolution of Consumer Movement in India, Formation of consumer organizations and their role in consumer protection, Misleading Advertisements and sustainable consumption, National Consumer Helpline, Comparative Product testing, Sustainable consumption and energy ratings.

Quality and Standardization: Voluntary and Mandatory standards; Role of BIS, Indian Standards Mark (ISI), Ag-mark, Hallmarking, Licensing and Surveillance; Role of International Standards: ISO an Overview

Note: Unit 2, 3 and 4 refer to the Consumer Protection Act, 1986. Any change in law would be added appropriately after the new law is notified

References:

1. Khanna, Sri Ram, Savita Hanspal, Sheetal Kapoor, and H.K. Awasthi. (2007) Consumer Affairs, Universities Press.
2. Choudhary, Ram Naresh Prasad (2005). Consumer Protection Law Provisions and Procedure, Deep and Deep Publications Pvt Ltd.
3. G. Ganesan and M. Sumathy. (2012). Globalisation and Consumerism: Issues and Challenges, Regal Publications
4. Suresh Misra and Sapna Chadah (2012). Consumer Protection in India: Issues and Concerns, IIPA, New Delhi
5. Rajyalaxmi Rao (2012), Consumer is King, Universal Law Publishing Company
6. Girimaji, Pushpa (2002). Consumer Right for Everyone Penguin Books.
7. E-books :- www.consumereducation.in
8. Empowering Consumers e-book,

9. e-book, www.consumeraffairs.nic.in

ENE29001

GROUP B

SEMESTER V

DISCIPLINE SPECIFIC ELECTIVE

INTERNATIONAL BUSINESS

L: T: P-4:1:0

Course Outcome:

On successful completion of this course the students can:

CO1: Learn in detail about import and export and able to become an importer and exporter

CO2: Specify in detail the application of foreign trade policies and analyse how international factors affect domestic concern

CO3: Learn in depth and analyse legal issues related to international business

CO4: Identify and analyse various social culture and responsibility awareness on global issues

CO5: Understand in detail and identify sources of trade finance and forms of payment

CO6: Identify the function of WTO and regional integrations

CO7: Understand in depth characteristics of foreign exchange market

CO8: Identify the details of facilities provided by the International monetary institutions

Unit 1: Introduction

Globalisation – Meaning and implications - Globalisation of markets and production – The emerging global economy - Drivers of Globalisation. Modes and entry strategies of international business – arguments for and against – trends in international trade. Differences between domestic and international business.

Unit 2: International Business Environment

Cultural aspects, values and norms, social structure, religious and ethical systems, language, education, implications of cultural differences on business. International business environment, Political and legal factors, political systems, legal systems, International business environment, Economic factors, the determinants of economic development. Tariffs, subsidies, local content requirements, administrative policies, anti dumping policies, political and economic arguments for intervention ,Development of the world trading system.

Unit 3: WTO and Regional Integrations

GATT, the Uruguay round of negotiations. WTO, genesis and functions, the future of WTO. Regional Integrations, Trading Blocks, nature and levels of integration, arguments for and against regional integration, Trading blocks, European Union, ASEAN, APEC, NAFTA, SAARC.

Unit 4: Multinational Corporations

Organisation, design and structures, head quarters and subsidiary relations in multinational corporations.

Unit5: Foreign Exchange Market

Functions, nature of foreign exchange market, the trading mechanism, exchange rate determination, balance of trade, stability of exchange rate, currency convertibility

Unit 6: International Monetary System

Funding facilities and strategies of IMF and World Bank, Expatriation and Repatriation, Ethical dimensions in International Business.

References:

1. Charles W L Hill. And Arun Kumar Jain. International Business: competing in the global market place, Mc Graw-Hill.
2. John D. Daniels Lee H Radebaugh, International Business: Environments and Operations Addison Wesley.
3. Justin Paul – International Business – Prentice Hall of India.
4. Oded Shenkar Yadong Luo: International Business – John Wiley and Co.
5. Wild J. John, Wild L. Keneth and Han C. Y. Jerry, International Business: An integrated approach, Prentice Hall
6. Alan M. Rugman and Richard M. Hodgetts – International Business by Pearson Education.

ENE30001

GROUP B

SEMESTER V

DISCIPLINE SPECIFIC ELECTIVE

GOODS AND SERVICES TAX-I

L: T: P-4:1:0

Course Outcome:

On successful completion of this course the students can:

CO1: Understand the technology and flow of return filing under GST

CO2: Learn in details and gain knowledge to practice as GST Consultant

CO3: Learn in details provisions of GST to handle TDS and POS online and off line more efficiently

CO4: Understand in depth tax provisions to make managerial decisions effectively in various tax related matters

CO5: Understand the provisions of integrated goods and service Tax Act, 2017

CO6: Learn in depth the provisions relating to place of supply of goods imported into, or exported from India

CO7: Identify the details of provisions in relation to Time of supply of goods

Unit 1: Introduction to GST

Indirect tax Structure in India, Issues in Indirect Tax, Rationale for Transition to GST; GST-Meaning, Definition of GST, Types of GST, Features of GST, Benefits of GST, Problems on Computation of GST.

Unit 2: Definitions

Actionable claim, Address of Delivery, Aggregate Turnover, Agriculturist, Associated enterprises, Business, GST Council, Credit note and Debit note, Deemed exports, Draw-back, Electronic Credit ledger, Exempt Supplies, Input, Input service, Input Service Distributor, Input Tax, Input tax Credit, Intra-state supply of Goods, Job work, Reverse Charge, Invoice, Composition Levy, Mixed Supply, outward supply, Person, Turnover in State

Unit 3: Levy and Collection of Tax

Scope of supply; Levy of GST; Liability of tax payable person, Rate and value of tax, meaning and conditions of supply, list of transactions without consideration list of neither a supply of goods, nor supply of services; meaning and treatment of mixed supply: meaning and treatment of composite supply: reverse charge mechanism: Composition levy.

Unit 4 : The Integrated Goods and Service Tax Act,2017

Short title, extent and commencement; Definitions; Central tax, Customs frontier of India, Export of Goods and Services, Import of goods and services; Location of Recipient of service, Location of supplier of service; Appointment of officers; Levy and Collection; Power to grant exemption from tax; Inter-State supply;. Intra-State supply; Supplies in territorial waters

Unit 5: Place of supply of goods other than supply of goods imported into, or exported from India

Place of supply of goods imported into, or exported from India; Place of supply of services where location of supplier and recipient1 is in India; Place of supply of services where location of supplier or location of recipient is outside India; Special provision for payment of tax by a supplier of online information and database access or retrieval services

Unit 6: Time of supply

Introduction, time of supply-forward charge, reverse charge, residuary, special charges-Time of supply of service- forward charge, reverse charge, Vouchers, Residuary, Special charges. Problems on determination of time of supply.

References:

1. Taxmann publications
2. Compendium on Goods and service tax-Dr. Manju S 3.www.cbec.gov.in/
4. www.ICSI.edu.in
5. www.icai.org.
6. Students Guide To GST & Customs Law Vinod K Singhania

ENE31001

GROUP B

SEMESTER V

DISCIPLINE SPECIFIC ELECTIVE

FINANCIAL MANAGEMENT-I

L: T: P-4:1:0

Course Outcome:

On successful completion of this course the students can:
CO1: Identify the details of various sources of finance
CO2: Learn the characteristics of different methods of time value of money and its application to investment decision
CO3: Learn the classification and characteristics of cost of capital
CO4: Identify the characteristics of capital structure and factors affecting the capital structure
CO5: Learn the details of Capital Budgeting
CO6: Understand the classification and characteristics of Dividend theories

Unit 1: Introduction to financial management
Meaning – scope – goals of financial management – sources of finance.

Unit 2: Time value of Money
Present value and future value concepts-present value of annuity, application of present and future value to investment decisions, preparation of amortization table.

Unit 3: Cost of capital

Meaning- importance of cost of capital in financial decisions, determination of specific costs-cost of debt- cost of preference share capital-cost of equity, cost of retained earnings-weighted average cost of capital-Leverages- meaning- types problems on Leverages.

Unit 4: Capital Structure

Meaning-optimum capital structure-features of appropriate capital structure-factors influencing capital structure-theories of capital structure-NI approach-NOI approach, MM approach, traditional approach, determination of optimal debt-equity mix.

Unit 5: Capital budgeting

Meaning-features, role of capital budgeting, techniques of capital budgeting-payback period, average rate of return, net present value, profitability index, internal rate of return, discounted pay back method. Application of excel in capital budgeting techniques.

Unit 6: **Dividend decisions**

Meaning, Dividend decisions, Dividend policies - objectives of dividend policy-determinants of dividend policy-dividend relevance- Walter's model, Gordon model-Dividend irrelevance-MM hypothesis.

References:

1. Financial Management I.M.Pandey.
2. Financial Management Ravi Kishore
3. Financial Management Dr.V.R.Palanivelu
4. Financial Management Kulkarni
5. Financial Management Tulsian P C
6. Financial Management Khan and Jain

ENE32001

GROUP B

SEMESTER V

DISCIPLINE SPECIFIC ELECTIVE

ADVANCED COST AND MANAGEMENT ACCOUNTING-I

L: T: P-4:1:0

Course Outcome:

On successful completion of this course the students can:

CO1: Learn in depth various Costing methods

CO2: Understand the details of contract costing and process costing

CO3: Identify reasons for reconciliation of cost and financial accounts

CO4: Learn in depth the details of Activity based costing

CO5: prepare the operating cost sheet

Unit 1: Introduction to Costing Methods

Meaning, Importance and Categories, Cost accounting Standards- Generally Accepted Cost Accounting Principles (GACAP)- Purpose, Objective and Applicability.

Unit 2: Contract costing

Introduction- Contract account, Profit on incomplete contracts, work in progress, Contractee's Accounts, Escalation clause.

Unit 3: Process costing: Introduction, Distinction between Job costing, and process costing, process losses, inter-process profits, Joint products and by-products- Meaning, features, differences, problems on process accounts including joint and by products.

Unit 4: **Operating Costing**
Introduction, transport costing, standing charges, operating/running charges, and preparations of operating cost sheet.

Unit 5: Reconciliation of cost and financial accounts
Meaning, need for reconciliation, reasons for disagreement, reconciliation procedure, problems on reconciliation.

Unit 6: Activity based costing (ABC)
Definition, Features, Advantages, Differences between ABC and traditional costing, Allocation of overheads; Objectives of ABC, Development of ABC, Implementation of ABC, Problems on Computation of Activity Based Costing and Traditional Costing;

References:

1.Cost Accounting: N.K. Prasad
2.Cost Accounting: Nigam & Sharma :
3.Practical Costing: Khanna, Pandey & Ahuja
4: Cost Accounting: M.L. Agarwal
5.Cost Accounting: Jain & Narang
6.Cost Accounting: S.P. Iyengar

ENE33001

GROUP B

SEMESTER V

DISCIPLINE SPECIFIC ELECTIVE

RETAIL MANAGEMENT

L: T: P-4:1:0

Course Outcome:

On successful completion of this course the students can:

CO1: Learn in depth the characteristics of retailing

CO2: Understand in depth the details of retail consumer

CO3: Identify and basis of retail market segmentation and strategies

CO4: Specify the factors determining the retail location selection

CO5: Understand in depth merchandise and managing them

CO6: Learn in depth the details of retail operation and retail pricing

Unit 1: **Introduction to Retailing**

Concept of retailing, Functions of retailing, Terms and Definition, retail formats and types, Retailing Channels, Retail industry in India, Importance of retailing, Changing trends in retailing.

Unit 2: **Understanding the Retail Consumer**

Retail consumer behaviour, Factors influencing the Retail consumer, Customer decision making process, Types of decision making, Market research for understanding retail consume.

Unit 3: Retail Market Segmentation and Strategies

Market Segmentation and its benefits, kinds of markets, definition of Retail strategy, Strategy for effective market segmentation, Strategies for penetration of new markets, Growth strategies, Retail value chain.

Unit 4: Retail Location Selection

Importance of Retail locations, Types of retail locations, Factors determining the location decision, Steps involved in choosing a retail locations, Measurement of success of location.

Unit 5: **Merchandise Management**

Meaning of Merchandising, Factors influencing Merchandising, Functions of Merchandising Manager, Merchandise planning, Merchandise buying, Analyzing Merchandise performance.

Unit 6: **Retail Operations and Retail Pricing**

Store administration, Premises management, Inventory Management, Store Management, receipt Management, Customer service, Retail Pricing, Factors influencing retail prices pricing strategies, controlling costs.

References:

1. Retail Management 01 Edition S. C. Bhatia
2. Retail Management: Text and Cases (English, Paperback, Swapna Pradhan
3. Retail Management; Principles and Practices – R. Sudarshan
4. Retail Management PB (English, Paperback, Mathur U C)

ENF28001

GROUP C

SEMESTER VI

DISCIPLINE SPECIFIC ELECTIVE

INVESTMENT ANALYSIS AND PORTFOLIO MANAGEMENT

L: T: P-4:1:0

Course Outcome:

On successful completion of this course the students can:

CO1: Learn in depth the characteristics of investment

CO2: Understand in depth characteristics of financial system and stock market

CO3: Identify and use different models for portfolio analysis

CO4: Learn in depth capital asset pricing model

CO5: Identify the risk and return of investment

CO6: Understand in depth portfolio selection

CO7: Understand in depth the efficient market hypothesis and portfolio analysis

Unit 1: Introduction to Investment

Meaning, Financial and Economic Meaning, Characteristics, Objectives, Investment v/s Speculation, Investment v/s Gambling, Types of Investors and Investment avenues.

Unit 2: **Indian Financial System and Stock Market-Investment Planning,**

Introduction to Stock Market, Overview of Indian Financial System, Market Indices, Methods of Computation of Market Indices.

Unit 3: Portfolio Management

Meaning, Phases, Evolution, Role of Portfolio Management, Calculation of Risk and Return, Fundamental Analysis: Economic Analysis, Industry analysis and Company analysis and Technical Analysis: Meaning, Dow Theory, basic Principles, Trends and charts.

Unit 4: Share and Bond Valuation-Share

Concepts and present value, share valuation model, constant Growth Model, Multiple Growth Model, Discount rate, Multiplier Approach to share values and Regression Analysis. Bonds: Bond Returns, Prices, Pricing Theories, Bond Risks and Bond Duration.

Unit 5: Efficient Market Hypothesis and Portfolio Analysis

EMH: Random Walk Theory, the Efficient Market Hypothesis, Forms of Market Efficiency. Portfolio Analysis: Expected Return and Risk of Portfolio, Reduction of Portfolio Risk through Diversification, Portfolio with more than two Securities – solved examples.

Unit 6: Portfolio Selection

Feasible set of Portfolios, Selection of Optimal Portfolio, Limitations of Markowitz Model and Single Index Model and Multi Index Model. Capital Asset Pricing Model and Arbitrage Pricing Theory.

References:

1.Investment analysis and Portfolio Management Prasanna Chandra
2.Security Analysis and Portfolio Management Punithavathi pandian
3.Security Analysis and portfolio Management Ambika Prasad Dash
4.Security Analysis and Portfolio Management, M. Ranganatham, R. Madhumathi

ENF29001

GROUP C

SEMESTER VI

DISCIPLINE SPECIFIC ELECTIVE

FINANCIAL DERIVATIVES

L: T: P-4:1:0

Course Outcome:

On successful completion of this course the students can:

CO1: Learn in depth the characteristics of financial derivatives and derivatives market

CO2: Deliberate the characteristics of futures and forwards
CO3: Understand in details with examples options
CO4: Deliberate the classification and characteristics of financial swaps
CO5: Write down the details of commodity market
CO6: Identify in depth credit derivatives

Unit 1: Financial Derivatives

Introduction, -meaning- Types of financial derivatives - Features of derivatives market - Factors contributing to the growth of derivatives - functions of derivative markets - traders in derivatives markets - Derivatives market in India

Unit 2: Futures and forwards

Meaning, differences-valuation of futures, Mechanics of buying & selling futures, Margins, Hedging using futures -specification of futures - Commodity futures, Index futures, interest rate futures – arbitrage opportunities.

Unit 3: **Options:**
Types of options, option pricing, factors affecting option pricing – call and put options on dividend and non-dividend paying stocks put-call parity - mechanics of options - stock options - options on stock index - options on futures – interest rate options. Concept of exotic option. Hedging & Trading strategies involving options, valuation of option: basic model, one step binomial model, Black and Scholes Model,

Unit 4: Financial Swaps
features and uses of swaps - Mechanics of interest rate swaps – valuation of interest rate swaps – currency swaps – valuation of currency swaps

Unit 5: Commodity derivatives
Commodity futures market-exchanges for commodity futures in India, Forward Market Commissions and regulation-commodities traded – trading and settlements – physical delivery of commodities

Unit6: Credit Derivatives
Meaning, common credit derivatives, types of credit dervates, Credit Default swaps(CDS), Total Return swaps, Collateralized debt obligations(CDO), Indian scenario.

References:

1. Financial Derivatives- Vohra and Bagri
2. Capital Market Instruments Kotreshwar G
3. Fundamental Financial Derivatives N R Parasuraman
4. Financial Derivatives S L Guptha

ENF30001

GROUP C

SEMESTER VI

DISCIPLINE SPECIFIC ELECTIVE

GOODS AND SERVICES TAX AND CUSTOM DUTY-II

L: T: P-4:1:0

Course Outcome:

On successful completion of this course the students can:

CO1: Understand the technology and flow of return filing under GST

CO2: Learn in details and gain knowledge to practice as GST Consultant

CO3: Learn in details provisions of GST in relation to value of taxable supply and input tax credit

CO4: Understand in depth tax provisions to make managerial decisions effectively in various tax related matters

CO5: Learn in detail the procedure to be followed to assess the value and determine customs duty

CO6: Understand the procedure of registration under GST

CO7: Prepare tax invoice, credit and debit notes

Unit 1: Value of taxable supply

Conditions, inclusions, Consideration not wholly in money, Supply between two related persons, Supply through agent, cost based value, Residual valuation, specific supplies, Service of pure agent. Problems on determination of value of supply.

Unit 2: Input tax credit

Meaning, conditions for taking credit, ineligible input tax credit, availability of credit in special circumstances, Input tax credit and change in constitution of registered person, Taking input tax credit in respect of inputs and capital goods sent for job work, Manner of Distribution of Credit by Input Service Distributor (ISD)

Unit 3: Tax Invoice, Credit and Debit Notes

Tax invoice; Prohibition of un authorised collection of tax; Amount of tax to be indicated in tax invoice and other documents ; Credit and debit notes.

Unit 4: Registration under GST

Persons liable for registration, compulsory registration, Procedure for Registration, Rejection of application for registration, cancellation of Registration

Unit 5: Returns

Brief introduction to various GSTRS-procedure for filing various returns.

Unit 6: Customs Act 1962

Meaning- Notified goods –specified goods- Prohibition of importation and exportation under sec 11- types of customs duty- Basic customs duty, Education Cess, Anti dumping duty, Safeguard Duty, IGST, GST Compensation Cess- Computation of Assessable value and applicable duties. Exports – Meaning- zero rated supply.

References:

1. Taxmann publications
2. Compendium on Goods and service tax-Dr. Manju S
3. www.cbec.gov.in/
4. Systematic Approach GST- Dr. Ravi. Gupta, Dr. Girish. Ahuja

ENF31001

GROUP C

SEMESTER VI

DISCIPLINE SPECIFIC ELECTIVE

FINANCIAL MANAGEMENT –II

L: T: P-4:1:0

Course Outcome:

On successful completion of this course the students can:

CO1: Deliberate the details of working capital management

CO2: Learn in depth the details of cash management

CO3: Understand the details of working capital financing

CO4: Deliberate in details with examples Venture capital financing

CO5: Learn in depth the details of shareholders value creation

CO6: Deliberate in depth International financial management

Unit 1: Working Capital Management

Meaning, Features, types of working capital, factors influencing working capital, level of current assets, operating cycle and cash cycle, current assets financing policy

Unit 2: Cash Management

Cash budget cash collection and disbursement, options for investment of surplus funds, credit management- credit policy variables-credit evaluation. Inventory management- need for inventories; order quantity-EOQ model- monitoring and control of inventories-ABC- JIT techniques.

Unit 3: Working Capital Financing

Leasing-types of leases, Rationale for leasing, operating leases, leasing as a financing decision; hire purchase financing- Hire purchase financing v/s lease financing, instalment sale, evaluation of Hire purchase financing

Unit 4: V**enture Capital Financing**

Meaning, features, development of venture capital in India, stages in venture financing- the business plan- essentials of a business plan, the process of venture capital financing- Methods of venture financing; Disinvestment mechanisms

Unit 5: Share Holder Value Creation

Financial goals and strategy, shareholder value creation- market value added, Market to book value, Economic value added(EVA)- Balanced scorecard- the learning and growth perspective, significance of balanced score card , implementation of score card.

Unit 6: International Financial Management

Foreign exchange market, foreign exchange rates- spot exchange rates, bid-ask rate, forward exchange rates- foreign exchange risk- transaction exposure, economic exposure, translation exposure, hedging of foreign exchange risk- foreign currency option, money market operations- financing international operations.

References:

1. Financial Management I.M.Pandey.
2. Financial Management Ravi Kishore
3. Financial Management Dr.V.R.Palanivelu
4. Financial Management Kulkarni
5. Financial Management Tulsian P C
6. Financial Management Khan and Jain

ENF32001

GROUP C

SEMESTER VI

DISCIPLINE SPECIFIC ELECTIVE

ADVANCED COST AND MANAGEMENT ACCOUNTING-II

L: T: P-4:1:0

Course Outcome:

On successful completion of this course the students can:

CO1: Understand the details of management accounting

CO2: Learn in depth the details of financial statement analysis techniques

CO3: Analyze the inflow and outflow of cash and able to prepare cashflow statement

CO4: Understand the characteristics of different types of ratios

CO5: Learn in depth budget and budgetary control and prepare various budget for different activities of the business

CO6: Learn in depth marginal costing and able to effective decision regarding make or buy, accepting foreign order, continuance or discontinuance of manufacturing a products

Unit 1: Introduction

Meaning and Definition of Management Accounting, Scope and Objectives of Management Accounting-Differences between Management Accounting and Financial Accounting –Management accounting and Cost accounting-Limitations of Management Accounting.

Unit 2: Analysis of Financial Statements

Common Size Statements, Comparative Statement, Trend analysis.

Unit 3: Ratio Analysis

Meaning and Objectives-Types of rations - (A) Profitability Ratios-GP ratio - NP Ratio-Operating ratio- Operating profit ration-Return on capital employed ratio- EPS, (B) Turnover Ratios-working capital turnover ratio- Stock Turnover ratio-Fixed assets turnover ratio-Debtors turnover Ratio-Creditors turnover Ratio, (C) Financial ratios –

Current Ratio-liquidity ratio-Debt-equity ratio-Proprietary Ratio-Capital gearing Ration-Advantagesand Limitations of Ratios- Construction of Balance sheet using ratios.

Unit 4: Cost Flow Statement

Meaning, Definition, Uses and Limitations-Differences between funds flow statement and cash flow statement-Preparation of Cash flow statement (AS-7): Direct method and Indirect Method.

Unit 5: Marginal Costing

Definition - Basic concepts – Assumptions - Marginal Cost statement – Contribution-Break Even Analysis-P/V Ratio-Margin of Safety - Decision areas - Make or Buy and Pricing.

Unit 6: Budget and Budgeting Control

Definition - Basic Concepts - Budget Manual - Key factor - Classification of Budgets - Problems on cash budget, sales budget, Flexible Budget, Cash Planning and Motives for holding cash.

References:

1. Cost Accounting: N.K. Prasad
2. Cost Accounting: Nigam & Sharma :
3. Practical Costing: Khanna, Pandey & Ahuja
4. Cost Accounting: M.L. Agarwal
5.Cost Accounting: Jain & Narang
6.Cost Accounting: S.P. Iyengar

ENF33001

GROUP C

VI SEMESTER

DISCIPLINE SPECIFIC ELECTIVE

ORGANISATIONAL BEHAVIOUR

L: T: P-4:1:0

Course Outcome:

On successful completion of this course the students can:

CO1: Understand in detail behaviour of employees and able to manage them efficiently

CO2: Identify in details employees performance and able to motivate for effective performance

CO3: Learn in depth and analyse the behaviour of employees

CO4: Understand in details key positions in an organisation and able to occupy them

CO5: Learn in details with examples frame policies and strategies in organisation

Unit 1: Introduction
Meaning, definition, historical development, fundamental principles of OB, contributing disciplines, approaches, challenges and opportunities.

Unit 2: Foundations of Individual Behaviour
Individual behaviour: Foundations of individual behaviour. Ability: Intellectual abilities, Physical ability, the role of disabilities. Personality: Meaning, formation, determinants, traits of personality, personality attributes influencing OB. Attitude: Formation, components of attitudes, relation between attitude and behaviour.

Unit 3: Perception and Emotions- Perception: Process of perception, factors influencing perception, link between perception and individual decision making. Emotions: Affect, mood and emotion and their significance, basic emotions, emotional intelligence, self-awareness, self-management, social awareness, relationship management.

Unit 4: Motivation and Leadership

Motivation- meaning, theories of motivation-needs theory, two factor theory, Theory X and Y, application of motivational theories. Leadership: Meaning, styles of leadership, leadership theories, trait theory, behavioural theories, managerial grid, situational theories-Fiedler's model, SLT, transactional and transformation leadership.

Unit 5: Group Behaviour

Definition, types, formation of groups, building effective teams. Conflict: Meaning, nature, types, process of conflict, conflict resolution. Power and politics: Basis of power, effectiveness of power tactics.

Unit 6: Emerging Challenges

Emerging challenges, managing diversity, globalisation, technology transformation, e - business, promoting ethical behaviour.

References:

1.Organisational behaviour, Stephen P Robbins, Timothy A. Judge, Neharika Vohra, 14th Edition, Pearson
2. Organization Behaviour – Ashwathappa, Himalaya Publication House
3. Organisational Behaviour: A modern approach - Arun Kumar and Meenakshi, Vikas Publishing House
4. Organisational Behaviour - Fred Luthans, 12/e, McGraw Hill International
5 Management and Organisational Behaviour - Laurie J Mullins, Pearson education
6. Fundamentals of Organisational Behaviour - Slocum/Hillriegel, Cengene Learning

B.COM

Question Paper Pattern

(For all courses except Quantitative Techniques, Computerised Accounting and E-filling of returns)

PART-A

Answer the following. Each question carries 15 marks. 2X15=30

1. …… ……

OR

2. ……..…….

3. ……..……..

OR

4. ……..…….…….

PART-B

Answer the following. Each question carries 10 marks. 2X10=20

5. …….…….

OR

1. …….……..……

7. …….…….

OR

8. …….…….

PART-C

Answer any four of the following. Each question carries 5 marks. 4X5=20

9. …….……

10. …….…….…….

11. …….

12. …….

13. …….

14 …….

****

B.COM

Question Paper Pattern
4.5 Quantitative Techniques

Time: 3 hrs **Max. Marks: 70**

Part-A

Answer the following. Each question carries two marks 10X2=20

1. a. …….
   b. …….
   c.……..
   d. ……....
   e.……..
   f.…….
   g.…….
   h. …….
   i. ……..
   j. ……..

Part-B

Answer any four of the following. Each question carries five marks 4X5=20

2. ……...

3. ……..……..

4. ……..……..

5. ……

6. ……...……

Part-C

Answer any three of the following. Each question carries ten marks 3X10=30

7. ……

8. ……

9. ……

10. ……

B.COM

Question Paper Pattern
3.6 Computerized Accounting System (SEC-1) / 4.6 E-filling of returns (SEC-2)

Time: 3 hrs **Max. Marks:70**

Part-A

Answer the following. Each question carries two marks. 10X2=20

1. a. ……
b. ……
c. ……
d. ……
e. ……
f. ……
g. ……
h. ……
i. ……
j. ……

Part-B

Answer any four of the following. Each question carries five marks. 4X5=20

2. ……
3. ……
4. ……
5. ……
6. ……

Part-C

Answer any three of the following. Each question carries ten marks 3X10=30

5. ……
6. ……
7. ……
8. ……

JSS MAHAVIDYAPEETHA

JSS COLLEGE OF ARTS, COMMERCE AND SCIENCE

OOTY ROAD, MYSURU - 570025

Structure & Detailed Syllabus

Four years Multidisciplinary Undergraduate Programme with Multiple Exit options

in

GEOGRAPHY

B.A. / B.Sc. Geography Degree

(Basic/Honours)

2021 –2022

2022 – 2023 onwards

Syllabus & Regulations Governing the Choice-Based Credit System (CBCS)

For the Four-Years (Eight Semesters) Bachelor of Arts / Bachelor of Science (B.A./B.Sc.) Geography Program

Eligibility for Admission:

Candidates who have passed PUC in Science, Commerce, Arts in Karnataka State or any other States in India with equal qualifications are eligible for admission to the course, providedthey have secured minimum of 50% marks in the qualifying examination(PUC/ +2 Level) (45% for SC / ST / Category-I Candidates).

The Candidates not studied Geography as an optional subject in PU/ 10+2 Level need to undergo one week bridge course programme conducted by the Geography department of the concerned Colleges.

Scheme and Duration of the Course:

B.A./B.Sc. Geography Program consists of 8 semesters in four academic years.

Discipline Specific Core (DSC) Courses: (B-3 Model)

First, second, third and fourth semesters will have one DSC course each. Every DSC course has 6 credits including practical component for 2 credits (4 credits for theory and 2 credits for practical).

Fifth and sixth semesters will have two Discipline Specific Core (DSC) courses in each semester for 5 credits including practical component for 2 credits (3 credits for theory and 2 credits for practical).

Seventh and eighth semesters will have three Discipline Specific Core (DSC) courses in each semester. In seventh semester, two DSC courses for 5 credits each including practical component for 2 credits (3 credits for theory and 2 credits for practical) and one DSC course has 3 credits without practical component. Whereas in eighth semester, one course will have a practical component for 2 credits apart from theory for 3 credits and the remaining two DSC courses for 3 credits each without practical component. Totally, the program has 14 DSC courses.

Open Elective (OE) Courses:

Open Elective Course (OE) refers to Elective courses/papers in a non-core subject across all disciplines. First, second, third and fourth semesters will have one OE course in each semester. Every OE course has 3 credits with no practical component. OE courses are offered by the department for other disciplines and the candidates have to choose one OE from the pool in each semester. The OE courses enhance the geographical knowledge and help students in learning Geographical thinking and make them geographic literates. There are totally 4 OE courses inthe program.

Vocational Courses:

Fifth and Sixth semesters will have one vocational course for 3 credit in each semester. The candidates have to choose any one vocational course from the pool in each semester.

Internship:

In sixth semester internship course for 2 credits is prescribed which is mandatory in nature. Each student is expected to prepare a report on Internship and shall make a presentation during the examination. The candidates are expected to complete this course between the Fifth and sixth semester under the supervision of a teaching faculty of the concerned department. These courses can enable students to obtain the required technicalknowledge along with practical skill

Discipline Specific Elective (DSE) Courses:

Fifth, Seventh and eighth semesters will have DSE courses. In Fifth semester one DSE course, in seventh semester two DSE courses and in Eighth semester two DSE course for credit of 3 each need to be studied by a student apart from the Research methodology course in seventh semester for 3 credits and Research project course for six credits in eighth semester. All the DSE courses have 3 credits with no practical component (100 marks).

Research Methodology and Research Project:

The seventh semester will have research methodology course for 3 credits (60+40=100 marks) and in eighth semester students have to take up a research project course for 6 credits (100+100=200 marks). If a candidate is not interested to opt for the Research Project in the eighth semester such candidates can choose two more DSE course of 3 credits each from the given pool or can opt for Internship programme for 6 credits.

It is mandatory to select research project for six credits in Eighth semester and Research Methodology course in Seventh Semester for a candidate willing to pursue PhD program.

There shall be University examination at the end of each semester. The course pattern and the scheme of examinations are as follows:

Duration of the Course:

The duration of the B.A./B.Sc. Geography Program shall extend over 8 semesters (Four academic years) of 16 weeks or more, each with a maximum of 90 actual working days of instruction in each semester.

Course pattern:

The number of credits per semester may vary from 20 to 25, an average of 23 credits per semester and a total of around 186 credits for the program. The credits shall be based on the number of instructional hours per week, generally 1 credit per hour of instruction in theory and 1 credit for 2 hours of practical or project work or internship per week. The courses offered in the programme covers the Discipline Specific Core (DSC), Discipline Specific Elective (DSE), Open Elective (OE) Vocational courses and Internship.

Medium of instruction:

The medium of instruction shall be English / Kannada.

Attendance:

The course shall be treated as an independent unit for the purpose of attendance. A student shallattend a minimum of 75% of the total instruction hours in a course including assignments and seminars in each semester. The student who fails to secure 75% attendance in a course shall be required to repeat that semester.

Internal Assessment:

Marks for internal assessment shall be awarded on the basis of Attendance, conducting internal Tests, assigning Case Studies and Assignments / Seminars and other activities. The internal assessment marks shall be notified on the department / college notice board for the information of the students and it shall be communicated to the Registrar (Evaluation) within a stipulated time prescribed by the university.

All DSC, DSE theory and Vocational courses shall have internal assessment for 40 Marks.

The practical, Internship and Skill Enhancement courses shall have internal assessment for 25 marks each, including the 10 marks for the practical record.

Research Project shall have internal assessment for 100 marks.

The outline for continuous assessment activities for C1 and C2 components of a course shall be as under

Activities	**C1 Component**	**C2 Component**	**Total Marks**
Session test	10 marks	10 marks	20
Seminars/ presentation/activities	10 marks		10
Case study/assignment/field work/project work etc.		10 marks	10
Total	**20**	**20**	**40 marks**

Board of Examiners (BOE):

Board of examiners constituted by the University shall consist of a Chairman, internal and external members out of which at least one shall be from the Department / College offering the course and at least two external members from other universities. The board shall scrutinize the question papers and shall forward for the approval of university.

Results:

A candidate should obtain a minimum of 40% marks in each course in the University examination including internal assessment marks. The candidates who have passed in all the semesterexaminations are eligible for the award of B.A./B.Sc. Honors Degree in Geography. If the candidates chooses Geography as major along with any social science stream subjects as minor, like Sociology, Political Science, History, Economics, etc, such candidates can be awarded B.A. Degree and for those studied geography as major with any science subjects as minor such candidates shall be awarded B.Sc. Honors in Geography.

Carryover:

A candidate who fails in a lower semester examination may go to the higher semester, however, the resultof the candidates who have passed the VIII semester examination but not passed the lower semester examinations shall be declared as NCL (not completed lower semester examinations). Such candidates shall be eligible for the award of degree only after completion of all the lower semester examinations.

Question Paper Pattern:

The Theory exam shall be conducted for 60 Marks and it consists of 3 Sections namely Section A, Section B, Section C with internal choices. (Short, Medium and Long answer questions).

Section A - Each question carries 3 marks and student has to answer 4 out of 6 questions.

Section B - Each question carries 6 marks and student has to answer 3 out of 5 questions, and

Section C - Each question carries 10 marks and student has to answer 3 out of 4 questions.

Model Curriculum

Name of the Degree Program:	B.A. / B.Sc. (Basic / Honours) Degree in Geography
Discipline Core:	Geography
Total Credits for the Program:	186
Starting year of implementation:	2021-2022

Program Outcomes:

By the end of the program the students will be able to:

(Refer to literature on outcome based education (OBE) for details on Program Outcomes)

PO1: Relating to Knowledge

By the end of the program the students will be able to:

Give explanation of relevant terms and concept of geography including definitions.

Give better explanation about relevant principles, theories and models in geography.

Show clear knowledge relating to man and environmental process and factors.

PO2: Understanding and application

By the end of the program the students will be able to:

Identify the importance of spatial scale and time scale.

Know the complex and interactive nature of physical and human environments.

Identify the importance of the resemblances and variance between places, environments andpeople.

Comprehend how processes bring changes in systems, distributions and environments.

PO3: Students Skills

By the end of the program the students will be able to:

Interpret a variety of types of geographical data and sources and recognise their limitations.

Communicate geographical evidence, ideas and arguments.

Use geographical data to identify trends and patterns.

Use diagrams and sketch maps to demonstrate geographical aspects.

Demonstrate skill of analysis and synthesis of geographical information

PO4: Students Evaluation

By the end of the program the students will be able to:

Critically evaluate geographical principles, theories and models

Assess the effects of geographical processes and change on physical and human environments.

Assess how the viewpoints of different groups of people, potential conflicts of interest andother factors interact in the management of physical and human environments.

Evaluate the relative success of failure of initiatives.

Syllabus Aims:

The aims of the syllabus describe the B.A. / B.Sc program in geography at 5th, 6th, 7th & 8th Level. These aims outline the educational context in which syllabus content should be viewed. Many of these aims may be delivered by the use of suitable case-studies, through application of geographical skills and practical field visits.

The BA./ B.Sc Geography syllabus aims to enable students to:

- Know the significance of scale in studying geography
- Know the processes functioning at various scales within physical and human environments
- Improve a sense of space, place and location
- Develop consciousness of the relevance of geography to understanding and solving contemporary environmental problems
- Realisation of the main fundamentals of physical geography and human geography and the interconnectedness between them
- Explain the causes and effects of change over space and time on physical and human environments
- Develop an gratefulness of the nature, value, limitations and importance of different approaches to analyse and explanation in geography
- Increase the knowledge of, and ability to use and apply, appropriate skills and techniques including fieldwork
- Improve a logical approach in order to present a structured, coherent and evidence-basedargument
- Develop a concern for accuracy and objectivity in extracting, recording, processing, presenting, analysing and interpreting geographical data.

Curriculum Structure for Undergraduate Program B.A. / B.Sc. Geography

Name of the Degree Program:	B.A./B.Sc.	Total Credits for the Program:	186
Discipline/Subject:	Geography	Starting year of implementation:	2021-2022

Program Articulation Matrix for Core Courses:

Semester	Title /Name of the course	Program outcomes that the course addresses	Pre-requisite course(s)	Pedagogy	Assessment
I	Principles of Geomorphology	PO-1, PO-2, PO-4	No Pre-requisite course(s)	Interactive Lectures, Case Studies	In-course & End Course Assessment
II	Introduction to Climatology	PO-1, PO-2, PO-4	No Pre-requisite course(s)	Interactive Lectures, Case Studies	In-course & End Course Assessment
III	Fundamentals of Human Geography	PO-1, PO-3, PO-4	No Pre-requisite course(s)	Interactive Lectures, Case Studies, Seminar	In-course & End Course Assessment
IV	India: Resources and Sustainability	PO-2, PO-3	No Pre-requisite course(s)	Interactive Lectures, Case Studies, Quiz	In-course & End Course Assessment
V	Population Resource & Dynamics	PO-1, PO-2, PO-4	No Pre-requisite course(s)	Inquiry-based learning, Interactive Lectures	In-course & End Course Assessment
	Fundamentals of Remote Sensing	PO-1, PO-3	Cartography & Spatial Statistics	Blended learning, Interactive Lectures, MOOCs	In-course & End Course Assessment
VI	Environmental Geography	PO-1, PO-2, PO-4	No Pre-requisite course(s)	Investigative Case-Based Learning, Seminar	In-course & End Course Assessment
	Fundamentals of Geographic Information System	PO-1, PO-3	Basics of Cartography	Blended learning, Interactive Lectures, MOOCs	In-course & End Course Assessment
VII	Advanced Geomorphology	PO-2, PO-4	Principles of Geomorphology	Blended learning, Interactive Lectures, MOOCs	In-course & End Course Assessment
	Advanced Climatology	PO-2, PO-4	Introduction to Climatology	Blended learning, Interactive Lectures, MOOCs	In-course & End Course Assessment
	Conceptual Development in Geography	PO-2, PO-3, PO-4	No Pre-requisite course(s)	Interactive Lectures, Group Activity	In-course & End Course Assessment
VIII	Sustainable Soil Resource Management	PO-1, PO-2, PO-4	Principles of Geomorphology	Cooperative Learning, Interactive Lectures, MOOCs	In-course & End Course Assessment
	Agriculture & Food Security	PO-1, PO-2, PO-4	No Pre-requisite course(s)	Blended learning, Interactive Lectures, MOOCs	In-course & End Course Assessment
	Principles of spatial models in Geography	PO-1, PO-2, PO-4	No Pre-requisite course(s)	Blended learning, Interactive Lectures, MOOCs	In-course & End Course Assessment
	Research Project / Internship (6)	PO-2, PO-3, PO-4	Research Methodology	Process-Oriented Guided Inquiry Learning (POGIL),Problem or Project Based	In-course & End Course Assessment, Final report

Program Articulation Matrix for Open Elective (OE)

Semester	Title of the course	PO that the course addresses	Pre-requisite course(s)	Pedagogy	Assessment
I	Introduction Physical Geography	PO-1, PO-2, PO-3	No Pre-requisite course(s)	Interactive lectures, Blended learning	In-course & End Course Assessment
	Fundamentals of Remote Sensing	PO-1, PO-2, PO-3	No Pre-requisite course(s)	Interactive lectures, Blended learning	In-course & End Course Assessment
II	Human of Geography	PO-1, PO-2	No Pre-requisite course(s)	Inquiry-based learning, Interactive Lectures	In-course & End Course Assessment
	Basics of Geographic Information Systems	PO-1, PO-2, PO-3	Fundamentals of Remote Sensing	Interactive lectures, Blended learning	In-course & End Course Assessment
III	Geography of India	PO-1, PO-2	No Pre-requisite course(s)	Interactive lectures, Blended learning	In-course & End Course Assessment
	Application of GIS & Remote Sensing	PO-1, PO-2, PO-4	Fundamentals of Remote Sensing, Basics of GIS	Interactive lectures, Blended learning	In-course & End Course Assessment
IV	Geography of Karnataka	PO-1, PO-2	No Pre-requisite course(s)	Interactive lectures, Blended learning	In-course & End Course Assessment
	Population & Settlement Geography	PO-1, PO-2	No Pre-requisite course(s)	Interactive lectures, Blended learning	In-course & End Course Assessment

Program Articulation Matrix for Vocational Courses:

Semester	Title of the course	PO that the course addresses	Pre-requisite course(s)	Pedagogy	Assessment
V	Geo-surveying	PO-1, PO-3	No Pre-requisite course(s)	Interactive lectures, Blended learning, ,Hands on experience	In-course & End Courses assessment
	Statistical Techniques in Geography	PO-1, PO-3	No Pre-requisite course(s)	Interactive lectures, Blended learning, Hands on experience	In-course & End Courses assessment
VI	Open Source GIS: Applications	PO-1, PO-3	No Pre-requisite course(s)	Interactive lectures, Blended learning, Hands on experience	In-course & End Courses assessment
	Digital Cartography and Mobile Mapping	PO-1, PO-3	No Pre-requisite course(s)	Interactive lectures, Blended learning, Hands on experience	In-course & End Courses assessment

Program Articulation Matrix for Discipline Specific Elective (DSE):

Semester	Title Of the course	PO that the course addresses	Pre-requisite course(s)	Pedagogy	Assessment
V	Regional Geography of Karnataka	PO-1	No Pre-requisite course	Blended learning, Investigative Case-Based Learning, Seminar	In-course & End Coursesassessment
	Tourism Geography	PO-1	No Pre-requisite course	Inquiry-based learning, Interactive Lectures, case studies	In-course & End Courses Assessment
VII	Regional planning and Development	PO-1	No Pre-requisite course(s)	Interactive Lectures, cas e studies	In-course & End Courses Assessment
	Settlement Geography	PO-1	No Pre-requisite course(s)	Interactive Lectures, case studies	In-course & End Courses Assessment
	Bio geography	PO-1	No Pre-requisite course(s)	Interactive Lectures, case studies	In-course & End Courses Assessment
	Climate Change: Vulnerability & Adaptation	PO-1	No Pre-requisite course(s)	Interactive Lectures, case studies	In-course & End Courses Assessment
VIII	Sustainable Rural development	PO-1	Regional Planning Development	Blended learning, Interactive Lectures, MOOCs	In-course & End Coursesassessment
	Urban geography	PO-1, PO-2, PO-4	Settlement Geography	Blended learning, Interactive Lectures, MOOCs	In-course & End Coursesassessment
	Geography of Health & Wellbeing /	PO-2, PO-4	Principles of Geomorphology and Bio-geography Introduction to Climatology Fundamentals of Human Geography	Blended learning, Investigative Case-Based Learning, Seminar	In-course & End Coursesassessment
	Natural Resource Management	PO-1, PO-2, PO-4	Regional Planning and Development Fundamentals of Human Geography	Cooperative Learning, Group Activity, Interactive Lectures, MOOCs	In-course & End Coursesassessment
	Geopolitics	PO-1, PO-2, PO-4	Fundamentals of Human Geography	Inquiry-based learning, Interactive Lectures, case studies	In-course & End Coursesassessment
	Transport Geography	PO-1, PO-2, PO-4	No Pre-requisite course(s)	Cooperative Learning, Group Activity, Interactive Lectures, MOOCs	In-course & End Coursesassessment

B.A. / B.Sc. (Basic / Honours) Degree in Geography Contents of Courses in the Program

Course Type					
Semester	Discipline Specific Core (DSC)	Open Elective (OE) /(3)	Vocational Courses (3)	Discipline Specific Elective (DSE)(4)	Research/Other Courses
I	Principles of Geomorphology	1. Introduction Physical Geography 2. Fundamentals of Remote Sensing	Nil	Nil	
II	Introduction to Climatology	1. Human of Geography 2. Basics of Geographic Information Systems	Nil	Nil	
III	Fundamentals of Human Geography	1. Geography of India 2. Application of GIS & Remote Sensing	Nil	Nil	
IV	India: Resources and Sustainability	1. Geography of Karnataka 2. Population & Settlement Geography	Nil	Nil	
V	Population Resource & Dynamics* Fundamentals of Remote Sensing ***course for those opting Geography as Minor**	Nil	1. Geo-Surveying / 2. Statistical Techniques in Geography	1. Regional Geography of Karnataka/ 2. Tourism Geography	
VI	Environmental Geography* Fundamentals of Geographic Information System ***course for those opting Geography as Minor**	Nil	1. Open Source GIS: Applications 2. Digital Cartography and Mobile Mapping	Nil	Internship

VII	Advanced Geomorphology Advanced Climatology Conceptual Development in Geography	Nil	Nil	1.Regional planning and Development 2.Settlement Geography 3.Bio geography 4.Climate Change: Vulnerability & Adaptation	Research Methodology
VIII	Sustainable Soil Resource Management Agriculture & Food Security Principles of Spatial Models in Geography	Nil	Nil	1.Sustainable Rural development 2.Urban geography 3.Geography of Health & Wellbeing / 4.Natural Resource Management 5.Geopolitics 6.Transport Geography	Research Project

Course Pattern and scheme of Examination for BA/BSc Geography Programme as per NEP2020

Semester	Course Type	Course Name	Credits T = Theory P = Practical			Instruction Hour Per Week		Total No. of Hours/ Semester		Marks for Exam		Marks for IA			Duration of Exam (in Hours)	
			T	P	Total	Theory	Practical	T	P	Theory	Practical	T	P	Total	Theory	Practical
I	GEOG DSC T1.1	Principles of Geomorphology	4	2	6	4	4	52	52	60	25	40	25	150	2	2
	GEOG OE T1.1	1. Introduction Physical Geography 2.Fundamentals of Remote sensing	3	-	6	3	-	42	-	60	-	40	-	100	2	-
II	GEOG DSC T2.1	Introduction to Climatology	4	2	6	4	4	52	52	60	25	40	25	150	2	2
	GEOG OE T2.1	1. Human of Geography 2. Basics of Geographic Information Systems	3	-	3	3	-	42	-	60	-	40	-	100	2	-
III	GEOG DSC T3.1	Fundamentals of Human Geography	4	2	6	4	4	52	52	60	25	40	25	150	2	2
	GEOG OE T3.1	1. Geography of India 2. Applications of GIS & Remote Sensing	3	-	3	3	-	42	-	60	-	40	-	100	2	-
IV	GEOG DSC T4.1	India: Resources and Sustainability	4	2	6	4	4	52	52	60	25	40	25	150	2	2
	GEOG OE T4.1	1. Geography of Karnataka 2. Population & Settlement Geography	3	-	3	3	-	42	-	60	-	40	-	100	2	-

V	GEOG DSC T5.1	Population Resource & Dynamics	3	2	5	3	4	42	52	60	25	40	25	150	2	2
	GEOG DSC T5.2	Fundamentals of Remote Sensing	3	2	5	3	4	42	52	60	25	40	25	150	2	2
	GEOG VOC P5.1	Vocational – 1 1. Geo-Surveying / 2. Statistical Techniques in Geography	3	-	3	3	-	42	-	60	-	40	-	100	2	-
	GEOG DSE T5.1	1. Regional Geography of Karnataka 2. Tourism Geography	3	-	3	3	-	42	-	60	-	40	-	100	2	-
VI	GEOG DSC T6.1	Environmental Geography	3	2	5	3	4	42	52	60	25	40	25	150	2	2
	GEOG DSC T6.2	Fundamentals of Geographic Information System	3	2	5	3	4	42	52	60	25	40	25	150	2	2
	GEOG VOC P6.1	Vocational – 2 1. Open Source GIS: Application 2. Digital Cartography and Mobile Mapping	3	-	3	3	-	42	-	60	-	40	-	100	2	-
	GEOG INTP 6.1	**Internship**	-	-	2	4	-	52	-	25	-	25	-	50	2	-

Semester	Course Type	Course Name	Credits T = Theory P = Practical			Instruction Hour Per Week		Total No. of Hours/ Semester		Marks for Exam		Marks for IA			Duration of Exam (in Hours)	
			T	P	Total	Theory	Practical	T	P	Theory	Practical	T	P	Total	Theory	Practical
VII	GEOG DSC T7.1	Advanced Geomorphology	3	2	5	3	4	42	52	60	25	40	25	150	2	2
	GEOG DSC T7.2	Advanced Climatology	3	2	5	3	4	42	52	60	25	40	25	150	2	2
	GEOG DSC T7.3	Conceptual Development in Geography	3		3	3		42		60		40		100	2	
	GEOG DSE T7.1 GEOG DSE T7.2 (ANY TWO)	1.Regional planning and Development	3		3	3		42		60		40		100	2	
		2.Settlement Geography	3		3	3		42		60		40		100	2	
		3.Bio geography	3		3	3		42		60		40		100	2	
		4.Climate Change: Vulnerability & Adaptation	3		3	3		42		60		40		100	2	
	GEOG RM T7.3 **(Compulsory)**	RESEARCH METHODS IN GEOGRAPHY	3		3	3		42		60		40		100	2	
VIII	GEOG DSC T8.1	Sustainable Soil Resource Management	3	2	5	3	4	42	52	60	25	40	25	100	2	2
	GEOG DSC T8.2	Agriculture and food security	3		3	3		42		60		40		100	2	
	GEOG DSC T8.3	Principles of Spatial Models in Geography	3		3	3		42		60		40		100	2	
	GEOG RSPP8.1	**RESEARCH PROJECT**			6					100		100		200	2	
	GEOG DSET8.1 GEOG DSET8.2 (ANY TWO) **(any2 additional course For Non Research Project candidates)**	1.Sustainable Rural development	3		3	3		42		60		40		100	2	
		2.Urban geography	3		3	3		42		60		40		100	2	
		3.Geographyot Health & Wellbeing/	3		3	3		42		60		40		100	2	
		4.Natural Resource Management	3		3	3		42		60		40		100	2	
		5.Geopolitics	3		3	3		42		60		40		100	2	
		6.Transport Geography	3		3	3		42		60		40		100	2	

Program Structure for the B.A./B.Sc. Geography (Basic / Honours) Degree

Semester	Discipline Specific Core (DSC) (Credits) (L+T+P)	Discipline Specific Elective (DSE) / Open Elective (OE) (Credits) (L+T+P)	Ability Enhancement Compulsory Courses (AECC),Languages (L+T+P)		Skill Enhancement Course (SEC)			Total Credits
					Skill-based (Credits) (L+T+P)	Value-based (Credits) (L+T+P)		
I	DSC-A1 Principles of Geomorphology (4+2) DSC-B1 (4+2)	OE-1.1 Introduction Physical OE-1.4 Fundamentals of Remote Sensing (3)	L1-1 (3), L2-1 (3) (3+1+0 each)	Nil	SEC-1: Digital Fluency (2) (1+0+2)	Physical Educationfor Fitness (1) (0+0+2)	Health & Wellness (1) (0+0+2)	25
II	DSC-A2 Introduction to Climatology (4+2) DSC-B2 (4+2)	OE-2.1 Human Geography / OE-2.2 Basics of Geographic Information Systems (3)	L2-1 (3), L2-1 (3) (3+1+0 each)	Environmental Studies (2)	Nil	Physical Education - Yoga (1) (0+0+2)	NCC/ NSS/R&R (S&G)/ Cultural (1) (0+0+2)	25
Exit option with Certificate (50 Credits)								
III	DSC-A 3 fundamentals ofHuman Geography (4+2) DSC-B3 (4+2)	OE-3.1 Geography of India / OE-3.2 Application of GIS & Remote Sensing (3)	L1-3 (3), L2-3 (3) (3+1+0 each)	Nil	SEC-2: Artificial Intelligence (2) (1+0+2)	Physical Education - Sports Skills(1) (0+0+2)	NCC/ NSS/R&R (S&G)/ Cultural (1) (0+0+2)	25
IV	DSC-A4 India: Resources and Sustainability DSC-B4 (4+2)	OE-4.1 Geography of Karnataka /OE-4.2 Population & Settlement Geography	L1-4 (3), L2-4 (3) (3+1+0 each)	Constitution of India (2)	N il	Physical Education – Games (1) (0+0+2)	NCC/ NSS/R&R (S&G)/ Cultural (1) (0+0+2)	25
Exit option with Diploma (100 Credits)								
Choose any one Discipline as Major, the other as the Minor								
V	DSC-A5 Population Resource &Dynamics * (3 + 2) DSC-A6 Fundamentals of Remote Sensing (3+2) DSC-B5 (3+2) *for minor candidates	DSE1 1. Geography of Karnataka/ 2. Tourism Geography Geography Vocational – 1 (3) Voc 1.1 Geo-Surveying Voc 1.2 Statistical Techniques in Geography	Nil	Nil	SEC-3: Such as Cyber Security (2) (1+0+2)	Physical Education – Games (1) (0+0+2)	NCC/ NSS/R&R (S&G)/ Cultural (1) (0+0+2)	24

VI	DSC-A7 Environmental Geography* (3 + 2) DSC-A8 Fundamentals of Geographic Information Systems (3+2) DSC-B6 (4) *for minor candidates	Vocational – 2 (3) Voc 2.1 Open Source GIS: Applications Voc 2.2 Digital Cartography and Mobile mapping **Internship (2)**	Nil	Nil	SEC-4: Professional Cmmunication (2)	Physical Education – Games (1) (0+0+2)	NCC/ NSS/R&R (S&G)/ Cultural (1) (0+0+2)	23
Exit option with Bachelor of Arts, B.A. / Bachelor of Science, B.Sc Basic Degree (144 Credits)								
VII	DSC-A9 Advanced Geomorphology (3+2) DSC-A10 Advanced Climatology (3+2) DSC-A11 Conceptual Development in Geography(3)	DSE-2 and DSE-3 (**Any two**) 1.Regional planning and Development 2.Settlement Geography 3.Bio geography 4.Climate Change: Vulnerability & Adaptation **Research Methods in Geography (3)**	Nil	Nil	Nil	Nil	Nil	22
VIII	DSC-A12 Sustainable Soil Resource Management (3+2) DSC-A13 Agriculture & FoodSecurity (3) DSC-A14 Principles of Spatial Models in Geography(3)	DSE-4 (**AnyTwo**) DSE -5 1. Sustainable Rural development 2. Urban geography 3. Geography of Health & Wellbeing / 4. Natural Resource Management 5. Geopolitics 6. Transport Geography **Research Project (6)/Internship** (any two additional DSE courses or Internship programme can be opted by students if Research Project is not selected)	Nil	Nil	Nil	Nil	Nil	21
Award of Bachelor of Arts Honours, / Bachelor of Science Honours Degree (186 Credits)								

Technical Skills and possible jobs after each exit during and after the program

Semester	Exit Level	Credits	Technical Skills	Possible Jobs
Ii	Certificate	50	• Map Interpretation • Geomorphic Analysis • Climate Data Analysis & Interpretation	• Field Surveyor • Weather Data Analyst
IV	Diploma	100	• Cartography • Statistics Analysis	• Field Surveyor • Cartographer
VI	Degree	142	• Cartography • GIS and Image Analysis • Tourism Management	• GIS Field Surveyor • GIS Trainee • Nature Conservation Officer • School Teacher
VIII	Degree with Honors	186	• GIS & Image Analysis • Resource Management • Town Planning • Tourism Management	• Sustainability Consultant • Tourism officer • Transport planner • Cartographer • GIS Engineer • Environmental consultant • Geography Teacher • Geography Researcher

BA/ B.Sc. With Geography as a minorIn the 3rd year

V Semester

Course Type					
Semester	Discipline Specific Core (DSC)	Open Elective (OE) /(3)	Vocational Courses (3)	Discipline Specific Elective (DSE)(4)	Research/ Other Courses
I	Principles of Geomorphology	1. Introduction to Physical Geography/ 2. Fundamentals of Remote Sensing	Nil	Nil	
II	Introduction to Climatology	1. Human of Geography/ 2. Basics of Geographic Information Systems	Nil	Nil	
III	Fundamentals of Human Geography	1. Geography of India 2. Application of GIS & Remote Sensing	Nil	Nil	
IV	India: Resources and Sustainability	1. Geography of Karnataka 2. Population & Settlement Geography	Nil	Nil	
V	1.Population Resource & Dynamics	Nil	Nil	Nil	
VI	1.Environmental Geography	Nil	Nil	Nil	

B.A/B.Sc Semester 1

Title of the Course: Principles of Geomorphology

Code: GEOGDSC T1.1

Number of Theory Credits	Number of lecture hours/ semester	Number of practical Credits	Number of practical hours/ semesters
4	**52 or 56**	**2**	**52 or 56**

Course Outcomes:

1. After the completion of this course, students should be able to:
2. Define the field of Geomorphology and to explain the essential principles of it.
3. To outline the mechanism of dynamic nature of the Earth's surface and interior of theEarth.
4. To illustrate and explain the forces affecting the crust of the earth and its effect on it.
5. To understand the conceptual and dynamic aspects of landform development

Course Objectives:

This course aims to:

1. To define the concepts in Geomorphology and Physical Geography
2. To introduce various concept to understand cycles of the solid Earth surface
3. To understand the dynamic nature of the Earth's surface, various processes, and landforms.
4. To study the impact human on geomorphic system.

Content of Theory Course 1	52/56Hrs
Unit – 1 Geomorphology	13/14
Introduction to geography: physical and human geography Introduction to Geomorphology: meaning, nature, development, and scopePrinciples of Geomorphology Geological Time Scale Distribution of continents and oceans	
Unit – 2 Systems and Cycles of the Solid Earth	13/14
Internal structure of the earth Alfred Wegener's continental drift Theory of Isostacy: Views of Pratt and Airy Convectional current theory and concept of sea floor spreading Theory of Plate Tectonics: plate boundaries, subduction, Case Studies: Volcano, Earthquake: reporting of latest incidents Case Studies: Volcano, Earthquake: reporting of latest incidents	
Unit – 3 The Dynamics of Earth	13/14
Earth's Movements: Endogenetic and Exogenetic forces, Sudden and Diastrophic movements- Epeirogenetic and Orogenetic Movements-Process of folding and faulting Vulcanicity and earthquake Rocks: Characteristics, types, importance, and rock cycle Weathering: meaning, types and controlling factors Mass Movement: meaning, controlling factors, types-landslides, rock-falls	

Unit – 4 Evolution of Landforms	13/14
Evolution of Landforms Landforms: meaning, types and factors controlling landforms developmentSlope development: concept and types Concept of Cycle of Erosion–W.M. Davis and W. Penck Agents of Denudation: river; drainage patterns, groundwater, Sea waves, Windand Glaciers and resultant landforms. Application of geomorphology: in India and Karnataka (Regional planning, Urban planning and transportation, Mining, Hazard management, Agriculture and Environmental management).	

References

1. Ahmed E. (1985) Geomorphology, Kalyani Publishers, New Delhi.
2. Bloom A.L. (1978) Geomorphology: A Systematic Analysis of Late CenozoicLandforms Prentice – Hall of India, New Delhi.
3. Brunsden D. (1985) Geomorphology in the Service of Man: The Future ofGeography, Methnen, U.K.
4. Chorley, R.J., Schumm, S. A. and Sugden, D.E. 1984: Geomorphology, Methuen,London
5. Cooke, R.U. and Warren, 1973: Geomorphology in Deserts, Batsford, London
6. Dayal, P. 1996: Textbook of Geomorphology, Shukla Book Depot, Patna.
7. Goudar M B, Physical Geography (Kannada Version)
8. Goudie Anrew et.al. (1981) Geomorphological Techniques, George Allen &Unwin,London.
9. Homes A. (1965) Principles of Physical Geology, 3rd Edition, ELBSS Edn.
10. Hugar M R Physical Geography part 1(Kannada Version)
11. Kolhapure and S S Nanjan, Physical Geography (Kannada Version)
12. Nanjannavar S S: Physical Geography (Kannada Version)
13. P Mallappa, Physical Geography (Kannada Version)
14. Ranganath Principles of Physical Geography (Kannada Version)
15. Strahler A.N. (1968) The Earth Sciences, Harper & Row Intl. Edn, New York
16. Thornberry W.D. (1969) Principles of Geomorphology 2nd Edition, Wiley Intl. Edn. &Wiley, 1984.
17. Verstappen H. (1983) Applied Geomorphology, Geomorphological Surveys forEnvironmental Develop- ment, Elsevier, Amsterdam

Reference Websites

1. http://www.solarviews.com/eng/earth.htm
2. http://www.moorlandschool.co.uk/earth/tectonic.htm
3. https://www.usgs.gov/
4. https://www.ksndmc.org/

Pedagogy

Formative Assessment	
Assessment Occasion/type	**Weightage in Marks**
Case Studies	30%
Assignment	20%
CIA	50%
Total	100%

GEOGDSC P1.1 **Geomorphology Practical**

CREDIT:02

Content of Practical Course 1: List of Experiments to be conducted

Exercise-1: Identification of Rocks and Minerals. Mineral samples: Iron ore, Bauxite ore and Manganese. Rock Samples: Granite, Basalt, Lime Stones, Sandstone, quartzite, and marble.

Exercise-2: Extraction and interpretation of Geomorphic information from Topographicalmaps

Exercise-3: Preparation of contour map from toposheet, Construction of Relief Profiles-serial, Super imposed, Projected & Composite.

Exercise-4: Slope Analysis - Slope Maps (Wentworth method) Slope calculation and conversion (isotan and isosin) and aspect maps & Hypsometric curve and integral

Exercise-5: Drainage Morphometry: delineation of watershed, stream ordering and Morphometric analysis: mean stream length, drainage density and drainage frequency. **Field Work**: Measurement of channel cross-sections in the field, Geomorphic map of channel bed, Study of erosional and depositional features in the field.

Case Study: students must be taken to observe local land formation and degradation and write areport on their effectiveness.

B.A. / BSc Semester 1

Title of the Course: GEOGOE T1.1 - 1. Introduction to Physical Geography

Number of Theory Credits	Number of lecture hours/ semester
3	42 - 45

Course Outcomes:

1. Students will be able to understand the fundamental concepts in Earth Sciences
2. Understands basic terminology used to describe physical processes and landscapeforms.
3. Describe elements of the atmosphere and the oceans

Course Objectives:

This course aims to

1. Study basic principles of the Earth Sciences
2. Understand the landforms, atmospheric elements and structure and basics ofoceanography

Content of Theory Course 1	42/45Hrs
Unit – 1	11
Origin, Shape and Size of the Earth, Movement of the Earth- Rotation and Revolution, Effects of the movement of Earth,Coordinates -Latitude, Longitude and Time. Structure of the Earth,	
Unit – 2	11
Rocks - types,significance, Weathering – types. Agents of Denudation - River, Glacier, Wind and Under Ground water. Volcanicity, Earthquakes and Tsunamis	
Unit – 3	11
Structure and Composition of Atmosphere,Weather and Climate. Atmospheric Temperature, Heat Budget of the atmosphere Atmospheric Pressure, Winds and Precipitation	
Unit – 4	12
Distribution of Land and Sea, Submarine Relief of the Ocean, Temperature and Salinity of Sea Water. Ocean Tides, Waves and Deposits, Ocean currents - Atlantic, Pacific and IndianOceans. Marine Resources: Biotic, mineral and energy resources	

References

1. B.S. Negi (1993) Physical Geography. S.J. Publication, Meerut
2. D.S. Lal (1998) Climatology. Chaitnya publishing house, Allahabad
3. K. Siddhartha (2001) Atmosphere, Weather and Climate. Kisalaya publication, NewDelhi
4. R.N. Tikka (2002) Physical Geography. Kedarnath Ramnath & co, Meerut.
5. Willian D. Thornbury (1997) Principle of Geomorphology. New Age International (PvtLtd.) New Delhi.

Pedagogy

Formative Assessment	
Assessment Occasion/type	**Weightage in Marks**
Quiz	30%
Assignment	20%
CIA	50%
Total	100%

B.A. / BSc Semester 1

Title of the Course: OE 1.1.2 Fundamentals of Remote Sensing

Code: GEOGOE T1.1.2

Number of Theory Credits	**Number of lecture hours/ semester**
3	**42 - 45**

Course Outcomes:

1. This course is to make understand the basic concepts of Remote Sensing and toimpart necessary skills of remote sensing analysis, and image interpretation to thestudents. So that, students acquire employable skills in remote sensing.
2. Students will learn how to handle and process the satellite images for understandingof biophysical phenomena of the earth system.

Course Objectives:

1. To congregate the basic concepts and fundamentals of physical principles of remotesensing
2. To create a firm basis for successful integration of remote sensing in any field ofapplication.
3. To study basics of digital image processing and image interpretation techniques.
4. To study the applications of the remote sensing to solve the real-world problems.

Content of Theory Course 1	**52/56Hrs**
Unit – 1 Introduction	11
Definition of Remote Sensing, developmental stages, Laws of Physics, electromagnetic waves, spectrum, regions, wavelength, frequencies, and applications. Types-Satellites, Sensors, Payloads, Orbits, telemetry of satellites.	
Process and types of Remote Sensing	11
Process of remote sensing, interaction of radiation with atmosphere and targets, atmospheric noises, attenuation in radiance, resolutions of remote sensing, optical remote sensing, visible region of the spectrum, thermal remote sensing, microwaveremote sensing, Hyperspectral remote sensing, LiDAR, and other remote sensing Platforms.	

Unit – 3 Image Classification and Interpretation	11
Satellite products and its spectral characteristics, composite images, band ratios; Land use land cover classification schemes-Anderson and NRSC; Visual image interpretation, elements, stages of interpretation and interpretation keys. Image classification- supervised, unsupervised, and principal component analysis (PCA) and accuracy assessment.	
Unit – 4 Applications of Remote Sensing	12
Disaster Management, Meteorological Studies, Agricultural and Irrigation Studies, Forestry Studies, Hydrological Studies, Natural Resource, Oceanic and Coastal mapping, Soil resource mapping, Urban and Rural Mapping and Management.	

References

1. Image processing and GIS for remote sensing: techniques and applications; Second Edition (2016) - Liu, Jian-Guo, Mason, Philippa J
2. Introduction to Remote Sensing and Image Interpretation (2003); Lillesand T.M.
3. Introduction to Remote Sensing, Fifth Edition (2011); James B. Campbell, Randolph H.Wynne
4. Introductory Digital Image Processing: A Remote Sensing Perspective, Fourth Edition(2015) - John R. Jensen
5. Practical handbook of remote sensing, First Edition (2016) - Lavender, Andrew, Lavender, Samantha
6. Remote Sensing and GIS, Second Edition (2011), Bhatta, B.
7. Remote sensing and image interpretation (2015); Chipman, Jonathan W., Kiefer, Ralph W., Lillesand
8. Remote Sensing of the Environment: An Earth Resource Perspective (Prentice HallSeries in Geographic Information Science) - Second Edition (2006), John Jensen

1. https://onlinecourses.nptel.ac.in/noc19_ce41/preview

Pedagogy

Formative Assessment	
Assessment Occasion/type	**Weightage in Marks**
Quiz	30%
Assignment	20%
CIA	50%
Total	100%

B.A. / BSc Semester 2

Title of the Course: Introduction to Climatology

CODE: GEOGDSC T2.1

Number of Theory Credits	Number of lecture hours/ semester	Number of practical Credits	Number of practical hours/ semesters
4	52 or 56	2	52 or 56

Course Outcomes:

After the completion of this course, students should be able to

1. define the field of climatology and to understand the atmospheric composition and structure.
2. to outline the mechanism and process of solar radiation transfer to earth surface and toex- plain the temperature distribution and variation according to time and space.
3. to illustrate and explain the air pressure system, wind regulating forces and the formationof the Atmospheric Disturbance.
4. to understand and compute the air humidity as well as to explain the process of Condensation and formation of precipitation and its types.

Course Objectives:

This course aims to:

1. to define the field of climatology and components of the climate system
2. to introduce various dimensions of climatology like structure and composition.
3. to understand the global atmospheric pressure, temperature, and wind system.
4. to study the concept of atmospheric moisture and its types

Content of Theory Course 1	52/56Hrs
Unit – 1 Composition and Structure of the Atmosphere	14
Nature and Scope of Climatology, Atmospheric Sciences; Climatology and Meteorology Origin and structure of the Atmosphere: Troposphere, Stratosphere, Mesosphere, Ionosphere, Exosphere and their characteristics. Composition of the atmosphere Weather and Climate	
Unit – 2 Atmospheric Temperature	14
Insolation: Definition, Mechanism, Solar Constant. Factors affecting the Insolation: Angle of incidence, length of the day, Sunspots,Distance between the earth and the sun, effect of the atmosphere. Heating and cooling process of the atmosphere-Radiation, Conduction,convection, and advection. Temperature: meaning and Influencing Factors on the Distribution ofTemperature Distribution of the temperature: Vertical, Horizontal, and Inversion of temperature. Global Energy Budget: Incoming shortwave solar radiation, Outgoing Longwave Terrestrial radiation, Albedo. Net Radiation and Latitudinal Heat Balances.	
Unit – 3 Atmospheric Pressure and Winds	14

Atmospheric Pressure: Influencing factors on atmospheric pressure.Vertical and Horizontal Distribution of the atmospheric pressure and Pressure Belts, Pressure Gradient. Tri-cellular-Hadley, Ferrel's and Polar Cells. Winds: influencing factors, Types - planetary, seasonal, local wind Variable winds-Cyclones and anti-cyclones. Air-Masses and Fronts: Definition, Nature, Source Regions, Classification.	
Unit – 4 Atmospheric Moisture	14
Humidity: Sources, influencing factors and types-Absolute, Relative and Specific. Hydrological cycle: process of evaporation, condensation. Clouds and its types Precipitation and its forms. Climate Change: Causes and consequences, recent issues-floods, drought,	

References

1. Lal, D. S. (1998). Climatology. Allahabad: Chaitanya Publishing House.
2. P Mallappa, Physical Geography (Kannada Version)
3. Ranganath Principles of Physical Geography (Kannada Version)
4. Nanjannavar S S: Physical Geography (Kannada Version)
5. Hugar M R Physical Geography part 1(Kannada Version)
6. Goudar M B, Physical Geography (Kannada Version)
7. Kolhapure and S S Nanjan, Physical Geography (Kannada Version)
8. Lutgens, Frederic K. & Tarbuck, Edward J. (2010). The Atmosphere: An Introductionto Meteorology. New Jersey: Pearson Prentice Hall.
9. Oliver, John E. & Hidore, John J. (2003). Climatology: An Atmospheric Science.Delhi: Pearson Education.
10. Singh, S. (2005). Climatology. Allahabad: Prayag Pustak Bhawan.
11. Barry, R.G. and Chorley, R.J. (2003): Atmosphere, Weather and Climate; Psychology Press, Hove; East Sussex.
12. Critchfield, H.J., (1975): general Climatology, Prentice Hall, New Jersey.
13. Mather,J.R.(1974): Climatology: Fundamentals and Applications; Mc Craw Hill BookCo., U.S.A.
14. Rumney, G.R. (1968): Climatology and the World Climates, Macmillan, London.
15. Trewartha, G.T. (1980): An Introduction to Climate; McGraw Hill, New York, 5thedition, (International Student Edition)

Reference Websites

1. https://earthobservatory.nasa.gov/
2. https://mausam.imd.gov.in/
3. https://www.weatheronline.in/
4. https://earthexplorer.usgs.gov/
5. https://www.nhc.noaa.gov/satellite.php

Pedagogy

Formative Assessment	
Assessment Occasion/type	**Weightage in Marks**
Quiz	30%
Assignment	20%
CIA	50%
Total	100%

GEOGDSC P2.1- **Climatology Practical CREDITS: 2**

Content of Practical Course 1: List of Experiments to be conducted

Conduct all exercises with Goal, Procedure, devices, and findings.

Exercise 1: Understanding Structure and functions of the Indian Meteorological Department (IMD).

Exercise 2: Collection of climatic data from IMD website.

https://mausam.imd.gov.in/bengaluru/

Exercise 3: Plotting of downloaded climatic data using graphical methods-

Elementary Instrumental Observation:

Exercise 4: Centigrade and Fahrenheit thermometer for measuring temperature.

Exercise 5: Mercurial Barometer and Aneroid Barometer for measuring atmosphericpressure

Exercise 6: Wind Vane and cup-anemometer.

Exercise 7: Wet and Dry bulb thermometer for measuring humidity

Exercise 8: Rainguage- Dial type for measuring rainfall Exercise 3: Rainfall Trend Analysis.

Exercise 9: Interpretation of Indian Daily Weather charts.

Exercise 10: Deriving water balance chart, Actual and potential evapotranspiration

Note: Students are expected to download weather charts of the four seasons.

B.A. / BSc Semester 2

Title of the Course: 1 Introduction to Human Geography
CODE: GEOGOE T2.1.1

Number of Theory Credits	Number of lecture hours/ semester
3	42 - 45

Course Outcomes:

1. Students will learn how human, physical, and environmental components of theworld interact.
2. Students will be familiarized with economic processes such as globalization, tradeand their impacts on economic, cultural and social activities.
3. The student will describe what geography and human geography are.
4. Understand population dynamics and migration.

Course Objectives:

This course aims to

1. Understand the basics concepts of human geography
2. Study population attributes and dynamic nature of it
3. Introduce economic, cultural, and trade activities and their impact on thedevelopment of the region

Content of Theory Course 1	45Hrs
Unit – 1 Introduction to Human Geography	11
Nature and scope, Development Environmental Determinism and Possiblism, Neo determinism (stop and godeterminism) Approaches to human geography: Exploration and Descriptive approach, regionalanalysis Approach, Areal Differentiation Approach, Spatial organization Approach.Modern approaches: Welfare or Humanistic Approach, Radical Approach, Behavioral Approach, Post Modernism in geography Fields and sub fields in Human geography	
Unit – 2 Geographical Analysis of Population	11
Distribution and Growth of Population Density of population: meaning and Types: Arithmetic Density and PhysiologicalDensity. Regional distribution of Density of Population. Population Movement: Migration, Raventein's Law of Migration, Factors of population Migration, Economic Push and Pull factors, Cultural Push and Pull Factors, Environmental Push and Pull Factors. Migration Types: Immigration and Emigration, Internal and International Migration	
Unit – 3 Cultural Patterns and Processes	11
Concept of Culture, Material and Non material culture Cultural Regions, cultural Traits and Complexes, cultural Hearths, cultural Diffusion. Languages of the World: Types, Classification and Distribution. Religions: Types and Classification. Distribution. Universalizing Religions: Christianity, Islam, Buddhism. Ethnic Religions: Hinduism, the Chinese religion, Shintoism, Judaism. The Major tribal population of the world.	

Unit – 4 Human Economic Activities, Development and Settlements	12
Primary Economic Activities – Agriculture, Types: Primitive Subsistence, Intensive subsistence, Plantation Agriculture, Extensive Commercial grain cultivation, MixedFarming, Dairy Farming Secondary Activities: Manufacturing, classification – based on size – Small Scale and Large scale. Based on Raw material – Argo-based, Mineral based,Chemical Based and Forest based. Industrial Regions of the world. Tertiary Activities: Types: Trade and commerce, Retail Trading services, Wholesaletrading. Transport and communications: Factors, communication services – Telecommunication. Services: Informal and Non formal sector. Information technology and service. Human Settlements: Factors, Classification, Types and Patterns: Rural, Urban. Compact or Nucleated and Dispersed settlements. Rural settlement Patterns: linear,rectangular, circular, star shaped, T shaped.	

References

1. Hartshorne, T. A., & Alexander, J. W. (2010). Economic Geography. New Delhi: PHI Learning.
2. Knox, P., Agnew, J., & McCarthy, L. (2008). The Geography of the World Economy. London: Hodder Arnold.
3. Lloyd, P., & Dicken, B. (1972). Location in Space: A Theoretical Approach to Economic Geography. New York: Harper and Row.
4. Siddhartha, K. (2000). Economic Geography: Theories, Process and Patterns, NewDelhi: Kisalaya Publications.
5. Smith, D. M. (1971). Industrial Location: An Economic Geographical Analysis, NewYork: John Wiley and Sons.

Pedagogy

Formative Assessment	
Assessment Occasion/type	**Weightage in Marks**
Quiz	30%
Assignment	20%
CIA	50%
Total	100%

B.A. / BSc Semester 2

Title of the Course: 2. Basics of Geographic Information Systems (GIS)
CODE: GEOGOE T2.1.2

Number of Theory Credits	**Number of lecture hours/ semester**
3	**39 or 42**

Course Outcomes:

1. Students are trained to adapt the theoretical concepts in a practical way through the mathematical models of geography.
2. Students will have the hands-on training on various modes of spatial and non-spatialdata collection, data storage, data analytics, data interpretation and data display through the thematic maps.
3. Students are exposed on spatial thinking to solve the geographical problems withrange of proven mathematical and statistical models.
4. Students can employ in various corporate and government organisation where theydeal to solve geographical problems.

Course Objectives:

This course aims to:

1. Understand the concept and techniques of the Geographic Information Systems.
2. Define the GIS data types and structures.
3. Study geo processing and visualization concepts and techniques in GIS.

Content of Theory Course 1	**52/56Hrs**
Unit – 1 Introduction	10
Emergence of GI Science, Milestone and Developmental stages in GIS, Definition, scope, role of GIS in digital world; Components, functionalities, merits and demerits, global market, interdisciplinary domains, and its integration with GIS.	
Unit – 2 Geodesy and Spatial Mathematics	10
Cartesian coordinates, latitude, longitudes, formats of angular units, geographical coordinates, Datum: WGS84, vs NAD32. UTM, Aerial Distance measurement using Geographic and projected coordinates, Area, Perimeter, length by coordinates andvarious international measures.	
Unit – 3 GIS Data and Scale	10
Spatial Data and its structures; sources and types of data collection; data errors, topology of data and relationship. Large Scale vs Small Scale, generalization; precision and accuracy of data-logical consistency and non-spatial data integration	
Unit – 4 Geoprocessing and Visualization	12
Spatial and Non-Spatial Queries, proximity analysis, Preparation of Terrain andSurface models. Hotspot and density mapping. Types of maps, thematic maps and Its types, relief maps, flow maps and cartograms. Tabulations: Graphs and Pivottables	

References

1. An Introduction to Geographical Information Systems - Ian Heywood (2011)
2. Geographic Information Systems and Cartographic Modelling - Tomlin, C.D. (1990)
3. Geographic Information Systems and Environmental Modelling - Clarke, C., K. (2002)
4. Geographic Information Systems and Science - Paul A. Longley, et. al. (2015)
5. Geographic Information Systems: A Management Perspective - Aronoff, S. (1989)
6. GIS - Fundamentals, Applications, and Implementations - Elangovan, K. (2006)
7. Introduction to Geographical Information Systems - Chang, Kang-Tsung (2015)
8. Mathematical Modeling in Geographical Information System, Global PositioningSystem and Digital Cartography - Sharma, H.S. (2006)
9. Remote Sensing and GIS - Bhatta, B. (2011)
10. Spatial analysis and Location-Allocation Models - Ghosh, A. and G. Rushton (1987)

Reference Websites

1. IIRS MOOC programme: https://isat.iirs.gov.in/mooc.php
2. ITC Netherlands, Principles of GIS https://webapps.itc.utwente.nl/librarywww/papers_2009/general/principlesgis.pdf
3. Geographical Information Systems: Principles, Techniques, Management and Applications https://www.geos.ed.ac.uk/~gisteac/gis_book_abridged/

Pedagogy

Formative Assessment	
Assessment Occasion/type	**Weightage in Marks**
Quiz	30%
Assignment	20%
CIA	50%
Total	100%

University of Mysore

B.A. / B.Sc. (Geography) Degree

(Basic / Honours)

Scheme & Syllabus - NEP-2020Second Year

Semester	Course code	Course title	Teaching hours	Hours / week	Examination Pattern- Max & min marks/ paper		Duration of Examination in Hrs	Total Marks	Credits
					Exam	IA			
III	DSC T 3.1	Fundamentals of Human Geography	56	4	60	40	2	100	4
	DSC P 3.1	Fundamental Techniques in Human Geography	56	4	25	25	2	50	2
	OE 3.1	Geography of India	42	3	60	40	2	100	3
	OE 3.2	Application of GIS and Remote sensing	42	3	60	40	2	100	3

semester	Course code	Course title	Teaching hours	Hours / week	Examination Pattern- Max & min marks/ paper		Duration of Examination in Hrs	Total Marks	Credits
					Exam	IA			
IV	DSC T 4.1	India: Resources and Sustainability	56	4	60	40	2	100	4
	DSC P 4.1	Representation of Indian Geographical features and resources.	56	4	25	25	2	50	2
	OE 4.1	Geography of Karnataka	42	3	60	40	2	100	3
	OE 4.2	Population and settlement Geography	42	3	60	40	2	100	3

B.A. / B.Sc. honors Programme

Semester III

Title of the Course: Fundamentals of Human Geography **CODE:** DSC T 3.1

Number of Theory Credits	Number of lecture hours/semester
4	56

Course Outcomes:

1. Students will earn Basic concepts, approaches and development of Human Geography.
2. Learn how human interact with environmental components of the world and also learn how human beings and environment mutually influences one another.
3. Students will be familiarized with cultural and economic processes at different scales such as globalization, trade, cultural and social activities.
4. The student will be able differentiate between geography and human geography.
5. Understand population dynamics and human settlements.

Course Objectives:

This course aims to

1. Understand the basics concepts and approaches of human geography
2. Study the nature and distribution of cultural elements and their process and to appraise the mutual interaction between People and places.
3. To examine the population attributes and dynamic nature of them.
4. To study different types of economic activities and their adaptation with the environment and their impact on the development of the regions.

Module –1: Introduction to Human Geography	14
Nature and scope, Development and Branches of Human Geography, Themes in Geography: Location, Place, Human-Environment Interaction, Movementand Region. Man- Environment Relation: Environmental Determinism and Possiblism, Neo-Determinism (stop and go determinism) Approaches to Human geography: Exploration and Descriptive Approach, Regional Approach,Areal Differentiation Approach, Spatial organization Approach. Modern Approaches: Welfare or Humanistic Approach, Radical Approach, Behavioral Approach, Post Modernism in geography.	
Module –2: Cultural patterns and Processes	14
Concept of culture, Material and Non-material Culture, Cultural traits and Cultural regions. Meaning and Definition of races, Classification of races, Main characteristics (traits) and Broadracial groups of the world and their distribution. Languages: Classification and Distribution of languages. Religion: Types, Classification, and Distribution of religions: Hinduism, Christianity, Islam andBuddhism. **Assignment:** Each student is expected to prepare a brief report on the cultural composition of their own locality/ place/ village/ ward/town or neighborhoods through field investigation and also can use published data.	

Module –3: Population and Settlements	14
Distribution and Growth of Population; Factors affecting population Distribution. Density of Population: Meaning and Types; Arithmetic Density, Physiological Density andAgricultural density, Regional Distribution of Density of Population; Carrying capacity and Sustainability, Concept of Settlements, Origin and evolution of Human settlements, Factors of settlements, originand distribution, types and pattern of settlements, Rural and Urban settlements, Trends and Patterns of World Urbanization. **Field Activity:** Students should study and identify the factors influencing on the origin and growth of the settlement and each student is expected to identify patterns of settlements by visiting nearest settlement. The students are advised to carry topographical map of the place during field visit.	
Module–4: Economic Activities	14
Concept and Classification of Economic activities; Factors affecting Economic Activities. Primary Economic Activities – Agriculture, Types: Primitive Subsistence, Intensive Subsistence, Plantation Agriculture, Extensive Commercial grain Cultivation, Mixed Farming,Dairy Farming. Secondary Activities: Manufacturing, Classification – 1. Based on size – Small Scale and Largescale.2. Based on Raw Material – Agro-based, Mineral based, Chemical Based and Forest based. Industrial Regions of the world. Tertiary Activities: Types: Trade and Commerce, Retail Trading Services, Wholesale Trading.Transport and communications: Factors, Communication Services – Telecommunication. Services:Informal and Non formal sector. Information technology and service. **Case Study:** Students have to visit a village/a town nearby and observe the economic activities and understand different classes and identify the most dominant economic activities..	

References

1) De Blij H. J.,Alexander B Murphy, Erin H Fouberg, (2006) Human Geography: people, Place and culture, Abe books Published by Wiley ISBN 10: 0471679518 / ISBN 13: 9780471679516
2) Sarah Bendarz, Mark Bockenhauer, Fredrik Hiebert, 2020, Human Geography: A Spatial Perspective;.NatlGeographics School Pub Inc.
3) Majid Hussein 2018 Human Geography, Rawat Publication (Fifth Edition)
4) David Dorrell, Josesph Henderson, Todd Lindley and Georgeta Cannor (2019) Introduction to Human Geography, University System of Georgia, https://ung.edu/university-press/books/introduction-to-human-geography.php
5) Hartshorne,T.A., & Alexander,J.W.(2010).Economic Geography. New Delhi: PHI Learning.
6) Nellson, Gabler Vining (1995) Human Geography, People, Cultures and Landscapes
7) Ranganath (2002) Principles of Human Geography (Kannada Version) Vidyanidhi, Gadag
8) Rubenstein J.M (2016). An Introduction to Human Geography, Macmillan Publishing Company, New York
9) Knox,P.,Agnew,J.,&McCarthy,L.(2008).The Geography of the World Economy.London: HodderArnold.
10) Lloyd,P.,&Dicken,B.(1972).Location in Space: A Theoretical Approach to Economic

Geography. NewYork: Harper and Row.
11) Siddhartha,K.(2000).Economic Geography: Theories, Process and Patterns, NewDelhi: Kisalaya Publications.
12) Smith,D.M.(1971).Industrial Location: An Economic Geographical Analysis, New York: John Wiley and Sons.

B.A./ B.Sc. honors Programme

Semester III

Title of the Course: Fundamental Techniques in Human Geography, CODE: DSC P 3.1

Number of Theory Credits	Number of lecture hours / semester
2	56

Course Outcomes:

1. Students will learn the geographical concepts such as scale, map, projections, distance, direction, and learn how these features are used in map production and area visualization.
2. Studentswillbefamiliarizedwith different methods of computing population growth, understanding the techniques of nearest neighbor analysis.
3. Thestudentwillbe able understand the factors affecting settlement development and economic activities therein.

CourseObjectives:

This course aims to

1. Understand the application of the cartography in mapping of population
2. Study population growth models
3. Introduce how economic, cultural, and trade activities impact on the development of the settlement

Content of the Practical Course		
Exercise 1	**Maps:** Definition, Elements of map: scale, direction, map projection, conventional signs and symbols, legend, Types of map: **1. Based on scale**: A. large scale: cadastral maps, Topographic maps, B. Small scale: wall maps, atlas maps, maps 2. **Based on purpose and content**: Physical Maps, Political Maps,Thematic Maps. Uses of Maps.	08
Exercise 2	**Map Scales:** Definition of Scale, Methods of representing Scales: Statement Method, Graphical Method, Ratio Method (R F).	08
Exercise 3	**Conversion of Scale**: Verbal to RF, RF to Verbal, Verbal to Graphical. Exercises on Measuring Distances on Map and converting map distance to ground distance.	08
Exercise 4 and 5	**Map Projections:** Meaning and Purpose, Latitudes and Longitudes, Classification of Map Projections and their general properties: Conical Projections, Cylindrical Projections, Zenithal Projections. UTM Projections. Choice of Map Projection.	08
Exercise 6	Drawing of conical projection with One Std. Parallel and Two Std. Parallels,	08

Exercise 7	Drawing of Cylindrical Equal Area Projection.	06
Exercise 8	Drawing of Zenithal Polar Gnomonic Projection.	06
Exercise 9	Introduction to UTM Projection, uses and importance.	4

References:

1. Dr.L.R.Singh (2010), Fundamentals Of Practical Geography, Sharda Pustak Bhavan, Allahabad, India.
2. Pijushkanti Saha, Partha Basu (2013) Advanced Practical Geography
3. Ashis Sarkar (2015) Practical Geography: A Systematic Approach, Orient Black swan Pvt Ltd.
4. Rana Pb Singh Rl Singh(2018), Elements of Practical Geography. Kalyani Publishers
5. Dent B.D., 1999. Cartography: Thematic Map Design, (Vol. 1), McGraw Hill
6. Gupta K.K and Tyagi V.C., 1992. Working with Maps, Survey of India, DST, New Delhi.
7. Mishra R.P. and Ramesh A., 1989. Fundamentals of Cartography, Concept Publishing.
8. Monk house, F.J. and Wilkinson, H.R., 1971. Maps and Diagrams. Methuen and Co. Ltd., London. K.
9. Singh, R.L., 2005. Elements of Practical Geography. Kalyani Publishers, New Delhi. India.

B.A. /B.Sc. Honors Programme

III Semester (Open Elective)

Title of the Paper: Geography of India **Code:OE3.1**

Number of Theory Credits	Number of lecture hours / semester
3	42

Course Outcomes:

1. This is intended to ensure the Students of other discipline to gain geographical knowledge about India.
2. Prepare them to think geographically about our nation and to enhance the pride of our Nation.

Course Objectives:

After the completion of this course the Students are expected to

1. Have an understanding of the Physical, ecological, economic, demographic and cultural characteristics of our nation.
2. By that they can apply geographical knowledge and skills in deeper understanding of the Core Subjects.

Module	Content	Hours
Module -1 Physical Bases		12
	Location, Size and Extent, Political Divisions Relief Features-Northern Mountains, Northern Great Plain,The Peninsular Plateau and Coastal Plain and Islands Climate: Seasons – Summer Season, South-West Monsoon,Retreating Monsoon Season, Winter Season, Drainage system- Rivers of North India, Rivers of SouthIndia, Vegetation - Types and Distribution- Afforestation programs	
Module – 2 Irrigation and Agriculture		10
	Irrigation: Need for Irrigation and Types Agriculture: Significance and Types- Intensive and ExtensiveFarming, Subsistence and Mixed Farming Major Crops- Production and Distribution : Rice, Wheat Cotton ,Sugar cane and Tea Development of Agriculture- Green Revolution	
Module - 3 Minerals, Power and Industries		10
	Mineral and Power Resources-Types and Significance Production and Distribution: Iron Ore, Manganese Production and Distribution: Coal, Petroleum, Hydro Electricity Major industries- Iron and Steel, Cotton textile, Sugar. Major industrial regions of India Special Economic Zones	
Module -4 Transport, Communication and Human Population		10
	Roadways, Railways, Airways Waterways. Important Ports: Calcutta, Chennai, Mumbai and New Mangalore. Indian Space Programme. Growth of Population Distribution and Density of Population Population Composition – Sex Ratio, Literacy Problems of Population	
	Total	42

References:

1. Gopal Singh : Geography of India, Atmarama and Sons, New Delhi.
2. Hussain M,2014, Geography of India, Tata McGraw-Hill Education- New Delhi
3. ICAR: Cropping pattern in India,1974.
4. Mathur,S.M.: Physical Geology of India, NBT1991.
5. Ranganath : Regional and economic Geography of India (Kan.Ver) VidyanidhiPrakashana, Gadag,2020.
6. Mallppa P : Economic Geography of India (Kan. Ver.) K V Lalitha Publishers

7. Ranjit Thirtha, 1996, Geography of India, Raniat, Jaipur.
8. Khullar D.R.2000, India a Comprehensive Geography ,Kalyani Publishers,Ludhiana.
9. Sharma T C,2012, Economic Geography of India, Rawath Publications, Delhi
10. Tiwari R.C 2006, Geography of India, Prayag Pustak Bhawan, Allahabad,
11. Pritivish Nag &Smita Sengupta, 1992, Geography of India, Concept Publishing Company, New Delhi.
12. Ranganatha, 2007, Geography of India, Vidhyanidhi Prakashan, Station Road, Gadag-01.
13. Phani Deka &Abani Bhaga bati,1992, Geography: Economic and Regional, Wiley Eastern Limited,AnsariRaod, Daryaganj, N. Delhi-01.

Websites:

1. http://www.mapsofindia.com/geography/
2. https://agricoop.nic.in/en
3. https://www.resourcedata.org/dataset/rgi-ministry-of-minerals-energy-and-water-resources
4. https://dpiit.gov.in/
5. http://rfrfoundation.org/nadi-ko-jano/
6. https://jalshakti-ddws.gov.in/

B.A. /B.Sc. Honors Programme

III Semester (Open Elective)

Title of the course: Application of GIS and Remote sensing **OE.3.2 Credits: 3**

Number of Theory Credits	Number of lecture hours / semester
3	42

Course Outcomes:

1. This is intended to ensure the Students of other discipline should understand fundamentals of remote sensing and Geographical Information system.
2. prepare them to think geographically and Apply this knowledge to their respective field of enquiry for spatial and other kinds of planning.

Course Objectives:

After the completion of this course the Students are expected to

1. Have an understanding of the Geo-spatial tools and their significance and utilization.
2. Utilize different tools and techniques of remote sensing and GIS for addressing various problems which are both natural and societal in nature.
3. By that they can apply geographical knowledge and skills in deeper understanding of the Core Subjects.

Module	Content	Hours
Module - 1	Remote Sensing; Concept, Definition, Evolution of Remote Sensing, Process of Remote sensing, EMR; Wave length, Frequency, Electromagnetic Spectrum; Bands, Atmospheric window, Interaction of EMR with atmosphere and surface. Spectral signature.	12
Module - 2	Remote Sensing Platforms, Orbit, Active and Passive Remote Sensing, Indian remote sensing satellites and launch vehicle's,	10

	Application of Remote Sensing in Agriculture, Disaster management, Urban studies, Coastal management and EIA.	
Module - 3	Geographic information System; Definition, Development of GIS, Components of GIS, Data types; Spatial and Non-spatial data, Raster and Vector data models, Data Sources, errors, Data input methods; Manual and Automated.	10
Module 4	Data Analysis; Buffer Analysis and its applications, Overlay functions, Query, Network Analysis, GIS Applications in urban monitoring & planning, Disaster Mitigation, Forestry, Wetland monitoring.	10

References:

1. Lilles and Thomas M. & Kiefer Ralph: Remote Sensing and Image Interpretation Third Edition John Wiley
2. Campbell John B.: Introduction to Remote Sensing Taylor &Francis
3. Floyd F. Sabins : Remote Sensing and Principles and Image Interpretation
4. Manual of Remote Sensing: American Society of Photogrammetry and Remote Sensing.
5. George Joseph: Fundamentals of Remote Sensing; Universities Press India Pvt Ltd, Hyderabad, India
6. Editors: John D. Bossler; John R. Jensen; Robert B. McMaster; Chris Rizos, 2001. Manual of Geospatial Science and Technology, November 2001, Vol 1 Part 1andII.
7. Paul M. Mather, 1999. Computer Processing of Remotely sensed Images: An Introduction. John Wiley
8. Aronoff, S. (1991). Geographic Information Systems: A Management Perspective, WDL Publications, Ottawa, Canada.
9. Chang, Kang-Tsung (2006). Introduction to geographic information systems. Boston: McGraw-Hill Higher Education.
10. Longley, P. A., Goodchild, M. F., Maguire, D. J., &Rhind, D. W. (2005). Geographic information systems and science. John Wiley & Sons.
11. Bernhardsen, T. (2002). Geographic information systems: an introduction. John Wiley & Sons.
12. Ian Heywood, Sarah Cornelius and Steve Carver (2010). An introduction to geographical information systems. Prentice Hall - Pearson Education limited.
13. Chang, Kang-tsung (2002). Introduction to Geographic Information Systems, McGraw-Hill Companies, Inc
14. Chrisman, N. (1997): Exploring Geographic Information systems, John Wiley & Sons., New York
15. The ESRI Guide to GIS Analysis, by Andy Mitchell, ESRI Press, 1999, 188 pp.

B.A./B.Sc. honors programme

Semester IV

Title of the Course: India- Resources and Sustainability **CODE:** DSC 4.1

Number of Theory Credits	Number of lecture hours / semester
4	56

Course Outcomes:

1. Students will learn about the physical setting of India.
2. Students will be familiarized with the water and Agricultural Resources of India and they will understand the importance of these resources in the national development and prosperity.
3. The student will be able understand the factors affecting, location and distribution of Industries and different modes of Transport.

Course Objectives:

This course aims to

1. Understand the physical setting of India.
2. Study water and agricultural resources of India.
3. Study the nature of transport and communication, Industries and population growth.
4. Introduce how economic, cultural, and trade activities impact on the development

Module -1	**Physical Setting**:	14
	Location, Size and Extent. Major Physiographic Regions - Northern Mountains, Northern Great Plains, Peninsular Plateau and Coastal Plains and Islands) and their Characteristics; Climate: Seasonal Weather Characteristics, Climatic Zones. Mechanism and Characteristics of Indian Monsoons. Tropical Cyclones and Western Disturbances. Floods and Droughts Drainage System. Soil: Types, Erosion and Conservation. Vegetation: Types, Distribution, Afforestation programs, National Parks, Wildlife Sanctuaries, and Biosphere reserves.	
Module -2	**Water and Agricultural Resources**:	14
	Water resources of India, Surface and Groundwater, Water Demandand Utilization. Irrigation: Sources, Types and Intensity. Issues and Challenges: Water Resources Scarcity, Water Conservation and Management. Watershed Management, Rainwater Harvesting, Recycle and Reuse of water. Interlinking of Rivers, National Water Policies, National Water Mission, Jalashakti	

	Abhiyaan. Command Area Development and Water Management. Central Water Commission and Water Tribunal and their role. 2.5 Agriculture: Land Use and Cropping Pattern – Meaning and Concepts, Land Use and Cropping Patten in India, Agro-climatic Regions, Green Revolution – Causes and Effects, Hunger Index and Malnutrition; Food security and right to food to achieve Zero hunger and Good Health and Wellbeing..	
Module -3 Industries, Transportation and Communication:		14
	Locational factors of industries, Major Industrial Regions and their characteristics, Classification of Industries: Agro-based, Mineral-based, Forest-basedand Animal-based industries. Special Economic Zones: Industrial / Economic Corridor. Transport & Communication: Significance, Growth and Development – Road ways, Railways, Waterways, Airways and Pipeline Networks and their Complementary and Competition. Communication: Means of Communication and their Significance **Assignment:** Selecting a region students have to study the locational factors nearby industry and prepare a report.	
Module -4 Human Resources:		14
	Growth, Distribution and Density of Population. Composition of Population: Age, Sex, Rural-Urban PopulationComposition. Migration: Meaning, Factors, Types, Causes and Consequences. Human Development in India: Measures, Levels of Developmentbased on HDI **Field Study**: Selecting a region / district students have to examine the levels of Human Development using HDI and prepare a report.	

References:

1. Majid Husain (2020) Geography of India, McGraw Hill Publishers
2. R.C. Tiwari (2016) Geography of India, Provolika Publications, Allahabad
3. D.R.Khullar (2019) India: A Comprehensive Geography ,Kalyani Publishers
4. R.L.Singh (1993) India: A Regional Geography, National Geographical Society of India, New Delhi.
5. Dr Deep Shikha (2016) Geography of India - A Text Book;
6. AlkaGautam (2009) Geography of India, Sharada pustak bhawan, University Road, Allahabad – UP.
7. Sharma TC &Coutinho O (2005) : Economic and Commercial geography of India, Vikas Publishing House ltd., New Delhi-14
8. Pritivish Nag & Smita Sengupta (1992) Geography of India, Concept Publishing Company, New Delhi.
9. Ranganath (2007) Geography of India, Vidhyanidhi Prakashan, Station Road, Gadag-01

Websites:

1. http://www.mapsofindia.com/geography/
2. https://mausam.imd.gov.in/

3. https://tourism.gov.in/
4. https://www.resourcedata.org/dataset/rgi-ministry-of-minerals-energy-and-water-resources
5. https://dpiit.gov.in/
6. https://agricoop.nic.in/en
7. https://www.fao.org/soils-portal/en/

B.A./B.Sc. honors Programme

Semester IV

Title of the Course: Representation of Indian Geographical features and Resources.
Code: DSC P-4.1

Number of Theory Credits	Number of lecture hours / semester
2	56

Course Outcomes:

After the completion of this course, students should be able to

1. Understand holistically about the geography of India and plotting resources on Indian outline map.
2. Interpret and apply the concepts on resource distribution of India and related economic activities
3. Demonstrate the economic development through the connectivity of transport and communication.

Course Objectives:

This course aims to

1. Understand the basics geographical setting of India
2. Study physiographic divisions with drainage, soil and vegetation of India.
3. Gets exact information regarding mechanism of monsoon and its impact.

Content of the Practical Course		
Ex.No.1	Mapping exercises on Indian outline Map: International Boundaries, Mountain peaks, Passes, Glaciers and important Physical Divisions of India, Rivers, National Biospheres and National Parks, Dams and Reservoirs, Lakes and Water Bodies, Islands, National Waterways, Ports and Harbours, National High ways, Important Airports, Industrial Corridors, Important Coastal Zones and Beaches, Ecologically Sensitive areas, Important industrial zones, Special Economic Zones, Resource centres and Mining, Cultural Regions, Tribal Areas. **Note:** Each student is expected to complete at least 3 mapping exercises from the above topics which should cover brief description on: Location (Latitude and longitude, state, district, place,) geographic/environmental/ ecological/ political/ economic significance of the place/ location. Minimum 10 locations shall be involved in each exercise.	10
Ex.no.2 and 3,	Mapping Temperature and Rainfall Distribution of India / Karnataka using Isopleth method.	10
Ex.no.4 and 5	Mapping of Agro-climatic zones of India, Flood Prone and Drought Prone Areas,	8

Ex. No.6 and 7	Mapping of Cropping Pattern and Crop intensity of India/ Karnataka. Weaver's Method, Bhatia's Method. Calculation and mapping of Irrigation intensity.	10
Ex.no.8	Human Development Index: Concept, Calculation and Mapping	6
Ex.no.9	Gender Development Index: Concept, Calculation and Mapping	6
Ex.no.10	Human Poverty Index: Concept and Calculation and Mapping	6

Reference:

1) Hartshorne,T.A.,&Alexander,J.W.(2010).EconomicGeography.NewDelhi:PHILearning.
2) Knox,P.,Agnew,J.,&Mc Carthy, L.(2008).The Geography of the World Economy. London: Hodder Arnold.
3) Lloyd,P.,&Dicken,B.(1972).LocationinSpace:ATheoreticalApproachtoEconomicGeography. New York: Harper and Row.
4) Siddhartha,K.(2000).EconomicGeography:Theories,ProcessandPatterns,NewDelhi:KisalayaPublications.
5) Smith,D.M.(1971).Industrial Location: An Economic Geographical Analysis, New York: John Wiley and Sons.

B.A. / B.Sc. Honors Programme

Semester IV (Open Elective)

Title of the Course : GEOGRAPHY OF KARNATAKA **Code: OE.4.1 Credits:3**

Number of Theory Credits	Number of lecture hours / semester
3	42

CourseOutcomes:

After the completion of this course, students should be able to

1. Understand the physical, economic and socio-demographic aspects of Karnataka state in a broader sense.
2. Understand the resource base of the state i.e., forests, soils, minerals, water and climate, and its impact on the socio-demographic and economic development of different regions of Karnataka in terms of agriculture, industries, transportation and other fields of human activities.
3. Understand the development of irrigational projects and industrial projects and special Economic zones (SEZ's)

Course Objectives:

This course aims to

1. Understand the site and situation of Karnataka
2. Intellectual connect to the resources and economic activities of Karnataka
3. Assess demographic composition of Karnataka state

Module	Content	Hours
Module -1	**Physical Background**	12
	Location, size and Administrative divisions. Physiographic Divisions: Coastal Regions, Malnad Regions and Maidan Regions. Weather and Climate: Seasons, Distribution of Rainfall and Temperature, Climatic regions, Drought prone areas in Karnataka. Drainage Systems: Major Drainage Systems in Karnataka. East flowing rivers and West flowing rivers. Natural Vegetation: Types of vegetation, Distribution offorests in Karnataka, Protection and Conservations. Reserve Forests and Protected Forests in Karnataka, National Parks and Bird Sanctuaries in Karnataka.	
Module -2 Soil, irrigation and Agriculture:		10
	Soil: Types and Distribution, Regional Issues of Soil Quality and Management. Water Resources: Distribution of Water Resources, Irrigation –Sources of irrigation, Multipurpose River Valley Projects. River Water Disputes with the neighbouring states. Agriculture regions of Karnataka. Major Food Crops – Paddy,Ragi, Maize, Pulses. Commercial Corps – Cotton, Sugarcane, Tobacco, Coffee, Spices, Livestock and Fishing. **Assignment**: Students need to visit local fields and get to knowhow soil conservation plans are prepared and submit report	
Module - 3 **Minerals, Energy and Manufacturing:**		10
	Major Mineral resources of Karnataka and their Regionalization. Iron ore, Manganese, Gold, Bauxite Energy Resources: Types and their Distributions. Conventional and Non-Conventional Sources. Industries: Textile Industries, Iron and Steel Industries, Sugar Industries. Industrial Regions and Special Economic Zones of Karnataka.,	
Module – 4 Transport, Information &Communication Technology and Population		10
	Transportation: Types of Transportation, Distribution of Transportation. Growth and Distribution of Information Technology in Karnataka. **Population** Growth, Distribution and Density of Population. Population Composition – Sex Ratio, Literacy. Human Development in Karnataka (HDI)	

Reference:

1. Ranganath (2015), Geography of Karnataka, Publisher: Mysore Book House

2. S.S.Nanjannavar (2016), Geography of Karnataka, Prabhu publications
3. R. N. Tikka (2002),Physical Geography
4. MisraR.P(1969) Geography of Mysore State
5. SarmahDipak (2019), Forest of Karnataka-A Paronomic View, Notion Press
6. Director, Census Reports Published by Govt. of Karnataka
7. Karnataka State Gazetteer Volume- I & II

Websites:

1. https://ksrsac.karnataka.gov.in/
2. https://ksdma.karnataka.gov.in/english
3. https://raitamitra.karnataka.gov.in/english
4. https://www.karnatakatourism.org/tourism-department/

BA/BSc Honors Programme

Semester IV (Open Elective)

Title of the course: Population and Settlement Geography **Code: OE.4.2 Credits: 3**

Number of Theory Credits	Number of lecture hours / semester
3	42

Course Outcomes:

After the completion of this course, students should be able to

1. Understand the concepts of both Population and Settlement geography.
2. Appreciate the man environment interplay which are expressed in different kinds and patterns in the distribution and density of population and Human settlements over space.
3. Understand the Demographic dynamics like birth, Death and Migration of Population and its relation with settlement dynamics like settlement size, types and rural urban settlements and its issues.

Course Objectives:

This course aims to

1. Introduce the basic concepts of Population Geography to the students.
2. Introduce the basic concepts of Settlement Geography to the students.
3. Bring the significance of Environment and society on Population dynamics and Mobility.
4. Critically examine the nature of man-environment relation and interaction with reference to human settlement types and patterns.

Module	Content	Hours
Module -1	**Population Geography -**	12
	Meaning, Definitions, Scope and nature of populationgeography Global Population size and growth, Malthus Theory,Demographic Transition Theory Over, Under and Optimum Population Population Policies in the world – Social Well being,Quality of Life	

Module -2	**Population Dynamics**	10
	Fertility – Measures and Distribution Mortality – Measures and Distribution Migration – Types, Causes and Consequences	
Module -3	**Settlement Geography**	10
	Meaning, Definitions, nature and importance of settlementgeography, Origin of settlement, influencing factors Site and situation of settlement – Stable and Unstable settlement	
Module -4	**Classification of Settlements- Rural and Urban Settlements**	10
	Rural Settlement – Types, Pattern, Functions Rural-Urban Continuum and Fringe Urban Settlement - Definition of urban place, Hierarchy, Functional classification of towns, Concept of Urban morphology. Primate City, Rank Size Rule	

References:

1. Alan Bowman and Andrew Wilson (2011), Settlement, Urbanization, and Population, Oxford UniversityPress, UK.
2. Chandna R.C (2011), Geography of Population, Kalyani publishers, Bangalore.
3. Izzi Howell (2019), Population and Settlement Geography (Geographics), Franklin Watts, UK.
4. John Pallister (2004), GCSE Geography: Human - Population and Settlement, Hodder Education Group,UK.
5. Majid Husain (2011) Human Geography, Rawat Publication, Jaipur.
6. Prithvish Nag, Debnath (2021), Population Geography, BharatiPrakashan, Bangalore.
7. Rama Yagya Singh (1994), Geography of Settlement, Rawat Publications, Jaipur
8. Sumita Ghosh (1998), Introduction to Settlement Geography, Orient Longman, Hyderabad.

DEPARTMENT OF GEOGRAPHY

MODEL QUESTION PAPER

B.A GEOGRAPHY

(For I, II, III, IV, V AND VI semesters)

Time: 2 Hours **Max. Marks: 60**

Part-A

I. Answer any FOUR of the following questions
4x3=12

1)… ……

2)……

3)……

4)……

5)……

6)……

Part-B

II. Answer any THREE of the following questions
3x6=18

7)……

8)……

9)……

10)……

11)……

Part –C

III. Answer any THREE of the following questions
3x10=30

12)……

13)……

14)……

15)……

……

JSS COLLEGE OF ARTS, COMMERCE AND SCIENCE
(AUTONOMOUS)
B.N. ROAD, MYSURU-570025

DEPARTMENT OF GEOGRAPHY

Revised Syllabus for Undergraduate (UG)
CBCS scheme - 2017-18

JSS COLLEGE OF ARTS, COMMERCE AND SCIENCE, OOTY

ROAD, MYSURU-25 DEPARTMENT OF GEOGRAPHY

PROFORMA OF INSTRUCTIONS AND EXAMINATION FOR BA PROGRAMME IN

GEOGRAPHY (CBCS) DURATION OF THE COURSE: 3YEARS (6 SEMESTER)

PROGRAMME: BA EG PROGRAMME CODE: BA11 (2017-18)

Year	SEM	Course code & Core course	Title of the paper	L + P hours per week	L:T:P	Total Credit	Total hours		Percentage			Maximum Marks in exam/Assessment			Exam Duration	
							Th	Pr	Th	Pr	IA	Th	Pr	IA	Th	Pr
I BA	I	**DLA23011** DSC-I :Theory	Physical Geography	4	04:00:02	**6**	60	60	50	20	30	70	70	30	3h	3h
		DLA23311 DSC-I: Pract-I	Contour diagrams and meteorological instruments	4												
	II	**DLB23011** DSC-II: Theory	Human Geography	4	04:00:02	**6**	60	60	50	20	30	70	70	30	3h	3h
		DLB23311 DSC-II: Pract-II	Interpretation of Topographical Maps and Indian Daily Weather Maps	4												
II BA	III	**DLC23011** DSC-III:Theory	General Cartography	4	04:00:02	**6**	60	60	50	20	30	70	70	30	3h	3h
		DLC23311 DSC-III:PractIII	Map Projection	4												
	IV	**DLD23011** DSC-IV: Theory	Environmental Geography	4	04:00:02	**6**	60	60	50	20	30	70	70	30	3h	3h
		DLD23311 DSC-IV:PractIV	Statistical Methods in Geography	4												

III BA	V		**Choose any one**	4												
		DSE-V: Theory														
		DLE23011(A)/	DSE- A: Geography of India		04:00:02	**6**	60	60	50	20	30	70	70	30	3h	3h
		DLE23011(B)	DSE- B: Economic Geography													
		DLE23711 DSE- V:Pract-V	Fundamentals of GIS	4												
		SEC	**Choose any one**													
		DLE23211(A)/	SEC-A : Regional Planning and Development													
		DLE23211 (B)	SEC-B: Remote Sensing and GPS Based Project Report	4	04:00:00	**4**	60	-	70	-	30	70	-	30	3h	--
		GE 1 **DLE23411**	Regional Geography of India	4												
		DLE23711 GE-1 V:Pract-I	Computer Mapping	4	04:00:02	**6**	60	60	50	20	30	70	70	30	3h	3h
	VI	Theory	**Choose any one**	4												
		DSE-VI:														
		DLF23011(A)/	DSE- A: Disaster Management		04:00:02	**6**	60	60	50	20	30	70	70	30	3h	3h
		DLF23011(B)	DSE -B :Geography of Tourism													
		DLF23711 DSE-VI:PractVI	Computer Mapping and GPS Surveying	4												
		SEC	**Choose any one**	4												
		DLF23211(A)/	SEC-A : GIS Based Project Report													
		DLF23211(B)	SEC-B: Field Techniques and Survey Based Project Report		04:00:00	**4**	60	-	70	-	30	70	-	30	3h	--
		GE-2 **DLF23411**	Regional Geography of India	4												
		DLF23711 GE-2 VI:Pract-I	Computer Mapping	4	04:00:02	**6**	60	60	50	20	30	70	70	30	3h	3h
				56												

JSS COLLEGE OF ARTS, COMMERCE AND SCIENCE, OOTY

ROAD, MYSURU-25 DEPARTMENT OF GEOGRAPHY

PROFORMA OF INSTRUCTIONS AND EXAMINATION FOR BA PROGRAMME IN

GEOGRAPHY (CBCS) DURATION OF THE COURSE: 3YEARS (6 SEMESTER)

PROGRAMME: BA KG PROGRAMME CODE:BA13 (2017-18)

Year	Sem	Course code & Core course	Title of the paper	L + P hours per week	L:T:P	Total Credit	Total hours		Percentage			Maximum Marks in exam/Assessment			Exam Duration	
							Th	Pr	Th	Pr	IA	Th	Pr	IA	Th	Pr
I BA	I	**DLA23013** DSC-I :Theory	Physical Geography	4	04:00:02	**6**	60	60	50	20	30	70	70	30	3h	3h
		DLA23313 DSC-I: Pract-I	Contour diagrams and meteorological instruments	4												
	II	**DLB23013** DSC-II: Theory	Human Geography	4	04:00:02	**6**	60	60	50	20	30	70	70	30	3h	3h
		DLB23313 DSC-II: Pract-II	Interpretation of Topographical Maps and Indian Daily Weather Maps	4												
II BA	III	**DLC23013** DSC-III:Theory	General Cartography	4	04:00:02	**6**	60	60	50	20	30	70	70	30	3h	3h
		DLC23313 DSC-III:PractIII	Map Projection	4												
	IV	**DLD23013** DSC-IV: Theory	Environmental Geography	4	04:00:02	**6**	60	60	50	20	30	70	70	30	3h	3h
		DLD23313 DSC-IV:PractIV	Statistical Methods in Geography	4												

III BA	V		**Choose any one**	4													
		DSE-V: Theory															
		DLE23013(A)/	DSE- A: Geography of India		04:00:02	**6**	60	60	50	20	30	70	70	30	3h	3h
		DLE23013(B)	DSE- B: Economic Geography														
		DLE23713 DSE- V:Pract-V	Fundamentals of GIS	4													
		SEC	**Choose any one**														
		DLE23213(A)/	SEC-A : Regional Planning and Development														
		DLE23213 (B)	SEC-B: Remote Sensing and GPS Based Project Report	4	04:00:00	**4**	60	-	70	-	30	70	-	30	3h	--
		GE 1	Regional Geography of India	4													
		DLE23413															
		DLE23713 GE-1 V:Pract-I	Computer Mapping	4	04:00:02	**6**	60	60	50	20	30	70	70	30	3h	3h
		Theory	**Choose any one**	4													
		DSE-VI:															
		DLF23013(A)/	DSE- A: Disaster Management		04:00:02	**6**	60	60	50	20	30	70	70	30	3h	3h
		DLF23013(B)	DSE -B :Geography of Tourism														
		DLF23713	Computer Mapping and GPS Surveying	4													
	VI	DSE-VI:PractVI															
		SEC	**Choose any one**	4													
		DLF23213(A)/	SEC-A : GIS Based Project Report														
		DLF23213(B)	SEC-B: Field Techniques and Survey Based Project Report		04:00:00	**4**	60	-	70	-	30	70	-	30	3h	--
		GE-2	Regional Geography of India	4													
		DLF23413															
		DLF23713 GE-2 VI:Pract-I	Computer Mapping	4	04:00:02	**6**	60	60	50	20	30	70	70	30	3h	3h
				56													

Programme Outcome

After completing the graduation in B A (EG) the students are able to:

PO1. Explain, graph, and analyze key economics models

PO2. Understand current events and evaluate specific policy proposals

PO3. To address problem that do not have clear economic solutions

PO4. Develop critical and quantitative thinking skills

PO5. Communicate effectively in written, oral and graphical form about specific issues

PO6. Apply economic analysis to everyday problems in real world situations

PO7. Understand and appreciate relationship between man and Environment

PO8. Read, interpret, and generate maps and other geographic representations

PO9. To extract, analyze, and present information from a spatial perspective

PO10. Understand physical-geographic processes, global distribution of Landforms and ecosystems

PO11. The role of physical environment on human population

PO12. Develop the ethical aptitudes and dispositions necessary to acquire and hold Leadership positions in industry, government, and professional organizations

Programme Outcome

After completing the graduation in B A (KG) the students will:

PO1. Develop human values and a sense of social service

PO2. Become a responsible and dutiful citizen.

PO3 Abel to enhance critical temper and creative ability

PO4. Understand and appreciate relationship between man and Environment.

PO5. Read, interpret, and generate maps and other geographic representations

PO6. Understand physical- geographic processes, the global distribution of landforms and Ecosystems

PO7.Role of the physical environment on human populations

Programme Specific Outcome

On Completion of BA (EG) students will:

PSO1. Understand theoretical and practical aspects of Economics and Geography

PSO2. Evaluate Economic behavior inconsonance with Geographical factors

PSO3. Suggest the policy makers about desirable changes to be made in Micro and Macro

Economic issues based on geographical factors

PSO4. Gain ability to understand the economic problems in Geographical indicators

PSO5. Able to offer palatable solutions for economic and geographical challenges

PSO6. Attain Proficiency to analyze the economic decision of Government and non-Govt.

Entities that correlate with Geographical factors

PSO7. Gain requisite knowledge to evaluate land use pattern and demographical profile

PSO8. Apply GIS for understanding Market situation, Transport problem change in

Weather Condition, Cropping Pattern, and Natural Calamities and so on

Programme Specific Outcome

On Completion of BA (KG) students will:

PSO 1: Know more specific terminologies along with its etymology

PSO2: Know the changes in the differences in formation of society and their culture

PSO3: Help to understand different races, Society, and culture.

PSO4 Understand the relationship between man and environment

PSO6. Understand in simple language environmental problems their cause, Effect and Remedies.

PSO7. Help the students to pursue higher studies and even in research

PSO8 Helpful for competitive examinations

PSO9. Students may help to guide agricultural activities, fertility of soils, their characteristics,

Climatic condition, in regional language

DLE23011 (A) / DLE23013 (A)

V – SEMSETER

Geography V: GEOGRAPHY OF INDIA

Course outcome

CO 1. Deliberate in depth physical stinting of India

CO 2.Write down in details with examples Irrigation system of India

CO 3. Identify in depth population study of India

CO 4. Learn in depth resources base study of India

CO 5. Identify the characteristics of economic study of India

UNIT	No. of Hours
1. Location, size and extent of India – Relief features- Drainage system – Climate	15
2. Irrigation – Types, multipurpose river valley projects – DVC, Bhakra- Nangal, Alamatti	10
3. Population – Size and Growth since 1901, Population Density and Distribution, Literacy, Sex Ratio.	10
4. Resource Base –Livestock (cattle & fisheries),Power (Coal,& hydroelectricity) Minerals (iron ore and bauxite).	10
5. Economy – Agriculture (Rice, Wheat, Sugarcane, Tea, Cotton); Industries (Cotton Textile, Iron-Steel, Automobile), Transportation Modes (Road and Rail).	15

References:

1. Hussain M., 1992: G*eography of India*, Tata McGraw Hill Education.
2. Mamoria C. B., 1980: *Economic and Commercial* G*eography of India*, Shiva Lal Agarwala.
3. Miller F. P., Vandome A. F. and McBrewster J., 2009: *Geography of India: Indo-Gangetic Plain, Thar Desert, Major Rivers of India, Climate of India and Geology of India* - Alphascript Publishing.
4. Nag P. and Sengupta S., 1992: G*eography of India*, Concept Publishing.
5 Pichamuthu C. S., 1967: *Physical Geography of India*, National Book Trust.
6 Sharma T. C. and Coutinho O., 1997: *Economic and Commercial* G*eography of India*, Vikas Publishing.
7. Singh Gopal, 1976: *A* G*eography of India*, Atma Ram.
8. Spate O. H. K. and Learmonth A. T. A., 1967: *India and Pakistan: A General and Regional Geography*,

DLE23011 (B) / DLE23013 (B)

V–SEMSTER

GEOGRAPHY V: ECONOMIC GEOGRAPHY

Course outcome

CO 1. Identify the classification and characteristics of concepts of economic geography

CO 2. Understand the characteristics of locational theories

CO 3 .Understand in depth study of primary activities

CO 4. Learn the details of study of secondary activities

CO 5. Write down in details with examples study of tertiary and quaternary activities

UNIT	No. of Hours
1. Definition, Approaches and Fundamental Concepts of Economic Geography; Patterns of Development.	12
2. Locational Theories – Agriculture (Von Thunen) and Industrial (Weber).	12
3. Primary Activities – Intensive Subsistence Farming, Commercial Grain Farming, Plantation, Commercial Dairy Farming, Commercial Fishing, and Mining (iron ore, coal and petroleum).	12
4. Secondary Activities – Cotton Textile Industry, Petro-Chemical Industry, Major Manufacturing Regions.	12
5. Tertiary and Quaternary Activities – Modes of Transportation, Patterns of International Trade, and Information and Communication Technology Industry.	12

Reading List

1. Alexander J. W., 1963: *Economic Geography*, Prentice-Hall Inc., Englewood Cliffs, New Jersey.
2. Bagchi-Sen S. and Smith H. L., 2006: *Economic Geography: Past, Present and Future*, Taylor and Francis.
3. Coe N. M., Kelly P. F. and Yeung H. W., 2007: *Economic Geography: A Contemporary Introduction*, Wiley-Blackwell.
4. Combes P., Mayer T. and Thisse J. F., 2008: *Economic Geography: The Integration of Regions and Nations*, Princeton University Press.
5. Durand L., 1961: *Economic Geography*, Crowell.
6. Hodder B. W. and Lee R., 1974: *Economic Geography*, Taylor and Francis.
7. Wheeler J. O., 1998: *Economic Geography*, Wiley.
8. Willington D. E., 2008: *Economic Geography*, Husband Pres

DLE23711 / DLE23713

V– SEMESTER
Practical V: FUNDAMENTALS OF G.I.S

UNIT			No. of Hours
1	a)	Meaning, definitions, components and importance of GIS	20
	b)	Spatial entities – Point, line and polygon Sources of spatial data- Census, Topographical Maps, Aerial Photographs and Satellite Imageries	
2	a)	Spatial Data Structure Raster and vector data Structures Linking spatial and non spatial data	20
	b)	Introduction to MapInfo software	
3	a)	Geo – referencing , Choice of map projection – Digitization, Attaching attribute data (Creating data base), Editing, Map layout, Thematic map	20

References:

1. Burrough P.A. : Geographical Information Systems for Land Resources
2. Maguire D. J. : Computers in Geography
3. Star J. C and J.E. : Geographic Information Systems
4. Internet : GIS. Development
5. Heywood : Introduction to GIS, 2002.
6. Mahesh : Introduction to GSI Shivalingappa Chandrashekar :

DLE23211 (A) / DLE23213 (A)

V – SEMSETER

Geography VI: REGIONAL PLANNING AND DEVELOPMENT

Course outcome

CO 1. Deliberate the details of concept of regional planning and development

CO 2. Write down in details with application, if applicable, characteristics and delineation of planning region

CO 3. Write down the characteristics of regionalization of India for planning

CO 4. Deliberate the details of models for regional planning

CO 5. Learn in depth backward regions and regional plans

UNIT	No. of Hours
1. Concept, Need and Types of Regional Planning.	8
2. Characteristics and Delineation of Planning Region.	10
3. Regionalization of India for Planning (Agro Ecological Zones).	12
4. Models for Regional Planning: Growth Pole Theory; Core Periphery Model and Growth Foci Concept in Indian Context	
5 Backward Regions and Regional Plans- Special Area Development Plans in India; DVC-The Success Story and the Failures; NITI Aayog.	15

References:

1. Blij H. J. De, 1971: Geography: Regions and Concepts, John Wiley and Sons.
2. Claval P.l, 1998: An Introduction to Regional Geography, Blackwell Publishers, Oxford and Massachusetts.
3. Friedmann J. and Alonso W. (1975): Regional Policy - Readings in Theory and Applications, MIT Press, Massachusetts.
4. Gore C. G., 1984: Regions in Question: Space, Development Theory and Regional Policy, Methuen, London.
5. Gore C. G., Köhler G., Reich U-P. and Ziesemer T., 1996: Questioning Development; Essays on the Theory, Policies and Practice of Development Intervention, Metropolis- Verlag, Marburg.
6. Haynes J., 2008: Development Studies, Polity Short Introduction Series.
7. Johnson E. A. J., 1970: The Organization of Space in Developing Countries, MIT Press,
8. Peet R., 1999: Theories of Development, The Guilford Press, New York
9. UNDP 2001-04: Human Development Report, Oxford University Press
10. World Bank 2001-05: World Development Report, Oxford University Press, New

DLE23211 (B) / DLE23213 (B)

V – SEMESTER

Geography VI: REMOTE SENSING AND GPS BASED PROJECT REPORT

Course Outcome

CO 1. Understand the characteristics of concept of remote sensing

CO 2. Identify in details with examples study of aerial photography

CO 3. Specify the details of principals of remote sensing satellites

CO 4. Write down the classification and characteristics of interpretation and application of remote sensing

CO 5. Deliberate in details with application, if applicable, study of global positing system

UNIT	No. of Hours
1. Remote Sensing: Definition, Development, Platforms and Types.	12
2. Aerial Photography: Principles, Types and Geometry.	12
3. Satellite Remote Sensing: Principles, EMR Interaction with Atmosphere and Earth Surface; Satellites (Land sat and IRS) and Sensors.	12
4. Interpretation and Application of Remote Sensing: Land use/ Land Cover.	12
5. Global Positioning System (GPS) – Principles and Uses	12

Practical Record: A project file consisting of five exercises will be done from aerial photos, satellite images (scale, orientation and interpretation) and GPS field survey.

Reading List

1. Campbell J. B., 2007: Introduction to Remote Sensing, Guildford Press.
2. Jensen J. R., 2004: Introductory Digital Image Processing: A Remote Sensing Perspective, Prentice Hall.
3. Joseph, G. 2005: Fundamentals of Remote Sensing, United Press India.
4. Lillesand T. M., Kiefer R. W. and Chipman J. W., 2004: Remote Sensing and Image Interpretation, Wiley. (Wiley Student Edition).
5. Nag P. and Kudra, M., 1998: Digital Remote Sensing, Concept, New Delhi.
6. Rees W. G., 2001: Physical Principles of Remote Sensing, Cambridge University Press.
7. Singh R. B. and Murai S., 1998: Space-informatics for Sustainable Development, Oxford and IBH Pub.
8. Wolf P. R. and Dewitt B. A., 2000: Elements of Photogrammetry: With Applications in GIS, McGraw-Hill.

DLE23411

GENERIC ELECTIVES - I
V – SEMESTER
GEOGRAPHY V: REGIONAL GEOGRAPHY OF INDIA

Course outcome

CO 1.Identify the characteristics of size and extent of India

CO 2. Understand the classification and characteristics of multipurpose river

CO 3.Identify the classification and characteristics of Population density and distribution

CO 4. Learn in details with examples power resources of India

CO 5. Specify the characteristics of Transportation modes

UNITS	No. of Hours
1. Location, size and extent of India – Relief features- Drainage system – Climate	15
2. Irrigation – Types, multipurpose river valley projects – DVC, Bhakra- Nangal, Alamatti	10
3. Population – Size and Growth since 1901, Population Density and Distribution, Literacy, Sex Ratio.	10
4. Resource Base –Livestock (cattle & fisheries),Power (Coal,& hydroelectricity) Minerals (iron ore and bauxite).	10
5. Economy – Agriculture (Rice, Wheat, Sugarcane, Tea, Cotton); Industries (Cotton Textile, Iron-Steel, Automobile), Transportation Modes (Road and Rail).	15

Reference:

1. Hussain M., 1992: Geography of India, Tata McGraw Hill Education.
2. Mamoria C. B., 1980: Economic and Commercial Geography of India, Shiva Lal Agarwala.
3. Miller F. P., Vandome A. F. and McBrewster J., 2009: Geography of India: Indo- Gangetic Plain,
Thar Desert, Major Rivers of India, Climate of India, Geology of India, Alphascript Publishing
4. Nag P. and Sengupta S., 1992: Geography of India, Concept Publishing
Pichamuthu C. S., 1967: Physical Geography of India, National Book Trust.
5 Sharma T. C. and Coutinho O., 1997: Economic and Commercial Geography of India, Vikas Publishing.
6 Singh Gopal, 1976: A Geography of India, Atma Ram.
7 Spate O. H. K. and Learmonth A. T. A., 1967: India and Pakistan: A General and Regional Geography,

DLE23711

GENERIC ELECTIVES - I

V – SEMESTER

PRACTICAL V: COMPUTER MAPPING

UNIT		No. of Hours
1.	Introduction to Computer : Generation of Computers, Hardware and Software Components	20
2.	Computer graphics : Creating Data base in computer, creation of Line, Bar and Pie diagrams. Thematic Maps - Choro chromatic and Schematic Maps	20
3.	GPS - Meaning, Function and its applications.	10
4.	Tour report / Factory visit	10

References:

1. Singh L.R. : Fundamentals of Practical Geography, Sharadha Pustaka Bhavan, Alahabad, 2006
2. Dr. M.A. Siddaqui : Introduction to Geographical Information System, Sharadha Pustaka Bhavan, Alahabad, 2006
3. Chang : Introduction to GIS, Tata McGraw Hill W, New Delhi.

DLF23011 (A) / DLF23013 (A)

VI – Semester
Geography VI: DISASTER MANAGEMENT

Course Outcome

CO 1. Identify in details with application, if applicable, hazards and disasters concepts

CO 2. Specify the characteristics of flood, landslide, drought are in India

CO 3. Write down in details with examples earthquake tsunami and cyclone are in India

CO 4. Identify the classification and characteristics of human induced disasters

CO 5. Learn in details with examples response and mitigation to disaster

UNIT	No. of Hours
1. Hazards, Risk, Vulnerability and Disasters: Definition and Concepts.	12
2. Disasters in India: (a) Causes, Impact, Distribution and Mapping: Flood, Landslide, Drought.	12
3. Disasters in India: (b) Causes, Impact, Distribution and Mapping: Earthquake, Tsunami and Cyclone.	12
4. Human induced disasters: Causes, Impact, Distribution and Mapping.	12
5. Response and Mitigation to Disasters: Mitigation and Preparedness, NDMA and NIDM; Indigenous Knowledge and Community-Based Disaster Management; Do's and Don'ts During Disasters	12

Reading List

1. Government of India. (1997) Vulnerability Atlas of India. New Delhi, Building Materials & Technology Promotion Council, Ministry of Urban Development, Government of India.
2. Kapur, A. (2010) Vulnerable India: A Geographical Study of Disasters, Sage Publication, New Delhi.
3. Modh, S. (2010) Managing Natural Disaster: Hydrological, Marine and Geological Disasters, Macmillan, Delhi.
4. Singh, R.B. (2005) Risk Assessment and Vulnerability Analysis, IGNOU, New Delhi. Chapter 1, 2 and 3
5. Singh, R. B. (ed.), (2006) Natural Hazards and Disaster Management: Vulnerability and Mitigation, Rawat Publications, New Delhi.
6. Sinha, A. (2001). Disaster Management: Lessons Drawn and Strategies for Future, New United Press, New Delhi.
7. Stoltman, J.P. et al. (2004) International Perspectives on Natural Disasters, Kluwer Academic Publications. Dordrecht.
8. Singh Jagbir (2007) "Disaster Management Future Challenges and Oppurtunities", 2007. Publisher- I.K. International Pvt. Ltd. S-25, Green Park Extension, Uphaar Cinema Market, New Delhi, India (www.ikbooks.com).

DLF23011 (B) / DLF23013 (B)

VI – SEMESTER
Geography VI: GEOGRAPHY OF TOURISM

Course outcome

CO 1. Learn in depth geography of tourism concepts

CO 2. Specify in details with examples types of tourism

CO 3. Learn in details with application, if applicable, recent trends of tourism

CO 4. Identify in details with application, if applicable, impact of tourism

CO 5. Understand the details of tourism in India

UNIT	No. of Hours
1. Origin, Development and significance of Tourism – factors influencing on tourism	10
1. Type of Tourism: Nature Tourism, Cultural Tourism, Medical Tourism, Pilgrimage	15
2. Recent Trends of Tourism: International and Regional; Domestic (India); Eco- Tourism, Sustainable Tourism, Meetings, Incentives, Conventions And Exhibitions (MICE), Carrying capacity of Tourism	15
3. Impact of Tourism: Economy; Environment; Society	10
4. Tourism in India: Tourism Infrastructure; Case Studies of Himalaya, Desert and Coastal and Heritage; National Tourism Policy	10

Reference:

1. Dhar, P.N. (2006) International Tourism: Emerging Challenges and Future Prospects. Kanishka, New Delhi.
2. Hall, M. and Stephen, P. (2006) Geography of Tourism and Recreation – Environment, Place and Space, Routledge, London.
3. Kamra, K. K. and Chand, M. (2007) Basics of Tourism: Theory, Operation and Practise, Kanishka Publishers, Pune.
4. Page, S. J. (2011) Tourism Management: An Introduction, Butterworth-Heinemann- USA.
5. Raj, R. and Nigel, D. (2007) Morpeth Religious Tourism and Pilgrimage Festivals Management: An International perspective by, CABI, Cambridge, USA, www.cabi.org.
6. Tourism Recreation and Research Journal, Center for Tourism Research and Development, Lucknow
7. Singh Jagbir (2014) "Eco-Tourism" Published by - I.K. International Pvt. Ltd. S-25, Green Park Extension, Uphaar Cinema Market, New Delhi, India(www.ikbooks.com).

DLF23711 / DLF23713

VI – SEMESTER
Practical VI: COMPUTER MAPPING AND GPS SURVEYING

UNIT		No. of Hours
1.	Introduction to Computer : Generation of Computers, Hardware and Software Components	20
2.	Computer graphics : Creating Data base in computer, creation of Line, Bar and Pie diagrams. Thematic Maps - Choro chromatic and Schematic Maps	20
3.	GPS Surveying: Concepts, Segments and applications, plotting way Points by using map source software.	20
4.	Tour report / Factory visit	

References:

1. Singh L.R. : Fundamentals of Practical Geography, Sharadha Pustaka Bhavan, Alahabad, 2006
2. Dr. M.A. Siddaqui : Introduction to Geographical Information System, Sharadha Pustaka Bhavan, Alahabad, 2006
3. Chang : Introduction to GIS, Tata McGraw Hill W, New Delhi.

DLF23211 (A) / DLF23213 (A)

VI – SEMESTER

Geography VI: GIS BASED PROJECT REPORT

Course Outcome

CO 1. Identify the characteristics of study of GIS
CO 2. Specify in depth GIS data structures
CO 3. Write down in depth GIS data analysis
CO 4. Deliberate in details with examples Application of GIS in Land use
CO 5. Identify the classification and characteristics of Application of GIS in Urban and Forest monitoring

UNIT	No. of Hours
1. Geographical Information System (GIS): Definition and Components.	12
2. GIS Data Structures: Types (spatial and Non-spatial), Raster And Vector Data Structure.	12
3. GIS Data Analysis: Input; Geo-Referencing; Editing and Output; Overlays.	12
4. Application of GIS in Land Use/Land Cover Mapping.	12
5. Application of GIS in Urban Sprawl and Forests Monitoring	12

Practical Record: A project file consisting of 5 exercises on using any GIS Software on above mentioned themes.

Reference:

1. Bhatta, B. (2010) Analysis of Urban Growth and Sprawl from Remote Sensing, Springer, Berlin Heidelberg.41
2. Burrough, P.A., and McDonnell, R.A. (2000) Principles of Geographical Information System-Spatial Information System and Geo-statistics. Oxford University Press
3. Chauniyal, D.D. (2010) Sudur Samvedan evam Bhogolik Suchana Pranali, Sharda Pustak Bhawan, Allahabad
4. Heywoods, I., Cornelius, S and Carver, S. (2006) An Introduction to Geographical Infromation system. Prentice Hall.
5. Jha, M.M. and Singh, R.B. (2008) Land Use: Reflection on Spatial Informatics Agriculture and Development, New Delhi: Concept.
6. Nag, P. (2008) Introduction to GIS, Concept India, New Delhi.
7. Sarkar, A. (2015) Practical geography: A systematic approach. Orient Black Swan Private Ltd., New Delhi
8. Singh, R.B. and Murai, S. (1998) Space Informatics for Sustainable Development, Oxford and IBH, New Delhi.

DLF23211 (B) / DLF23213 (B)

VI – SEMESTER

Geography VI: FIELD TECHNIQUES AND SURVEY BASED PROJECT REPORT

Course outcome

CO 1. Understand the characteristics of field techniques
CO 2. Deliberate in details with application, if applicable, case study rural and urban
CO 3. Specify in details with examples field work in Geographical studies
CO 4. Understand in details with examples preparation of questionnaires
CO 5. Learn the details of designing the field report

UNIT **No. of Hours**

1. Field Work in Geographical Studies – Role, Value and Ethics of Field-Work 10
2. Defining the Field and Identifying the Case Study – Rural /Urban /Physical /Human / Environmental. 10
3. Field Techniques – Merits, Demerits and Selection of the Appropriate Technique; Observation (Participant / Non Participant). 12
4. Questionnaires (Open/ Closed / Structured / Non-Structured); Interview with 16
   Special Focus on Focused Group Discussions; Space Survey (Transects and Quadrants, Constructing a Sketch).
5. Designing the Field Report – Aims and Objectives, Methodology, Analysis, Interpretation and Writing the Report. 12

Practical Record

1. Each student will prepare an individual report based on primary and secondary data collected during field work.
2. The duration of the field work should not exceed 10 days.
3. The word count of the report should be about **8000 to 12,000** excluding figures, tables, photographs, maps, references and appendices.
4. One copy of the report on A 4 size paper should be submitted in soft binding.

References:

1. Creswell J., 1994: *Research Design:* Qualitative and Quantitative Approaches Sage Publications.
2. Dikshit, R. D. 2003. The Art and Science of Geography: Integrated Readings. Prentice-Hall of India, New Delhi.
3. Evans M., 1988: "Participant Observation: The Researcher as Research Tool" in *Qualitative* Methods in Human Geography, eds. J. Eyles and D. Smith, Polity.
4. Mukherjee, Neela 1993. Participatory Rural Appraisal: Methodology and Application.

Concept
Publs. Co., New Delhi.
5 Mukherjee, Neela 2002. Participatory Learning and Action: with 100 Field Methods. Concept Publs. Co.,
New Delhi
6. Robinson A., 1998: "*Thinking Straight and Writing That Way*", in *Writing Empirical Research*
Reports: A Basic Guide for Students of the Social and Behavioral Sciences, eds. by F. Pryczak and R. Bruce Pryczak, Publishing: Los Angeles.
7. Special Issue on "Doing Fieldwork" *The Geographical Review* 91:1-2 (2001).
8. Stoddard R. H., 1982: *Field Techniques and Research Methods in Geography*, Kendall/Hunt.

DLF23411

GENERIC ELECTIVES II
VI – SEMESTER
Geography VI: REGIONAL GEOGRAPHY OF INDIA

Course outcome

CO 1. Identify the characteristics of size and extent of India

CO 2. Understand the classification and characteristics of multipurpose river

CO 3. Identify the classification and characteristics of Population density and distribution

CO 4. Learn in details with examples power resources of India

CO 5. Specify the characteristics of Transportation modes

UNITS	No. of Hours
1. Location, size and extent of India – Relief features- Drainage system – Climate	15
2. Irrigation – Types, multipurpose river valley projects – DVC, Bhakra- Nangal, Alamatti	10
3. Population – Size and Growth since 1901, Population Density and Distribution, Literacy, Sex Ratio.	10
4. Resource Base –Livestock (cattle & fisheries),Power (Coal,& hydroelectricity) Minerals (iron ore and bauxite).	10
5. Economy – Agriculture (Rice, Wheat, Sugarcane, Tea, Cotton); Industries (Cotton Textile, Iron-Steel, Automobile), Transportation Modes (Road and Rail).	15

Reference:

1. Hussain M., 1992: G*eography of India*, Tata McGraw Hill Education.
2. Mamoria C. B., 1980: *Economic and Commercial* G*eography of India*, Shiva Lal Agarwala.
3. Miller F. P., Vandome A. F. and McBrewster J., 2009: *Geography of India: Indo- Gangetic Plain,*
Thar Desert, Major Rivers of India, Climate of India, Geology of India, Alphascript Publishing
4. Nag P. and Sengupta S., 1992: G*eography of India*, Concept Publishing
Pichamuthu C. S., 1967: *Physical Geography of India*, National Book Trust.
7 Sharma T. C. and Coutinho O., 1997: *Economic and Commercial* G*eography of India*, Vikas Publishing.
8 Singh Gopal, 1976: *A* G*eography of India*, Atma Ram.
7 Spate O. H. K. and Learmonth A. T. A., 1967: *India and Pakistan: A General and Regional Geography*,

DLF23711

GENERIC ELECTIVES - II

VI – SEMESTER
Practical VI: COMPUTER MAPPING

UNIT		No. of Hours
5.	Introduction to Computer : Generation of Computers, Hardware and Software Components	20
6.	Computer graphics : Creating Data base in computer, creation of Line, Bar and Pie diagrams. Thematic Maps - Choro chromatic and Schematic Maps	20
7.	GPS - Meaning, Function and its applications.	10
8.	Tour report / Factory visit	10

References:

1. Singh L.R. : Fundamentals of Practical Geography, Sharadha Pustaka Bhavan, Alahabad, 2006
2. Dr. M.A. Siddaqui : Introduction to Geographical Information System, Sharadha Pustaka Bhavan, Alahabad, 2006
3. Chang : Introduction to GIS, Tata McGraw Hill W, New Delhi.

DEPARTMENT OF GEOGRAPHY
MODEL QUESTION PAPER FOR CBCS SCHEME
B.A GEOGRAPHY
(For I, II, III, IV, V AND VI semesters)

Time: 3 Hours **Max. Marks: 70**

Part-A

I. Answer any five of the following questions. Answer should not exceed 50 words 5x2=10

1)……
2)……
3)……
4)……
5)……
6)……
7)……

Part-B

II. Answer any Six of the following questions. Answer should not exceed 100 words 6x5=30

8)……
9)……
10)……
11)……
12)……
13)……
14)……
15)……

Part –C

III. Answer any Three of the following questions. 3x10=30

16)……
17)……

18)……
19)……
20)……

……..

JSS COLLEGE OF ARTS, COMMERCE & SCIENCE

(An Autonomous College of University of Mysore)

Re-accredited by NAAC with 'A' grade

OOTY ROAD, MYSORE-570 025, KARNATAKA

SYLLABUS 2021-22

B. Voc. (Software Development)

B.Voc. (SD) Scheme:

Year	Sem	Course Code	Title	L:T:P	Theory Hours	Tutorial Hours	Practical Hours	Total Hours	Total Credits
1 Year	Sem 1	SDA 020	Communication Language Kannada	3:0:0	45	0	0	45	3
		SDA 510	Basic Mathematics	3:0:0	45	0	0	45	3
		SDA 520	C Programming	2:0:1	30	0	15	45	3
		SDA 530	Digital Electronics	2:0:1	30	0	15	45	3
	Sem 2	SDB 510	Discrete Mathematics	3:0:0	45	0	0	45	3
		SDB 540	Communication Language English	3:0:0	45	0	0	45	3
		SDB 520	Algorithms & Data Structure	2:0:1	30	0	15	45	3
		SDB 550	Microcontroller & Embedded System	2:0:1	30	0	15	45	3
									24
2 Year		SDC 510	Advanced calculus	3:0:0	45	0	0	45	3
		SDC 520	Differential equation	3:0:0	45	0	0	45	3
		SDC 530	Software Architecture and SDLC & Process	2:0:1	30	0	15	45	3
		SDC 550	Indian Constitution	3:0:0	45	0	0	45	3
	Sem 4	SDD 510	Numerical Analysis & Statistics	3:0:0	45	0	0	45	3
		SDD 520	Operation Research	3:0:0	45	0	0	45	3
		SDD 530	Software Modeling & Software Quality Assurance	2:0:1	30	0	15	45	3
		SDD560	Environmental Studies	3:0:0	45	0	0	45	3
									24
3 Year	Sem 5	SDE 510	Project Management	2:0:2	30	0	30	60	4
		SDE 520	Configuration Management	3:0:1	45	0	15	60	4
		SDE 530	Human Computer Interaction	3:0:1	45	0	15	60	4
	Sem 6	SDF 510	Operating System	3:0:1	45	0	15	60	4
		SDF 550	Database Design	3:0:1	45	0	15	60	4
		SDF 520	CN & Security Fundamentals	3:0:1	45	0	15	60	4
									24
4 Year	Sem 7	G .1	Business English	2:0:1	30	0	15	45	3
		G - 2	Time Management Skills	2:0:1	30	0	15	45	3
									06
	Sem 8	G-3	Presentation Skills	2:0:1	30	0	15	45	3
		G-4	Teamwork Skills	2:0:1	30	0	15	45	3
									06

Scheme of Assessment:

SEMESTER I

General Education Content **180 hours**

1. Communication Language Kannada Credits: 3 (45 hours)

ಪ್ರಥಮ ಚತುರ್ಮಾಸ ಬಿ. ವೋಕ್ - 2021-22ನೇ ಸಾಲಿನ ಕನ್ನಡ ಭಾಷಾ ಪಠ್ಯಕ್ರಮ

ಘಟಕ- 1 ಕನ್ನಡ ನಾಡು- ನುಡಿ- ಚಿಂತನೆ

1. ಅ. ಕನ್ನಡಿಗರ ತಾಯಿ	-ಎಂ ಗೋವಿಂದ ಪೈ
ಆ. ಹಚ್ಚೇವು ಕನ್ನಡದ ದೀಪ	-ಡಿ ಎಸ್ ಕರ್ಕಿ
2. ಕರ್ನಾಟಕ: ಇಲ್ಲ ಹೆಸರು ಕೊಟ್ಟ ಮಂತ್ರ	-ಕುವೆಂಪು
3. ಕನ್ನಡವನ್ನು ಕಟ್ಟುವ ಕೆಲಸ	- ಹಾ ಮಾ ನಾಯಕ

ಘಟಕ - 2 ಆಕಾಶ

1. ಅ. ಆಕಾಶ	-ಸರಜೂ ಕಾಟ್ಕರ
ಆ. ಬಕಮೇವ	-ವಿನಾಯಕ
2. ಆಕಾಶಕ್ಕೆ ನೀಲಿ ಪರದೆ	-ಬೋಳುವಾರ ಮಹಮದ್ ಕುಂ

ಘಟಕ - 3 ತಾರುಣ್ಯ

1. ಅ. ಬಡವನಾದರೆ ಏನು ಪ್ರಿಯೆ	-ಸಚ್ಚಿದಾನಂದ ಹಾವನೂರ
ಆ. ಕಾರಿಹೆಗ್ಗಡೆಯ ಮಗಳು	-ಬಿ ಎಂ ಶ್ರೀಕಂಠಯ್ಯ
2. ಹದಿಹರೆಯದವರ ಅವಶ್ಯಕತೆಗಳು	-ಸಿ.ಆರ್.ಚಂದ್ರಶೇಖರ

ಘಟಕ - 4 ಸಂಕೀರ್ಣ

1. ಅ. ಧನ್ಯ ಧೀರದ ಮಾರ್ದವ್ಯಾದಿದೋ	-ಜನಪದ
ಆ. ನೆತ್ತಮನಾಡಿ ಭಾನುಮತಿ ಸೋಲ್ತೊಡೆ	-ಪಂಪ
2. ಕಿರಿ ಜೀವದ ಬುಟ್ಟಿಯಲ್ಲಿ ಭಯೋತ್ಪಾದ	-ನಾಗೇಶ್ ಹೆಗಡೆ
3. ಅ. ಕನ್ನಡ ಮತ್ತು ಗಣಕಯಂತ್ರ: ಕಂಪ್ಯೂಟರ್ ತಂತ್ರಾಂಶಗಳ ಪರಿಚಯ, ಅಂತರ್ಜಾಲ/ಇಂಟರ್‌ನೆಟ್, ಕನ್ನಡ ವೆಬ್‌ಸೈಟ್, ವರ್ಲ್ಡ್ ವೈಡ್ ವೆಬ್, ಶೋಧ ಯಂತ್ರ, ಮಿಂಚಂಚೆ/ಇ-ಮೇಲ್.	
ಆ. ದಟ ಅಂಚೆ, ಬ್ಲಾಗ್, ಸುದ್ದೋಲೆ	

ಹೊಸರಾಷ್ಟ್ರೀಯ ಶಿಕ್ಷಣನೀತಿ : 2021-22

ಕನ್ನಡ ಭಾಷಾ ಮಾದರಿ ಪ್ರಶ್ನೆ ಪತ್ರಿಕೆ

(1,2,3 ಮತ್ತು 4ನೇ ಚತುರ್ಮಾಸಗಳು)

ಅವಧಿ : 3ಗಂಟೆಗಳು

ಗರಿಷ್ಠ ಅಂಕಗಳು : 60

1. ಒಂದು ಪ್ರಶ್ನೆಗೆ ಉತ್ತರಿಸಿ — 1x10=10

(ಘಟಕ -೧ ರಿಂದ ಎರಡು ಪ್ರಶ್ನೆಗಳನ್ನು ಕೇಳಲಾಗುತ್ತದೆ)

2. ಒಂದು ಪ್ರಶ್ನೆಗೆ ಉತ್ತರಿಸಿ — 1x10=10

(ಘಟಕ -೨ ರಿಂದ ಎರಡು ಪ್ರಶ್ನೆಗಳನ್ನು ಕೇಳಲಾಗುತ್ತದೆ)

3. ಒಂದು ಪ್ರಶ್ನೆಗೆ ಉತ್ತರಿಸಿ — 1x10=10

(ಘಟಕ -೩ ರಿಂದ ಎರಡು ಪ್ರಶ್ನೆಗಳನ್ನು ಕೇಳಲಾಗುತ್ತದೆ

4. ಒಂದು ಪ್ರಶ್ನೆಗೆ ಉತ್ತರಿಸಿ — 1x10=10

(ಘಟಕ -೪ ರಿಂದ ಎರಡು ಪ್ರಶ್ನೆಗಳನ್ನು ಕೇಳಲಾಗುತ್ತದೆ)

5. ಎರಡು ಪ್ರಶ್ನೆಗಳಿಗೆ ಉತ್ತರಿಸಿ — 2x5=10

(ಘಟಕ ೧,೨,೩ ಮತ್ತು ೪ ರಿಂದ ಪದ್ಯ ಅಥವ ಪಾಠದಿಂದ ಎರಡು ಸಂದರ್ಭ ವಾಕ್ಯಗಳನ್ನು ಕೇಳಲಾಗುತ್ತದೆ.
ಪದ್ಯ ಅಥವ ಪಾಠದ ಆಶಯ, ಪಾತ್ರಚಿತ್ರಣ, ಸನ್ನಿವೇಶ ವಿಷಯ ಕುರಿತು ಎರಡು ಪ್ರಶ್ನೆಗಳನ್ನು ಕೇಳಲಾಗುತ್ತದೆ)

6. ಒಂದು ವಿಷಯ ಕುರಿತು ಬರೆಯಿರಿ — 1x5=5

(ನಾಲ್ಕು ಘಟಕಗಳ ಪಠ್ಯದಲ್ಲಿನ ಒಂದು ವಿಷಯ ಕುರಿತು ವಿದ್ಯಾರ್ಥಿಗಳ ಸ್ವಂತ ಅನುಭವ, ಆಲೋಚನೆ, ಅಭಿಪ್ರಾಯ ಕುರಿತು ಪ್ರಶ್ನೆ ಕೇಳಲಾಗುತ್ತದೆ)

7. ಒಂದು ವಾಕ್ಯದಲ್ಲಿ ಉತ್ತರಿಸಿ — 1x5=5

(ನಾಲ್ಕು ಘಟಕಗಳಲ್ಲಿ ಭಾಷಾಭ್ಯಾಸಕ್ಕೆ ಸಂಬಂಧಿಸಿದಂತೆ ಪದಗಳ ಅರ್ಥ, ಪದವಿಂಗಡಣೆ, ನುಡಿಗಟ್ಟನ್ನು ಸ್ವಂತವಾಕ್ಯದಲ್ಲಿ ಬಳಸುವುದು, ಬಿಟ್ಟ ಜಾಗ ತುಂಬುವುದು ...ಇತ್ಯಾದಿ ಐದು ಪ್ರಶ್ನೆಗಳನ್ನು ಕೇಳಲಾಗುತ್ತದೆ)

2. Basic Mathematics

(45 Hrs @ 3 Hrs per week, 3 credits)

Course Outcome:

After completion of the course, the students are able to:

CO1. Learn in depth Polynomials
CO2. Write down the details of Cardon's Method
CO3. Identify the details of Pair of straight lines
CO4. Deliberate in details with examples Circle
CO5. Specify in details with examples Radian Measure
CO6. Learn in depth Complex Numbers

Unit 1: Algebra 1 **15 Hours**

Theory of Equations: Polynomials – Relations between the roots and coefficients –Symmetric functions –Synthetic division-Descartes' rule of signs –Cubic equations- Cardon's method.

Unit 2: Analytical Geometry –I **15 Hours**

Two dimensional coordinate geometry – straight line (Revision), Pair of straight lines –standard results and simple problems.
Circle: equations of circles, Tangent and normal, radical axis and radical centers.
Conic : Parabola – Ellipse- Hyperbola (Equations in standard form and problems)

Unit 3: Trigonometry **15 Hours**

Radian measure-Trigonometric ratios –Trigonometric functions of compound angle, multiple angles and half angles-Inverse trigonometric functions-complex numbers.

.

Books for Reference:

1. Algebra –Natarajan
2. Algebra – Hardy and wright
3. Algebra –Shanthi Narayan
4. Algebra -Manicavachagam Pillay.
5. Elements of Analytical Solid geometry – Shanti Narayan
6. Elements of Analytical Solid geometry –S.L.Loney
7. Differential Calculus –Shanthi Narayan
8. Triogonometry –S.L.Loney

Scheme of Teaching and Examination:

Teaching: 45 Hours of Teaching at the rate of 3 Hrs per week

Scheme of Examination:

Component	Syllabus	Weight age	Period of continuous assessment
C1	first 50 % of the syllabus	15%	First half of the semester
C2	Remaining 50%	15%	Second half of the semester
C3	Semester - end examination	70%	After completing one full semester

Question paper pattern:

Title of the paper: **Basic Mathematics**

Section A:

Q1: Six questions of 2 marks each – Five questions to be answered. $5 \times 2 = 10$

Section B: Answer any Four questions from each main. Each full question carries 20 marks.

$4 \times 15 = 60$

Q2: Five sub questions of 5 marks each from unit 1
Q3: Five sub questions of 5 marks each from unit 2
Q4: Five sub questions of 5 marks each from unit 3

3. C PROGRAMMING

Credits 3 (45 Hours)

(2 Hours of Theory + 2 Hour of Practical per Week)

Course Outcome:

After completion of the course, the students are able to:

CO1. Specify in details with examples Problem Design
CO2. Learn in details with examples Algorithms
CO3. Deliberate the details of Data Definition Structure
CO4. Learn the details of Control Structures
CO5. Learn the details of Functions
CO6. Identify in details with examples Abstract Data Types

Unit 1 — 15 Hours

Problem Solving Technique: Problem definition, Problem analysis, Problem Design, Algorithms, Flow charts, Coding, Debugging, Program documentation, Program maintenance and Basic programming construct.

Data Definition Structure: Types, constants, variables, keywords and identifiers.

Operators and Expressions: Arithmetic, Relational, Logical, operator precedence rules; input and output statement and Assignment statement.

Unit 2 — 15 Hours

Control Structures: Sequential, Selection (one way, two way), looping (while, do while, for), combinations.

Functions: Definition and passing (function depth look), Prototypes: parameter definition and passing (scope: local and global variables).

Data Structures: One and Two dimensional arrays.

Abstract data types: Records (Structure definition statement); Strings: Use of main operations, string functions (concatenates string copy and compare etc).

Books for References:

- Programming with ANSI C by: E. Balagurusamy
- Let us C - Yashwanth kanetkar
- Computer concepts and C programming by - P. B. Kotur

Practical

(1Hour per week X 15 Weeks = 15 Hours)

Experiments are based on topics mention in the Paper designed by concerned Faculty

4. ELECTRONICS

Credits 3 (45 Hours)

(2 Hours of Theory + 2 Hour of Practical per Week)

Course Outcome:
After completion of the course, the students are able to:

CO1. Learn in detail with application, logic gates
CO2. Learn the classification and characteristics of combinational digital circuits
CO3. Deliberate the classification and characteristics of sequential digital circuits CO4. Learn in details with application, flip flop

Unit 1 **15 Hours**

Representation of Information: Number system, integer and floating point representation, character codes (ASCII, EBCDIC)

Number Systems: Introduction to decimal, binary and hexadecimal number systems. Inter-conversion of decimal, binary and hex numbers

Binary Arithmetic and codes: Addition, multiplication and division in binary systems. Subtraction in binary systems –one's and two's complement methods. Subtraction of binary numbers by one`s and two`s complement methods. Concept of signed and unsigned numbers

Alphanumeric codes- ASCII and EBCDIC, concept of parity, error detection and correction.

Logic Gates: Logic values and variables, positive and negative logic, AND, OR, NOT, NAND, NOR, AND, XOR gates, symbols and truth table. Definition of universal gates, NAND & NOR gates as universal gates.

Boolean Algebra: Laws of Boolean algebra. Principle of duality. DeMorgan's theorems. Simplification of Boolean expressions. Boolean expression for logic circuits and vice versa. . SOP and POS notations. Canonical Expressions. Conversion from SOP to POS form and vice versa. Reduction of Boolean expressions (three/ four variables with don't care conditions) using Karnaugh maps

Unit 2 **15 Hours**

Combinational Circuits: Half Adder, Full Adder, Half subtractor, Full subtractor, Encoders (Decimal to BCD) and decoders (BCD to Decimal), 4 X 1 Multiplexer and 1 X 4 demultiplexer - symbol and truth table

Sequential Circuits: RS flip flop, D flip flop. JK flip flop. Race around condition & T flip-flops. Shift registers –SISO, SIPO, PISO, PIPO registers. Brief explanation with Block diagrams. Counter - Synchronous and Asynchronous - Binary ripple counter and modulo counter.

Semiconductor Memories: Idea of different types of Semiconductor memories (RAM, ROM, PROM, EPROM, EEPROM), process of data storage and retrieval, organization of memory, concept of PLA and PAL.

Basic Building Blocks: ALU: arithmetic and logic unit operations, organization of control units, memory: types and organization, peripheral devices: I/O devices (video terminals and printers) and

controllers, storage devices (tapes and disks), Programmed and interrupt control mechanism, I/O controllers, and bus bandwidths

Books for References:

- Digital Electronic – Introduction to Theory & Practice by Gothmann.
- Modern Digital Electronic (3rd Ed.) by Jain.
- Digital Principles & applications (6th Ed.) by Leech, Malvino and Saha.
- Digital Electronic by Thomas Floyd.
- The 8086 / 8088 Family Design, Programming & Interfacing by John Uffenbeck.
- 8086 Microprocessors Programming & Interfacing by Duglos V Hall.
- Intel Microprocessors Architecture, Programming & Interfacing (6th Ed.) by Barry B Bery.

Practical

(1 Hour per week X 15 Weeks = 15 Hours)

Experiments are based on topics mention in the Paper designed by concerned Faculty

SEMESTER II

General Education Content 180 hours

1. Communicative Language English

Credits: 3 (45 hours)

(3 Hours of Theory per week)

Course Outcome:

After completion of the course, the students are able to:

CO1. Deliberate in details with examples Voice
CO2. Specify in details with examples Articles
CO3. Learn in depth Speech
CO4. Deliberate the details of Writing Skills
CO5. Learn in depth Speaking Skills

Module – 1 Grammar

		Marks	Hrs/ Week
1.	Subject and Verb Agreement	5	6
2.	Voice	5	5
3.	Articles	5	3
4.	Speech	5	6
5.	Question tag	5	5
6.	Framing of Questions	5	3+2=05

Module – 2 Writing Skills

1.	Letter Writing Letter of Application/Letter of Grievances/Resume Preparation	10	4
2.	Comprehension	10	3
3.	Essay Writing	10	3

Module – 3 Speaking Skills

1.	Greeting		
2.	Requesting		
3.	Enquiring		
4.	Explaining	10	03+2=05
5.	Reporting		
6.	Permission		
7.	Thanking		
		70	**45**

2. DISCRETE MATHEMATICS

Credits 3 (45 Hours)

(3 Hours of Theory per Week)

Course Outcome:

After completion of the course, the students are able to:

CO1. Understand the details of Matrices and Determinants
CO2. Learn the details of Hamilton Theorem
CO3. Understand in details with examples Graph Theory
CO4. Understand the details of Calculus
CO5. Identify in details with examples Definite and Indefinite Integrals

Unit 1: Matrices and Determinants **15 Hours**

Algebra of Matrices and determinants –Elementary row operations- Rank of a matrix –Linear dependence of row and column vectors- System of Homogeneous linear equations-System of non homogeneous linear equations-Characteristic equations –Eigen values and Eigen vectors-Cayley – Hamilton theorem-Inverse of a matrix.

Unit 2: Basics of graph theory **15 Hours**

Definition-paths-matrix representation of graphs –planar graphs-non planar graphs-coloring of graphs-chromatic number of graphs-Independent number.

Unit 3: Calculus **15 Hours**

Limits–Derivatives-Rules of differentiation-problems-differentiation of implicit Parametric and inverse functions-logarithmic differentiation and derivatives of second order Indefinite and definite integrals-simple problems.

Scheme of Teaching and Examination:

Teaching: 45 Hours of Teaching at the rate of 3 Hrs per week

Scheme of Examination:

Component	Syllabus	Weight age	Period of continuous assessment
C1	First 50 % of the syllabus	15%	First half of the semester
C2	Remaining 50%	15%	Second half of the semester
C3	Semester - end examination	70%	After completing one full semester

Question paper pattern: Title of the paper: **Mathematics II**

Section A:

Q1 Six questions of 2 mark each - Five questions to be answered. $5 \times 2 = 10$

Section B: Answer any Four questions from each main. Each full question carries 15 marks.

$4 \times 15 = 60$

Q2: Five sub questions of 5 marks each from unit 1

Q3: Five sub questions of 5 marks each from unit 2

Q4: Five sub questions of 5 marks each from unit 3

3. ALGORITHMS AND DATA STRUCTURES

Credits 3 (45 Hours)

(2 Hours of Theory + 2 Hour of Practical per Week)

Course Outcome:

After completion of the course, the students are able to:

CO1. Deliberate in details with examples Algorithms and Data Structures
CO2. Learn in depth Arrays
CO3. Learn in details with examples Binary Search Trees
CO4. Deliberate the characteristics of Heaps
CO5. Specify the characteristics of Sorting Algorithms
CO6. Learn the details of Shortest Path

Unit 1: **15 Hours**

Algorithms and Data Structures: Asymptotic and Algorithm Analysis, Properties of data, Asymptotic Analysis, Algorithm Analysis.

Abstract Lists and Implementations: Linked lists and arrays, Stacks, Queues, De-queues.

Abstract Sorted Lists and Implementations: General trees, binary (including binary and complete trees), N-array trees and tree traversals, Abstract Sorted Lists, Binary search trees, Balanced search trees, AVL trees, B-Trees.

Unit 2: **15 Hours**

Abstract Priority Queues: Heaps.

Abstract Sets/Maps: Chained Hash Tables, Linear Probing, Double Hashing.

Sorting Algorithms: Insertion and bubble sort, Heap, merge, and quick sort, Bucket and radix sort.

Graph and Direct Acyclic Graph Algorithms: Topological sort, Minimum spanning trees and shortest path.

Reference:

1. T.H. Cormen, C.E. Leiserson, R.L. Rivest and C. Stein, Introduction to Algorithms, 2nd Ed., Prentice-Hall of India, 2006.
2. Robert L. Kruse and A.J. Ryba, Data Structures and Program Design in C++, Prentice Hall, Inc., NJ, 1998.

Practical

(1 Hour per week X 15 Weeks = 15 Hours)

Experiments are based on topics mention in the Paper designed by concerned Faculty

4. INTRODUCTION TO MICROCONTROLLERS AND EMBEDDED SYSTEMS

(2 Hours of Theory + 2 Hour of Practical per Week)

Course Outcome:

After completion of the course, the students are able to:

CO1. Understand architecture of 8051 microcontroller
CO2. Write down the the instruction set and simple programs of 8051 microcontroller
CO3. Learn the details of 8051 microcontrollers
CO4. Specify the characteristics of embedded system

Unit 1: Microcontrollers (15 Hours)

Microcontroller 8051 - Introduction, block diagram of microprocessor, block diagram of microcontroller, comparison between microprocessor & microcontroller, Architecture of 8051 and pin out diagram of 8051. **Addressing modes -** Data moves, Types of addressing modes - register addressing, immediate addressing, direct addressing, indirect addressing mode. **Instructions set -** Data transfer instructions, arithmetic instructions, jump and call instructions. **PIC microcontroller** - Core feature and over view of series.

Unit 2: Embedded Systems (15 Hours)

Introduction to Embedded Systems - Definition of Embedded System, Embedded Systems Vs General Computing Systems, History of Embedded Systems, Classification, Major Application Areas, Purpose of Embedded Systems, Characteristics and Quality Attributes of Embedded Systems.

Hardware Side - introduction, The Core Level, Representing Information, Understanding Numbers, Addresses, Instructions, Registers. An Instruction Set View, Embedded Systems-A Register View, Register View of a Microprocessor

The Hardware Side: Storage Elements and Finite-State Machines - Theoretical model.

Text Books:

- Microcontroller – K J Ayala.
- Introduction to Embedded Systems - Shibu K.V, Mc Graw Hill.

Books for References:

- Microcontroller – Mazadi.

Practical

(1 Hour per week X 15 Weeks = 15 Hours)

Experiments are based on topics mention in the Paper designed by concerned Faculty

SEMESTER III

1. ADVANCED CALCULUS
Credits 3 (45 Hours)

(3 Hours of Theory per Week)

Course Outcome:

After completion of the course, the students are able to:

CO1. Learn in depth Sequences

CO2. Specify the details of Series

CO3. Understand in details with examples Rolle's Theorem

CO4. Deliberate in details with examples Taylor's Theorem

CO5. Identify the details of Partial derivatives

Unit 1: Sequences and Series — 15 Hours

Sequences- Bounded and monotonic sequences-convergent, divergent and oscillatory sequences- standard results and simple problems.

Infinite series-nth partial sum- geometric series-convergence of $\sum \frac{1}{n^p}$ - comparison test and ratio test-simple problems-alternating series.

Unit 2: Calculus — 15 Hours

Mean value theorems-Rolle's theorem, Lagrange's mean value theorem, Cauchy's mean value theorems (Statements and Geometrical interpretations)-Taylor's theorem –Maclaurin's expansion (Statement) and problems.

Unit 3: Partial derivatives — 15 Hours

Limit and continuity of functions of two and three variables. Partial differentiation. Change of variables. Partial derivation and differentiability of real-valued functions of two and three variables. Euler's theorem on homogeneous functions. Taylor's theorem for functions of two and three variables. Jacobians.

Books for Reference:

1. A First Course in Real Analysis – Asharani Singhal.
2. Real Analysis – S.C .Malik .
3. Principles of Mathematical Analysis –Shanthinarayan
4. Calculus ,Volume -1 and Volume -2

Scheme of Teaching and Examination:

Teaching: 45 Hours of Teaching at the rate of 3 Hrs per week

Scheme of Examination:

Component	**Syllabus**	**Weightage**	**Period of continuous assessment**
C1	first 50 % of the syllabus	15%	First half of the semester
C2	Remaining 50%	15%	Second half of the semester
C3	Semester - end examination	70%	After completing one full semester

Question paper pattern:

Title of the paper: Paper 1: **ADVANCED CALCULUS**

Section A:

Q1: Six questions of two marks each .Five questions to be answered $5 \times 2 = 10$

Section B: Answer any Four questions from each main. Each main carries 20 marks

3 X 20 = 60

Q2: Five sub questions of 5 marks each from unit 1
Q3: Five sub questions of 5 marks each from unit 2
Q4: Five sub questions of 5 marks each from unit 3

2: DIFFERENTIAL EQUATIONS IV

Credits 3 (45 Hours)

(3 Hours of Theory per Week)

Course Outcome:

After completion of the course, the students are able to:

CO1. Specify in details with examples linear differential equations

CO2. Write down in details with examples nonlinear differential equations

CO3. Understand in details with examples Homogeneous linear differential equations

CO4. Learn the details of Non homogeneous linear differential equations CO5. Specify the details of Partial differential equations

Unit 1: Linear and nonlinear differential equations 15 Hours

Elimination of arbitrary constant-solutions of linear differential equations - separation of variables –Homogeneous equations-exact equations- equations of the form $\frac{dy}{dx} + Py = Q$-Integrating factor. Equations solvable for x, y, p. Clairaut's form and singular solutions. .

Unit 2: Homogeneous and non homogeneous linear differential equations 15 Hours

Homogeneous Linear differential equations with constant coefficients.-non homogeneous linear differential equations –inverse differential operators-Cauchy's homogeneous linear differential equations- Second order linear differential equations-variation of parameters and exact equations.

Unit 3: Partial differential equations 15 Hours

Total differential equations-simultaneous equations- partial differential equations-Lagranges form of linear partial differential equations-charpit's method.

Books for Reference :

1. A short course in differential equations –Rainville and Bedient
2. Advanced Engineering Mathematics – Kreyszig
3. Higher Engineering Mathematics – Grewal
4. Laplace Transform –Murry R Speigel
5. Applications of Differential equations –Martin Brown

Scheme of Teaching and Examination

Teaching: 45 Hours of Teaching at the rate of 3 Hrs per week

Scheme of Examination:

Component	**Syllabus**	**Weightage**	**Period of continuous assessment**
C1	First 50 % of the syllabus	15%	First half of the semester
C2	Remaining 50%	15%	Second half of the semester
C3	Semester - end examination	70%	After completing one full semester

Question paper pattern:

Title of the paper: *Paper 2:* **DIFFERENTIAL EQUATIONS**

Section A:

Q1: Six questions of two marks each .Five questions to be answered $5 \times 2 = 10$

Section B: Answer any Four questions from each main. Each main carries 20 marks

3 X 20 = 60

Q2: Five sub questions of 5 marks each from unit 1
Q3: Five sub questions of 5 marks each from unit 2
Q4: Five sub questions of 5 marks each from unit 3

3. Software Architecture and SDLC & Processes

Credits 3 (45 Hours)

(2 Hours of Theory and 1Hour of Practical's)

Course Outcome:

After completion of the course, the students are able to:

CO1. Specify in depth Software Process
CO2. Deliberate in details with examples SDLC
CO3. Learn in depth Data Modeling
CO4. Understand the details of UML and ER Models
CO5. Specify the details of Loose Coupling

Unit 1: **15 Hours**

SDLC & Processes: Software Process, Software Development Life Cycle, Object-Oriented Concepts: connections between design and implementation, Software Testing, Object-Oriented Architecture and Design, Requirements analysis, Safety Critical Software.

Unit 2: **15 Hours**

Software Architecture: Introduction to enterprise software architecture, the role of middleware, Cloud computing =SaaS + Utility Computing, Data Modeling, UML and E-R models. XML, Schemas, XML Schemas, Data Processing. Strategies for data processing, Introduction to XQuery. JSON and JAXB, Domain-Driven Architecture. Domain-driven, design (DDD), Object-relational mapping (ORM), Service-oriented Architecture (SOA), Standardized service contract, Loose coupling, Service abstraction, Service-oriented Architecture (SOA).

Practical

(1 Hour per week X 15 Weeks = 15 Hours)

Experiments are based on topics mention in the Paper designed by concerned Faculty

4. Indian Constitution

Credits 3 (45 Hours)

(3 Hours of Theory)

Course Outcome:

After completion of the course, the students are able to:

CO1. Learn the details of Features of Indian Constitution
CO2. Understand the details of Fundamentals Rights
CO3. Identify the details of Role of Prime Minister
CO4. Learn the details of Power and Functions of Lok Sabha
CO5. Specify the details of Power and Functions of Chief Minister

UNIT I **08 hrs**

a) Preamble of the Indian Constitution
b) Salient features of Indian Constitution

UNIT II **10 hrs**

a) Fundamental Rights
b) Fundamental Duties
c) Directive principles of State Policy

UNIT III **14 hrs**

a) President – Election Method, Powers and Functions
b) The Role of the Prime Minister
c) The Parliament – Structure, Power and Functions(Lok Sabha and Rajya Sabha)
d) Supreme Court – Organization and Jurisdiction

UNIT IV **13 hrs**

a) The Role of Governor in the Administration of State
b) Powers and Functions of the Chief Minister
c) Composition , Powers and Functions of both the Houses of State Legislature
d) High Court – Organization and Jurisdiction

SEMESTER IV

General Education Content 180 hours

PAPER 1: NUMERICAL ANALYSIS

Credits 3 (45 Hours)

(3 Hours of Theory per Week)

Course Outcome:

After completion of the course, the students are able to:

CO1. Understand the details of Bisection Method

CO2. Identify in details with examples Range Kutta IV Order Method

CO3. Learn the details of Finite differences

CO4. Understand in depth Numerical Integration

CO5. Identify in details with examples Linear programming

:

Unit 1: Numerical Methods 15 Hours

Numerical solutions of algebraic equations-Bisection method -Newton Raphson method, Regula Falsi method -iteration method-Euler method, Range kutta IV order methods

Unit 2: Finite differences 15 Hours

Finite differences-Interpolation-Newton Gregory forward interpolation formula-Lagrange's interpolation formula-Finding first and second derivatives using interpolation formula.

.

Unit 3: Numerical integration 15 Hours

General quadrature formula- Trapezoidal rule, Simpson's $1/3^{rd}$ and $3/8^{th}$ rule Weddle's rule.

Books for reference:

1. Numerical methods: S.S.Sastry.
2. Probability and statistics for engineers and Scientists – Ronald E .Walpole and Raymond H Mayers .
3. Mathematical Statistics - John Freund (Prentice Hall India PVT .Ltd)

Scheme of Teaching and Examination

Teaching: 45 Hours of Teaching at the rate of 3 Hrs per week

Scheme of Examination:

Component	**syllabus**	**Weightage**	**Period of continuous assessment**
C1	first 50 % of the syllabus	15%	First half of the semester
C2	Remaining 50%	15%	Second half of the semester
C3	Semester – end examination	70%	After completing one full semester

Question paper pattern:

Title of the paper: **Numerical Techniques and Statistics**

Section A:

Q1: Six questions of two marks each .Five questions to be answered $5 \times 2 = 10$

Section B: Answer any Four questions from each main. Each main carries 20 marks

3 X 20 = 60

Q2: Five sub questions of 5 marks each from unit 1
Q3: Five sub questions of 5 marks each from unit 2
Q4: Five sub questions of 5 marks each from unit 3

PAPER 2: OPERATION RESEARCH

Credits 3 (45 Hours)

(3 Hours of Theory per Week)

Course Outcome:

After completion of the course, the students are able to:

CO1. Understand the details of Different phases of operation research

CO2. Deliberate in depth Simplex method

CO3. Identify in depth Duality theorems

CO4. Understand the details of Sequencing problems

CO5. Learn in depth Transportation model problems

CO6. Understand the details of Assignment problems

Unit 1: **15 Hours**

Definition of the term Operation Research -Different phases of operation research Advantages and limitations of O.R. Linear programming –Requirements for a linear programming problem , Examples on the Applications of linear programming problem, Formulation of a linear programming , Standardization , Solving LPP by Graphical Method ,Simplex Method (up to two variables)

Unit 2: **15 Hours**

Big M method revised simplex method, Dual simplex method, Duality theorems.

Sequencing problems: Processing 'n' jobs through two machines –Travelling salesman problems as an application of sequencing.

Unit 3: **15 Hours**

Transportation Model problems – Formulating, Solution –North West Corner Rule, Least Cost method, Row Minima method, Column minima method and Vogel's approximation.

Assignment problem: formulating, method of finding initial basic feasible solution to Assignment problem using Hungarian method.

Books for reference:

1. 'Operation Research ' by Kanthiswarup ,Guptha ,Manmohan –Sultan chand and sons Educational publishers ,New Delhi ,1996
2. ' Operation Research ' by H .A .Taha Prentice Hall of india Ltd 1998
3. 'Operation research ' ,by S .D Sharma Kedarnath Ramnath and co (publishers)1997

Scheme of Teaching and Examination

Teaching: 45 Hours of Teaching at the rate of 3 Hrs per week

Scheme of Examination:

Component	**Syllabus**	**Weightage**	**Period of continuous assessment**
C1	first 50 % of the syllabus	15%	First half of the semester
C2	Remaining 50%	15%	Second half of the semester
C3	Semester - end examination	70%	After completing one full semester

Question paper pattern:

Title of the paper: **Operation Research**

Section A:

Q1: Six questions of two marks each .Five questions to be answered $5 \times 2 = 10$

Section B: Answer any Four questions from each main. Each main carries 20 marks

3 X 20 = 60

Q2: Five sub questions of 5 marks each from unit 1
Q3: Five sub questions of 5 marks each from unit 2
Q4: Five sub questions of 5 marks each from unit 3

3. Software Modeling and Software Quality Assurance

Credits 3 (45 Hours)

(2 Hours of Theory and 2 Hour of Practical's)

Course Outcome:

After completion of the course, the students are able to:

CO1. Deliberate in details with examples Classes and Relationships
CO2. Specify the details of State diagrams
CO3. Identify in details with examples Events
CO4. Deliberate in details with examples Software quality assurance
CO5. Understand the details of Software quality assurance

Unit 1: **15 Hours**

Software Modeling: What is Modeling?, Classes, Relationships, Common Mechanisms, Diagrams, Class Diagrams, Advanced Relationships, Instances, Object Diagrams, Use Cases, Interaction/Activity Diagrams, Events, State Machines, Time, Space, State Diagrams and Events.

Unit 2: **15 Hours**

Software Quality Assurance: Software Quality, Quality Assurance, Testing Concepts and Issues, Testing Activities, Testing Techniques. Other Techniques, Defect Prevention/Process Improvement, Inspection, Refactoring; CRC, Software Reliability Engineering, Quality Models and Measurements.

Practical

(1 Hour per week X 15 Weeks = 15 Hours)

Experiments are based on topics mention in the Paper designed by concerned Faculty

Paper 4: Environmental Studies

(One-Semester Compulsory Core Module for B.Voc Programmes)

(3 hrs Theory/Week)

3 Credits (45 Hrs)

Course Outcome:

After completion of the course, the students are able to:

CO1. Deliberate the details of Components of environment
CO2. Specify the details of Ecology and Ecosystems
CO3. Identify in details with examples Natural resources
CO4. Learn the details of Biodiversity
CO5. Specify in details with examples Environmental pollution
CO6. Identify the details of Environmental issues and policies

Unit i: Environment and natural systems 4 hrs

- Introduction to Environment and Environmental Studies
- Definition and Components of Environment, Relationship between the different components of Environment
- Man and Environment relationship
- Impact of technology on Environment, Environmental Degradation
- Multidisciplinary nature of the Environment studies
- its scope and importance in the present day Education System

UNIT 2: Ecology and Ecosystems: 5 hrs

- Introduction: Ecology- Objectives and Classification
- Concept of an ecosystem- structure and functions of ecosystem
- Components of ecosystem- Producers, Consumers, Decomposers
- Bio-Geo- Chemical Cycles- Hydrologic Cycle, Carbon cycle, Energy Flow in Ecosystem, Food Chains, Food webs ,Ecological Pyramids
- Major Ecosystems: Forest Ecosystem, Grassland Ecosystem, Desert Ecosystem, Aquatic Ecosystem, Estuarine Ecosystem**.**

Unit 3: Natural Resources 6 hrs

Renewable and Non-renewable resources, exploitation and conservation,

a. Water resources: Surface and Ground water sources, Indian and Global scenario.
b. Land as a resource, land use change and land degradation
c. Forest resources: Definition and Classification of Forests
   Ecological and Economic importance and benefits of forest, Indian scenario,
   Deforestation: causes and effects, case studies remedial measures
d. Food resources: Sources of food, Global and Indian food demand scenario,

Limits of food production, Environmental effects of Agriculture

e. Energy resources: Renewable and non renewable energy sources, use of alternate energy sources, growing energy needs, case studies.

f. Mineral resources: Definition and Classification of minerals, mining issues case studies.

e. Role of individual in conservation of natural resources.

Unit 4: Biodiversity and its Conservation 7 hrs

- Biodiversity : Definition, Levels of biological diversity : genetic, species and ecosystem diversity
- Bio geographic zones of India
- Hot spots of biodiversity
- Ecosystem and biodiversity services: Ecological, economic, social, ethical, aesthetic and Informational values
- Biodiversity patterns
- India as a mega-biodiversity nation
- Threats to biodiversity: Habitat loss, poaching of wildlife, man-wildlife conflicts, biological invasions.
- Endangered and endemic species of India
- Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

UNIT 5: Environmental pollution: 6 hrs

- Types of Environmental Pollution:
- Water Pollution: Introduction – Water Quality Standards, Sources of Water Pollution: Industrial Agricultural, Municipal; Classification of water pollutants, Effects of water pollutants, Eutrophication.
- b) Marine pollution: Causes, effects and control.
- c) Air Pollution: Composition of air, Structure of atmosphere, Ambient Air Quality Standards, Classification of air pollutants, Sources of common air pollutants like PM, SO2, NOX, Natural & Anthropogenic Sources, Effects of common air pollutants
- d) Soil Pollution: causes, effects and control.
- e) Noise Pollution: Introduction, Sound and Noise, Noise measurements, Causes and Effects
- f) Thermal Pollution: Causes, effects and control.
- g) Nuclear hazards and human health risks.
- Solid waste management: Control measures of urban and industrial waste.
- Role of individual in the prevention of pollution, Pollution case studies.

UNIT 6: Sustainable development and Environmental issues and Policies. 7 hrs

- Sustainable development: Meaning, changes in resource utilization.
- Water conservation: watershed management and Rain water harvesting.
- Environmental issues: Climate change, global warming, acid rain, ozone layer depletion.
- Disaster management: floods, drought, earthquake, cyclones and landslides.
- Wasteland reclamation.

- Environment Protection Act: Air, Water, Wildlife (Prevention and Control of Pollution)
- Forest Conservation Act.
- Issues involved in enforcement of environmental legislation.
- Environment: rights and duties**.**

Unit 7: Human Population and the Environment 5 hrs

- Population growth, Explosion, demographic variation among nations.
- Family welfare Program.
- Environment, human health and welfare; infectious and lifestyle diseases in contemporary world.
- Value Education: Environmental ethics.
- HIV/AIDS
- Women and Child welfare.
- Role of information technology in Environment and human health

Unit 8: Field visit 5 hrs

- Field work Visit to an area to document environmental assets :river/ forest/ grassland/ hill/ mountain
- Visit to a local polluted site-Urban/Rural/Industrial/Agricultural.
- Visit to the solid waste treatment plant and water treatment plant.
- Video: The one degree • (Equal to 5 lectures)

Reference Books:

1. Textbook of Environmental Studies for Undergraduate Courses by Erach Bharucha Second edition, 2013 Publisher: Universities Press (India) Private Ltd, Hyderabad.
2. Basics of Environmental Studies by Prof Dr N S Varandani , 2013 Publisher: LAP -Lambert Academic Publishing , Germany
3. Environmental Studies by Anindita Basak , 2009 Publisher: Drling Kindersley(India)Pvt. Ltd Pearson
4. Textbook of Environmental Studies by Deeksha Dave & S S Kateva , Cengage Publishers.
5. Environmental Sciences by Daniel B Botkin & Edward A Keller Publisher: John Wiley & Sons.
6. Environmental Studies by R. Rajagopalan, Oxford University Press
7. Environmental Studies by Benny Joseph, TMH publishers
8. Environmental Studies by Dr. Suresh K Dhameja, 2007 Published by: S K Kataria & Sons New Delhi
9. Basics of Environmental Studies by U K Khare, 2011 Published by Tata McGraw Hill.
10. Environmental Studies by N.Arumugam & V.Kumaresan, saras publication.

SEMESTER V

Paper 1: Project Management

Credits 2 (30 Hours)

(2 Hour of Theory + 2 Hour of Practical per Week)

Course Outcome:

After completion of the course, the students are able to:

CO1. Understand in depth Project plan

CO2. Identify the details of User controlled scheduling

CO3. Deliberate the details of Adding tasks

CO4. Understand in details with examples Adding work resources

CO5. Learn the details of Calendar

Unit 1: **15 Hours**

Creating a Project Plan.
User-Controlled Scheduling
Adding Tasks
Resolving Common Scheduling Issues

Unit 2: **15 Hours**

Adding Work Resources
Adding Material and Cost Resources
Defining a Calendar
Viewing and Tracking Project Information Gantt Charts

Practical's

Credits 2 (30 Hours)

Experiments are based on topics mention in the Paper designed by concerned Faculty

Paper 2: Configuration Management

Credits 3 (45 Hours)

(3 Hour of Theory + 2 Hour of Practical per Week)

Course Outcome:

After completion of the course, the students are able to:

CO1. Specify in depth Configuration management

CO2. Understand the details of Configuration management planning

CO3. Deliberate the details of Configuration control

CO4. Learn in details with examples Configuration status accounting

CO5. Identify the details of Configuration audits

Unit 1: **15 Hours**

DEFINING CONFIGURATION MANAGEMENT: CM principles and standards, the recent growth of CM

CM PLANNING: Program phasing and milestones, Creating the CM organization, Defining CM system requirements, CM job classifications

CONFIGURATION IDENTIFICATION: First tasks of CM, Configurations & Baselines, Requirements traceability, Item identification and numbering

Unit 2: **15 Hours**

ENGINEERING RELEASE: Control of technical data, the document control process, Development vs. formal release

CONFIGURATION CONTROL: Defining a closed-loop process, Change classifications, Review boards and CCBs, Processing changes and RDWs

INTRODUCTION TO SOFTWARE CONFIGURATION MANAGEMENT: Specific software CM tasks, SEI evaluation criteria

Unit 3: **15 Hours**

CONFIGURATION STATUS ACCOUNTING: Defining CSA tasks and tailoring, Status accounting elements, Understanding the impact

CM PLANS: CMP preparation techniques, Software CMPs, Assessments and Plans

General procedures and work flow

CONFIGURATION AUDITS: Internal and informal audits, developing the audit plan, The Functional and Physical Audits

Practical's

Credits 1 (15 Hours)

Experiments are based on topics mention in the Paper designed by concerned Faculty

Paper 3: Human Computer Interaction

Credits 3 (45 Hours)

(3 Hours of Theory + 2 Hour of Practical per Week)

Course Outcome:

After completion of the course, the students are able to:

CO1. Learn the details of Introduction of human computer interface
CO2. Understand the details of Human consideration in screen design
CO3. Identify in details with examples Windows
CO4. Deliberate in depth Multimedia and coloring
CO5. Specify in details with examples Hypermedia

Unit 1: 20 Hours

Introduction-Importance-Human-Computer interface-characteristics of graphics interface-Direct manipulation graphical system - web user interface-popularity-characteristic & principles. User interface design process- obstacles-usability-human characteristics in design - Human interaction speed-business functions-requirement analysis-Direct-Indirect methods-basic business functions-Design standards-system timings - Human consideration in screen design - structures of menus - functions of menus-contents of menu-formatting -phrasing the menu - selecting menu choice-navigating menus-graphical menus.

Unit 2: 13 Hours

Windows: Characteristics-components-presentation styles-types-managements-organizations-operations-web systems-device-based controls: characteristics-Screen -based controls: operate control - text boxes-selection control-combination control-custom control-presentation control.

Unit 3: 12 Hours

Text for web pages - effective feedback-guidance & assistance-Internationalization-accesssibility-Icons-Image-Multimedia - coloring.

Windows layout-test: prototypes - kinds of tests - retest - Information search - visualization - Hypermedia - www - Software tools.

Practical's

Credits 1 (15 Hours)

Experiments are based on topics mention in the Paper designed by concerned Faculty

SEMESTER VI

Paper 1: Operating System

Credits 4 (60 Hours)

(3 Hours of Theory + 2 Hour of Practical per Week)

Course Outcome:
After completion of the course, the students are able to:

CO1. Identify the Characteristics of operating system
CO2. Deliberate in depth Scheduling algorithms
CO3. Learn in depth Semaphores
CO4. Specify the details of Message passing
CO5. Understand the details of Deadlock
CO6. Identify in details with examples File organisation

Unit 1: **15 Hours**

Overview of operating systems, functionalities and types of OS.
User Operating, System Interface, Command Interpreter and Graphical User Interface.
System Calls – Types of System Calls.
The concept of a process - operations on processes, process states, concurrent processes, process control block.
UNIX process control and management, signals and pipes.
Operating system organisation, OS kernel FLIH.
Processor scheduling, scheduling algorithms and Scheduling Criteria.

Unit 2: **15 Hours**

Mutual exclusion, process co-operation, producer and consumer processes.
Semaphores: definition, init, wait, signal operations.
Use of semaphores to implement mutex, process synchronisation etc., implementation of semaphores.
Critical regions, Conditional Critical Regions, Monitors, Ada Tasks.
Interprocess Communication (IPC), Message Passing, Direct and Indirect.

Unit 3: **15 Hours**

Deadlock – Deadlock Characterization, Methods of handling deadlock, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection and Recovery from deadlock. Memory organisation and management, storage allocation.
Virtual memory concepts, paging and segmentation, address mapping.
Virtual storage management, page replacement strategies.
File organisation: blocking and buffering, file descriptor, directory structure, File and Directory structures, blocks and fragments, directory tree, inodes, file descriptors, UNIX file structure.

Practical's

Credits 1 (15 Hours)

Experiments are based on topics mention in the Paper designed by concerned Faculty

Paper 2: Database Design

Credits 4 (60 Hours)

(3 Hours of Theory + 2 Hour of Practical per Week)

Course Outcome:

After completion of the course, the students are able to:

CO1. Understand the details of Database terminology and information types

CO2. Specify in depth Database planning and designing

CO3. Learn the details of Cloud computing

CO4. Specify the details of Sets and normalization

CO5. Specify in depth Report writing

CO6. Understand in details with examples Customer service management

Unit 1 **15 Hours**

Database Basics, Introduction to Devise Digital Storage, Database Terminology & Database Information Types, Microsoft Excel versus Microsoft Access, Database Planning, Database Objects – Creating Fields and Tables, Planning and Designing a Database

Unit 2 **15 Hours**

Introduction to Cloud Computing, Database Relationships, Designing for the Business Case, Introduction to Data Security & Data Archives, Managing the Database, Database Relationship Development, Introduction to Visual Data Analytics, Introduction to Sets & Normalization, Database Extractions

Unit 3 **15 Hours**

Database Queries and Basic SQL, Emergence of Social Media Databases, Database Distribution, Report Writing, Introduction to Customer Service Management, Computing Databases, Database Inputs, Form Development

Practical's

Credits 1 (15 Hours)

Experiments are based on topics mention in the Paper designed by concerned Faculty

Paper 3: Computer Networks & Security Fundamentals

Credits 4 (60 Hours)

(3 Hours of Theory + 2 Hour of Practical per Week)

Course Outcome:

After completion of the course, the students are able to:

CO1. Deliberate the details of OSI model
CO2. Learn the details of Switches
CO3. Understand the details of Protocols and services
CO4. Identify in depth Security
CO5. Learn in depth Encryption
CO6. Specify the details of E-mail and server protection

Unit 1 **15 Hours**

COMPUTER NETWORKS: Network Infrastructure - Internet, intranet, and extranet.
Understand the OSI model. TCP/IP, Local area networks (LANs), Wide area networks (WANs). Network topologies and access methods. Network Hardware - switches. Connecting devices – Bridges, Repeaters and Hubs.

Unit 2 **15 Hours**

Internetworking device – Router, Gateway and Media types. Error detection and correction – Parity Check, CRC Checksum and Hamming Code. Protocols and Services. Understand IPv4 & IPv6. Addressing names resolution & networking services. SECURITY: Understanding Security Layers Principles, Physical, Wireless, Internet & Operating System Security.

Unit 3 **15 Hours**

Cryptography – Symmetric Key Cryptography and Public Key Cryptography. User authentication, permissions, password, audit policies, encryption, malware, Network Security & dedicated firewalls. Network Access Protection (NAP), network isolation. Protocol security, client, e-mail & server protection.

Practical's

Credits 1 (15 Hours)

Experiments are based on topics mention in the Paper designed by concerned Faculty

Model Curriculum

JUNIOR SOFTWARE DEVELOPER

JUNIOR SOFTWARE DEVELOPER

SECTOR: **IT-ITeS**
SUB-SECTOR: **IT Services**
OCCUPATION: **Application Development**
REFERENCE ID: **SSC/Q0508, version 1.0** NSQF
LEVEL: **4**

Format: ModCur_2015_1_0

Model Curriculum for Junior Software Developer

Table of Contents

Junior Software Developer

CURRICULUM / SYLLABUS

This program is aimed at training candidates for the job of **Junior Software Developer** in the **IT-ITeS** Sector/Industry and aims at building the following key competencies in the learner.

Program Name	**Junior Software Developer**		
Qualification Pack Name & Reference ID.	Junior Software Developer SSC/Q0508, version 1.0		
Version No.	1.0	**Version Update Date**	31/12/2015
Pre-requisites to Training	10th Standard		
Training Outcomes	**After completing this programme, participants will be able to:** • assist in performing software construction and software testing entry-level tasks in the IT Services industry • manage work to meet requirements • maintain a healthy, safe and secure working environment		

The Course encompasses all six National Occupational Standards (NOS) of **Junior Software Developer SSC/Q0508** Qualification Pack issued by **IT-ITeS Sector Skills Council NASSCOM**.

Sr. No.	Module	Theory Duration (hh:mm)	Practical Duration (hh:mm)	Key Learning Outcomes	Corresponding NOS Code	Equipment Required
1	Basics of IT	05:00	15:00	Candidates will be able to: Demonstrate basic computer and internet literacy including operating a computer, describing its major components and how they work, using Windows and Linux OS, operating a browser, searching the internet, managing mails and using social internet media.	SSC/N0506	Refer to Unique Equipment Required section

2	Problem Solving and Program Design	30:00	60:00	Candidates will be able to: 1. Demonstrate aptitude for analysing information and making logical conclusions. 2. Demonstrate knowledge of the foundational mathematical concepts in computing.	SSC/N0506	Refer to Unique Equipment Required section
3	Basic Algorithms and Application Development	30:00	60:00	Candidates will be able to: • Design algorithms to solve problems and convert them into code using the appropriate programming language constructs. • Read and execute a test case and record the outcome in the appropriate template. Communicate effectively with appropriate people w.r.t. assigned roles in simple English – both oral and written.	SSC/N0506	Refer to Unique Equipment Required section
4	Self and work Management	30:00	70:00	Candidates will be able to: • Establish and agree work requirements with appropriate people . Keep immediate work area clean and tidy • Utilize time effectively • Use resources correctly and efficiently • Treat confidential information correctly • Work in line with organization's policies and procedures • Work within the limits of job role • Obtain guidance from appropriate people, where necessary Ensure work meets the agreed requirements	SSC/N9001	Refer to Unique Equipment Required section

Sr. No.	Module	Theory Duration (hh:mm)	Practical Duration (hh:mm)	Key Learning Outcomes	Corresponding NOS Code	Equipment Required
4	Self and work Management	30:00	70:00	Candidates will be able to: • Establish and agree work requirements with appropriate people • Keep immediate work area clean and tidy • Utilize time effectively • Use resources correctly and efficiently • Treat confidential information correctly • Work in line with organization's policies and procedures • Work within the limits of job role • Obtain guidance from appropriate people, where necessary • Ensure work meets the agreed requirements	SSC/N9001	Refer to Unique Equipment Required section
5	Team Work and Communication	12:00	38:00	Candidates will be able to: • Obtain guidance from appropriate people to agree the analysis to be performed on the data • Obtain advice and guidance from appropriate people on issues with data analysis outside their area of competence or • Review the results of their analysis with appropriate people • Undertake modifications to your analysis based on inputs from appropriate people • Communicate with colleagues clearly, concisely and accurately • Work with colleagues to integrate their work effectively with them • Pass on essential information to	SSC/N9002	Refer to Unique Equipment Required Section

				colleagues in line with organizational requirements • Work i`n ways that show respect for colleagues • Carry out commitments they have made to colleagues • Let colleagues know in good time if they cannot carry out your commitments, explaining the reasons • Identify any problems they have working with colleagues and take the initiative to solve these problems • Follow the organization's policies and procedures for working with colleagues		
6	Managing Health and Safety	12:00	38:00	Candidates will be able to: • Comply with organization's current health, safety and security policies and procedures • Report any identified breaches in health, safety, and security policies and procedures to the designated person • Identify and correct any hazards that can deal with safely, competently and within the limits of authority • Report any hazards that one is not competent to deal with to the relevant person in line with organizational procedures and warn other people who may be affected • Follow their organization's emergency procedures promptly, calmly, and efficiently • Identify and recommend opportunities for improving health, safety, and security to the designated person Complete any health and safety records legibly and accurately		

Sr. No.	Module	Theory Duration (hh:mm)	Practical Duration (hh:mm)	Key Learning Outcomes	Corresponding NOS Code	Equipment Required
7	Data and Information Management	15:00	35:00 `	Candidates will be able to: • Establish and agree with appropriate people the data/information they need to provide, the formats in which you need to provide it, and when they need to provide it • Obtain the data/information from reliable sources • Check that the data/information is accurate, complete and up-to-date • Obtain advice or guidance from appropriate people where there are problems with the data/information • Carry out rule-based analysis of the data/information, if required • Insert the data/information into the agreed formats • Check the accuracy of work, involving colleagues where required • Report any unresolved anomalies in the data/information to appropriate people. Provide complete, accurate and up-to-date • data/information to the appropriate people in the required formats on time	SSC/N9004	Refer to Unique Equipment Required Section

Sr. No.	Module	Theory Duration (hh:mm)	Practical Duration (hh:mm)	Key Learning Outcomes	Corresponding NOS Code	Equipment Required
8	Learning and Self Development	05:00	20:00	Candidates will be able to: • Obtain advice and guidance from appropriate people to develop your knowledge, skills and competence • Identify accurately the knowledge and skills they need for your job role • Identify accurately their current level of knowledge, skills and competence and any learning and development needs • Agree with appropriate people a plan of learning and development activities to address their learning needs • Undertake learning and development activities in line with their plan • Apply new knowledge and skills in the workplace, under supervision • Obtain feedback from appropriate people on their knowledge and skills and how effectively you apply them • Review their knowledge, skills and competence regularly and take appropriate action	SSC/N9005	Refer to Unique Equipment Required Section
	Total Duration:	**114:00**	**286:00**	**Unique Equipment Required:** Training room should be fully furnished with the following equipment / tools / accessories. Additional / specific resources, wherever applicable (e.g. Hardware, software) are indicated in the main text corresponding to relevant learning outcome.		

Sr. No.	Module	Theory Duration (hh:mm)	Practical Duration (hh:mm)	Key Learning Outcomes	Corresponding NOS Code	Equipment Required
				For Domain NOS, For NOS SSC/N0506 – HTML, C++ / Java, IDE General: • Comfortable seats with adequate lighting, controlled temperature and acoustics for training and learning • White Board, Markers and Eraser • Projector with screen • Flip chart with markers • Faculty's PC/Laptop with latest configuration and internet connection • Supporting software / applications for projecting audio, video, recording, • Presentation Tools to support learning activities: • Intranet • Email • IMs • Learning management system e.g. Moodle, Blackboard to enable blended learning • Microphone / voice system for lecture and class activities • Handy Camera • Stationery kit – Staples, Glue, Chart Paper, Sketch Pens, Paint Box, Scale, A4 Sheets For IT Lab sessions: Computer Lab with 1:1 PC : trainee ratio and having internet connection, MS Office / Open office, Browser, Outlook / Any other Email Client and chat tools. • Assessment and Test Tools for day to day online Tests and Assessments • For team discussions: Adequate seating arrangement in full / half circle format for one or more teams as per planned team composition. Reading Resources: Access to relevant sample documents and learning forums to enable self-study before and after each training session.		

Grand Total Course Duration: **400 Hours 0 Minutes**

*(This Syllabus/Curriculum has been approved by **IT-ITeS Sector Skills Council NASSCOM**.)*

Notes from IT-ITeS Sector Skills Council NASSCOM

1. This document outlines the broad scope of coverage. This should be linked with OBF and training delivery plan. OBF (Outcome based framework) reflects the pedagogy used to ensure an expected outcome. Training delivery plan focuses on the sequence of delivery.
2. Though many NOSs have some seemingly common outcomes, notably core/generic, professional and technical skills, it is imperative to understand the contextual difference between them. For example, writing skills required to document program structure and code (in SSC/N0506) are different from the writing skills required to prepare a time plan (in SSC/N9001). Training providers are advised to,
    a. Embed such skills development in the learning pedagogy for each expected outcome
    b. Prepare a detailed session plan for training delivery with focus on sequence and duration of training
    c. Run a diagnostic test to assess prior learning of students and help trainers / students identify the need for gap training, optimal duration and suitable training methodology. Accordingly, more introductory level sessions may be included in guided or self-paced mode of learning. E.g. adding some sessions on Functional English or Use of Internet and MS Office.

Annexure1: Assessment Criteria

Assessment Criteria for Junior Software Developer	
Job Role	**Junior Software Developer**
Qualification Pack	**SSC/Q0508**
Sector Skill Council	**IT-ITeS**

Sr. No.	Guidelines for Assessment
1	Criteria for assessment for each Qualification Pack (QP) will be created by the Sector Skill Council (SSC). Each performance criteria (PC) will be assigned Theory and Skill/Practical marks proportional to its importance in NOS.
2	The assessment will be conducted online through assessment providers authorised by SSC.
3	Format of questions will include a variety of styles suitable to the PC being tested such as multiple choice questions, fill in the blanks, situational judgment test, simulation and programming test.
4	To pass a QP, a trainee should pass each individual NOS. Standard passing criteria for each NOS is 70%.
5	For latest details on the assessment criteria, please visit www.sscnasscom.com.

				MARKS ALLOCATION	
ASSESSMENT OUTCOME (NOS CODE DESCRIPTION)	**Assessment criteria** (PC)	**Total Marks**	**Out Of**	**Theory**	**Skills Practical**
1.SSC/N0506 (Deal remotely with customer queries - Domestic)	PC1. greet customers and verify details, following your organization's procedures	**120**	12.5	2.5	10
	PC2. read carefully, summarize, and obtain **customer** confirmation of, your understanding of queries		12.5	2.5	10
	PC3. express your concern for any difficulties caused and your commitment to resolving queries		15	0	15
	PC4. record and categorize queries accurately using your organization's query management tool		5	0	5
	PC5. refer queries outside your area of competence or authority promptly to appropriate		2.5	0	2.5

	people				
	PC6. access your organization's knowledge base for solutions to queries, where available		2.5	0	2.5
	PC7. resolve queries within your area of competence or authority in line with organizational guidelines and service level agreements (SLAs)		15	0	15
	PC8. obtain advice and guidance from appropriate people, where necessary		2.5	0	2.5
	PC9. obtain confirmation from **c**ustomers that queries have been resolved to satisfaction		10	0	10

	PC10. record the resolution of queries accurately using your organization's query management tool		35	15	20
	PC11. comply with relevant standards, policies, procedures and guidelines when dealing remotely with customer queries		7.5	0	7.5
		NOS Total	**120**	**20**	**100**
2.SSC/N9001 (Manage your work to meet requirements)	PC1. establish and agree your work requirements with appropriate people		10	5	5
	PC2. keep your immediate work area clean and tidy		5	0	5
	PC3. utilize your time effectively		5	5	0
	PC4. use resources correctly and efficiently		5	2.5	2.5
	PC5. treat confidential information correctly	**40**	5	0	5
	PC6. work in line with your organization's policies and procedures		2.5	0	2.5
	PC7. work within the limits of your job role		2.5	0	2.5
	PC8. obtain guidance from appropriate people, where necessary		2.5	0	2.5
	PC9. ensure your work meets the agreed requirements		2.5	0	2.5
		NOS Total	**40**	**12.5**	**27.5**
3.SSC/N9003 (Maintain a healthy, safe and secure workin g environment)	PC1. comply with your organization's current health, safety and security policies and procedures	**40**	10	5	5

	PC2. report any identified breaches in health, safety, and security policies and procedures to the designated person		5	0	5
	PC3. identify and correct any hazards that you can deal with safely, competently and within the limits of your authority		10	5	5
	PC4. report any hazards that you are not competent to deal with to the relevant person in line with organizational procedures and warn other people who may be affected		5	0	5
	PC5. follow your organization's emergency procedures promptly, calmly, and efficiently		5	0	5
	PC6. identify and recommend opportunities for improving health, safety, and security to the designated person		2.5	0	2.5
	PC7. complete any health and safety records legibly and accurately		2.5	0	2.5
		NOS Total	**40**	**10**	**30**

Annexure2: Trainer Prerequisites for Job role: Junior Software Developer mapped to Qualification Pack: SSC/Q0508

Sr. No.	Area	Details
1	**Job Description**	To deliver accredited training service, mapping to the curriculum detailed above, in accordance with the Qualification Pack SSC/Q0508.
2	**Personal Attributes**	Aptitude for conducting training, and pre/ post work to ensure competent, employable candidates at the end of the training. Strong communication skills, interpersonal skills, ability to work as part of a team; a passion for quality and for developing others; well-organised and focused, eager to learn and keep oneself updated with the latest in this field.
3	**Minimum Educational Qualifications**	Minimum 12th Standard; Preferred Master's degree in any discipline

4a	**Domain Certification**	Minimum accepted score in SSC Assessment is 90% per NOS being taught in QP SSC/Q0508. Additional certification in customer orientation, dealing with difficult customers, written communication etc. will be an added advantage.
4b	**Platform Certification**	Recommended that the Trainer is certified for the Job Role: "Trainer" mapped to the Qualification Pack: "SSC/Q1402". Minimum accepted score is 70% per NOS.
5	**Experience**	Field experience: Minimum 2 years' experience in the same domain Training experience: 1 year preferred

Skill India

IT - ITeS SSC NASSCOM

N·S·D·C National Skill Development Corporation
Transforming the skill landscape

Certificate

CURRICULUM COMPLIANCE TO QUALIFICATION PACK – NATIONAL OCCUPATIONAL STANDARDS

is hereby issued by the

IT-ITES SECTOR SKILLS COUNCIL NASSCOM

for the

MODEL CURRICULUM

Complying to National Occupational Standards of
Job Role/ Qualification Pack: '**Junior Software Developer**' QP No. '**SSC/Q0508 NSQF Level 4**'

Date of Issuance: December 31st, 2015

Valid up to*: December 31st, 2016

* Valid up to the next review date of the Qualification Pack

Authorised Signatory
Lakshmi Narayan
(Chairman, IT-ITeS Sector Skills Council NASSCOM)

Model Curriculum

WEB DEVELOPER

WEB DEVELOPER

SECTOR:	**IT-ITeS**
SUB -SECTOR:	**IT Services**
OCCUPATION:	**Application Development**
REFERENCE ID:	**SSC/Q0503, version 1.0**
NSQF LEVEL:	**5**

Format: ModCur_2015_1_0

Model Curriculum for Web Developer SSC/Q0503

Table of Contents

Web Developer

CURRICULUM / SYLLABUS

This program is aimed at training candidates for the job of **Web Developer** in the **IT-ITeS** Sector/Industry and aims at building the following key competencies in the learner.

Program Name	**Web Developer**		
Qualification Pack Name & Reference ID.	Web Developer SSC/Q0503, version 1.0		
Version No.	1.0	**Version Update Date**	31/12/2015
Pre-requisites to Training	Graduate degree/ diploma in web design/ media design or any other related field		
Training Outcomes	**After completing this programme, participants will be able to:** • Contribute to the design of software products and applications • Develop media content and graphic designs for software products and Applications • Manage their work to meet requirements • Work effectively with colleagues • Maintain a healthy, safe and secure working environment • Provide data/information in standard formats • Develop their knowledge, skills and competence		

The Course encompasses all seven National Occupational Standards (NOS) of **Web Developer SSC/Q0503** Qualification Pack issued by **IT-ITeS Sector Skills Council NASSCOM**.

Sr. No.	Module	Theory Duration (hh:mm)	Practical Duration (hh:mm)	Key Learning Outcomes	Corresponding NOS Code	Equipment Required
1	Programming for the Web	20:00	30:00	Candidates will be able to: • Design basic programming structures to implement functionality in line with requirements defined in BRS/URS, SRS and HLD	SSC/N0501	Refer to Unique Equipment Required Section

2	Analysis and Design of Web based Applications	20:00	30:00	Candidates will be able to: Check their understanding of the Business Requirements Specification (BRS)/User	SSC/N0501	Refer to Unique Equipment Required Section

Sr. No.	Module	Theory Duration (hh:mm)	Practical Duration (hh:mm)	Key Learning Outcomes	Corresponding NOS Code	Equipment Required
				Requirements Specification (URS) with appropriate people • Check their understanding of the Software Requirements Specification (SRS) with appropriate people • Check their understanding of High Level Design (HLD) with appropriate people • Review their designs with appropriate people • Analyse inputs from appropriate people to identify, resolve and record design defects and inform future designs • Document their designs using standard templates and tools • Comply with their organization's policies, procedures and guidelines when contributing to the design of software products and applications		

3	Media Content and Graphics Design	20:00	80:00	Candidates will be able to: • Check their understanding of the Business Requirements Specification (BRS), Software Requirements Specification (SRS), High Level Design (HLD) and Low Level Design (LLD) with appropriate people • Access reusable components, media and graphical packages and tools from their organization's knowledge base	SSC/N0503	Refer to Unique Equipment Required Section

				• Convert requirements into media content and graphic designs, leveraging reusable components where available • Review media content and graphic designs with appropriate people and analyze their feedback • Record any defects and corrective actions taken to inform future work • Rework media content and graphic designs, incorporating feedback • Submit media content timely and graphic designs for approval by appropriate people • Update their organization's knowledge base with their experiences of the media content and graphic designs developed • Comply with their organization's policies, procedures and guidelines when developing media content and graphic designs for software products and applications		
4	Self and work Management	12:00	38:00	Candidates will be able to: • Establish and agree their work requirements with appropriate people • Keep their immediate work area clean and tidy • utilize their time	SSC/N9001	Refer to Unique Equipment Required Section

				effectively		

Sr. No.	Module	Theory Duration (hh:mm)	Practical Duration (hh:mm)	Key Learning Outcomes	Corresponding NOS Code	Equipment Required
				• Use resources correctly and efficiently • Treat confidential information correctly • Work in line with organization's policies and procedures • Work within the limits of their job role • Obtain guidance from appropriate people, where necessary • Ensure their work meets the agreed requirements		

5	Team Work and Communication	12:00	38:00	Candidates will be able to: • Communicate with colleagues clearly, concisely and accurately • Work with colleagues to integrate their work effectively with them • Pass on essential information to colleagues in line with organizational requirements • Work in ways that show respect for colleagues • carry out commitments they have made to colleagues • Let colleagues know in good time if they cannot carry out their commitments, explaining the reasons • Identify any problems they have working with colleagues and take the initiative to solve these problems • Follow the organization's policies and procedures for working with colleagues	SSC/N9002	Refer to Unique Equipment Required Section

Sr. No.	Module	Theory Duration (hh:mm)	Practical Duration (hh:mm)	Key Learning Outcomes	Corresponding NOS Code	Equipment Required
6	Managing and Health Safety	05:00	20:00	Candidates will be able to: • Comply with their organization's current health, safety and security policies and procedures • Report any identified breaches in health, safety, and security policies and procedures to the designated person • Identify and correct any hazards that they can deal with safely, competently and within the limits of their authority • Report any hazards that they are not competent to deal with to the relevant person in line with organizational procedures and warn other people who may be affected • Follow their organization's emergency procedures promptly, calmly, and efficiently • Identify and recommend opportunities for improving health, safety, and security to the designated person • Complete any health and safety	SSC/ N 9003	

7	Data and Information Management	15:00	35:00	Candidates will be able to: □ Establish and agree with appropriate people the data/information they need to provide, the formats in which they need to provide it, and when they need to provide it • Obtain the data/information from reliable sources • Check that the data/information is accurate, complete and up-to-date • Obtain advice or guidance from appropriate people where there are problems with the data/information • Carry out rule-based analysis of the data/information, if required • Insert the data/information into the agreed formats • Check the accuracy of their work, involving colleagues where required • Report any unresolved anomalies in the data/information to appropriate people Provide complete, accurate and up-to-date data/information to the appropriate people in the required formats on time	SSC/N9004	Refer to Unique Equipment Required Section

8	Learning and Self Development	5:00	20:00	Candidates will be able to: • Obtain advice and guidance from appropriate people to develop their knowledge, skills and competence • Identify accurately the knowledge and skills they need for their job role • Identify accurately their current level of knowledge, skills and	SSC/N9005	Refer to Unique Equipment Required Section
				competence and any learning and development needs • Agree with appropriate people a plan of learning and development activities to address their learning needs • Undertake learning and development activities in line with their plan • Apply their new knowledge and skills in the workplace, under supervision • Obtain feedback from appropriate people on their knowledge and skills and how effectively they apply them • Review their knowledge, skills and competence regularly and take appropriate action		

	Total Duration:	**109:00**	**291:00**	**Unique Equipment Required**: Training room should be fully furnished with the following equipment / tools / accessories. Additional / specific resources, wherever applicable (e.g. Hardware, software) are indicated in the main text corresponding to relevant learning outcome. For Domain NOSs: • NOS SSC/N0501: HTML5, Javascript, CSS, SQL, Web Builder, Word Press, Joomla and modelling tools such as Visio, UML • NOS SSC/N0503: HTML5, CSS, Flash, Photoshop, Windows media player, Eclipse, XAMPP General: • Comfortable seats with adequate lighting, controlled temperature and acoustics for training and learning

Sr. No.	Module	Theory Duration (hh:mm)	Practical Duration (hh:mm)	Key Learning Outcomes	Corresponding NOS Code	Equipment Required
				• White Board, Markers and Eraser • Projector with screen • Flip chart with markers • Faculty's PC/Laptop with latest configuration and internet connection • Supporting software / applications for projecting audio, video, recording, • Presentation Tools to support learning activities: ○ Intranet ○ Email ○ IMs ○ Learning management system e.g. Moodle, Blackboard to enable blended learning • Microphone / voice system for lecture and class activities □ Handy Camera • Stationery kit – Staples, Glue, Chart Paper, Sketch Pens, Paint Box, Scale, A4 Sheets • For IT Lab sessions: Computer Lab with 1:1 PC:trainee ratio and having internet connection, MS Office / Open office, Browser, Outlook/ other Email Clients • Assessment and Test Tools for day to day online Tests and Assessments • For team discussions: Adequate seating arrangement in full / half circle format for one or more teams as per planned team composition. • Reading Resources: Access to relevant sample documents and learning forums to enable self-study before and after each training session.		

Grand Total Course Duration: **400 Hours 0 Minutes**

*(This Syllabus/Curriculum has been approved by **IT-ITeS Sector Skills Council NASSCOM**.)* **Notes from IT-ITeS Sector Skills Council**

1. This document outlines the broad scope of coverage. This should be linked with OBF and training delivery plan. OBF (Outcome based framework) reflects the pedagogy used to ensure an expected outcome. Training delivery plan focuses on the sequence of delivery.

2. Though many NOSs have some seemingly common outcomes, notably core/generic, professional and technical skills, it is imperative to understand the contextual difference between them. For example, writing skills required write design specifications (in SSC/N0501) are different from the writing skills required to prepare a time plan (in SSC/N9001). Training providers are advised to,
    a. Embed such skills development in the learning pedagogy for each expected outcome
    b. Prepare a detailed session plan for training delivery with focus on sequence and duration of training
    c. Run a diagnostic test to assess prior learning of students and help trainers / students identify the need for gap training, optimal duration, and suitable training methodology. Accordingly, more introductory level sessions may be included in guided or self-paced mode of learning. E.g. adding some sessions on Functional English or Use of Internet and MS Office.

Annexure 1: Assessment Criteria

Assessment Criteria for Web Developer	
Job Role	**Web Developer**
Qualification Pack	**SSC/Q0503**
Sector Skill Council	**IT-ITeS**

Sr. No.	Guidelines for Assessment
1	Criteria for assessment for each Qualification Pack (QP) will be created by the Sector Skill Council (SSC). Each performance criteria (PC) will be assigned Theory and Skill/Practical marks proportional to its importance in NOS.
2	The assessment will be conducted online through assessment providers authorised by SSC.
3	Format of questions will include a variety of styles suitable to the PC being tested such as multiple choice questions, fill in the blanks, situational judgment test, simulation and programming test.
4	To pass a QP, a trainee should pass each individual NOS. Standard passing criteria for each NOS is 70%.
5	For latest details on the assessment criteria, please visit www.sscnasscom.com.

				MARKS ALLOCATION	
ASSESSMENT OUTCOME (NOS CODE AND DESCRIPTION)	**ASSESSMENT CRITERIA** (PC)	**TOTAL MARKS**	**OUT OF**	**THEORY**	**SKILLS PRACTICAL**
1. SSC/N0501 (Contribute to the design of software products and applications)	PC1. check their understanding of the Business Requirements Specification (BRS)/User Requirements Specification (URS) with appropriate people	**100**	10	10	0
	PC2. check their understanding of the Software Requirements Specification (SRS) with appropriate people		10	10	0
	PC3. check their understanding of High Level Design (HLD) with appropriate people		10	10	0
	PC4. design basic programming structures to implement functionality in line with requirements defined in BRS/URS, SRS and HLD		30	0	30
	PC5. review their designs with appropriate people		5	5	0
	PC6. analyze inputs from appropriate people to identify, resolve and record design defects and inform future designs		15	5	10

	PC7. document their designs using standard templates and tools		10	0	10
	PC8. comply with their organization's policies, procedures and guidelines when contributing to the design of software products and applications		10	0	10
		Total	100	40	60
2. SSC/N0503 (Develop media content and graphic designs for software products and Applications)	PC1. check their understanding of the Business Requirements Specification (BRS), Software Requirements Specification (SRS), High Level Design (HLD) and Low Level Design (LLD) with appropriate people	**100**	10	10	0
	PC2. access reusable components, media and graphical packages and tools from their organization's knowledge base		10	0	10
	PC3. convert requirements into media content and graphic designs, leveraging reusable components where available		20	0	20
	PC4. review media content and graphic designs with appropriate people and analyze their feedback		10	5	5
	PC5. record any defects and corrective actions taken to inform future work		10	0	10
	PC6. rework media content and graphic designs, incorporating feedback		10	5	5
	PC7. submit media content and graphic designs for approval by appropriate people		10	0	10
	PC8. update their organization's knowledge base with their experiences of the media content and graphic designs developed		10	0	10
	PC9. comply with their organization's policies, procedures and guidelines when developing media content and graphic designs for software products and applications		10	0	10
		Total	100	20	80
3.SSC/N9001 (Manage their work to meet requirements)	PC1. establish and agree their work requirements with appropriate people	**100**	7.5	0	7.5
	PC2. keep their immediate work area clean and tidy		15	7.5	7.5
	PC3. utilize their time effectively		15	7.5	7.5
	PC4. use resources correctly and efficiently		15	7.5	7.5

	PC5. treat confidential information correctly		7.5	0	7.5
	PC6. work in line with their organization's policies and procedures		15	0	15
	PC7. work within the limits of their job role		7.5	0	7.5
	PC8. obtain guidance from appropriate people, where necessary		7.5	0	7.5
	PC9. ensure their work meets the agreed requirements		10	0	10
		Total	100	22.5	77.5
4.SSC/N9002 (Work effectively with colleagues)	PC1. communicate with colleagues clearly, concisely and accurately	**100**	20	0	20
	PC2. work with colleagues to integrate their work effectively with theirs		10	0	10
	PC3. pass on essential information to colleagues in line with organizational requirements		10	10	0
	PC4. work in ways that show respect for colleagues		20	0	20
	PC5. carry out commitments you have made to colleagues		10	0	10
	PC6. let colleagues know in good time if you cannot carry out their commitments, explaining the reasons		10	10	0
	PC7. identify any problems you have working with colleagues and take the initiative to solve these problems		10	0	10
	PC8. follow the organization's policies and procedures for working with colleagues		10	0	10
		Total	100	20	80
5.SSC/N9003 (Maintain a healthy, safe and secure working environment)	PC1. comply with their organization's current health, safety and security policies and procedures	**100**	20	10	10
	PC2. report any identified breaches in health, safety, and security policies and procedures to the designated person		10	0	10
	PC3. identify and correct any hazards that you can deal with safely, competently and within the limits of their authority		20	10	10
	PC4. report any hazards that you are not competent to deal with to the relevant person in line with organizational procedures and warn other people who may be affected		10	0	10

	PC5. follow their organization's emergency procedures promptly, calmly, and efficiently		20	10	10
	PC6. identify and recommend opportunities for improving health, safety, and security to the designated person		10	0	10
	PC7. complete any health and safety records legibly and accurately		10	0	10
		Total	100	30	70
6.SSC/N9004 (Provide data/information in standard formats)	PC1. establish and agree with appropriate people the data/information you need to provide, the formats in which you need to provide it, and when you need to provide it		15	15	0
	PC2. obtain the data/information from reliable sources		15	0	15
	PC3. check that the data/information is accurate, complete and up-to-date	**100**	15	5	10
	PC4. obtain advice or guidance from appropriate people where there are problems with the data/information		5	5	0
	PC5. carry out rule-based analysis of the data/information, if required		20	0	20
	PC6. insert the data/information into the agreed formats		10	0	10
	PC7. check the accuracy of their work, involving colleagues where required		10	0	10
	PC8. report any unresolved anomalies in the data/information to appropriate people		5	5	0
	PC9. provide complete, accurate and up-to-date data/information to the appropriate people in the required formats on time		5	0	5
		Total	100	30	70
7.SSC/N9005 (Develop their knowledge, skills and competence)	PC1. obtain advice and guidance from appropriate people to develop their knowledge, skills and competence		20	7	13
	PC2. identify accurately the knowledge and skills you need for their job role		14	7	7
	PC3. identify accurately their current level of knowledge, skills and competence and any learning and development needs	**100**	14	0	14
	PC4. agree with appropriate people a plan of learning and development activities to address their learning needs		7	0	7
	PC5. undertake learning and development		12	0	12

	activities in line with their plan				
	PC6. apply their new knowledge and skills in the workplace, under supervision		12	0	12
	PC7. obtain feedback from appropriate people on their knowledge and skills and how effectively you apply them		7	0	7
	PC8. review their knowledge, skills and competence regularly and take appropriate action		14	7	7
		Total	100	21	79

Annexure 2: Trainer Prerequisites for Job role: Web Developer mapped to Qualification Pack: SSC/Q0503

Sr. No.	Area	Details
1	**Job Description**	To deliver accredited training service, mapping to the curriculum detailed above, in accordance with the Qualification Pack SSC/Q0503.
2	**Personal Attributes**	Aptitude for conducting training, and pre/ post work to ensure competent, employable candidates at the end of the training. Strong communication skills, interpersonal skills, ability to work as part of a team; a passion for quality and for developing others; well-organised and focused, eager to learn and keep oneself updated with the latest in this field.
3	**Minimum Educational Qualifications**	Minimum Graduate degree/ diploma in web design/ media design or any other related field; Preferred Master's Degree in Media Design
4a	**Domain Certification**	Minimum accepted score in SSC Assessment is 90% per NOS being taught in QP SSC/Q0503. Certification in relevant software competencies: Software Development Certifications in C++, Embedded, C#, C, Java etc., is an added advantage.
4b	**Platform Certification**	Recommended that the Trainer is certified for the Job Role: "Trainer" mapped to the Qualification Pack: "SSC/1402". Minimum accepted score is 70%.
5	**Experience**	Field experience: Minimum 2 years' experience in the same domain Training experience: 1 year preferred

N·S·D·C
National
Skill Development
Corporation
Transforming the skill landscape

IT - ITeS SSC
NASSCOM

4E-Vandana Building (4th Floor)
11, Tolstoy Marg
New Delhi-110001
Phone: 91-11- 4151 9230/60
Fax: 91-11- 4151 9240
Email: ssc@nasscom.in

Model Curriculum

Software Developer

SECTOR: IT-ITES

OCCUPATION: SUB-SECTOR: IT SERVICES DATA SCIENTISTS

REF. ID: SSC/Q0401, VERSION 1.0
NSQF LEVEL: 7

Skill India

IT - ITeS SSC
NASSCOM

N·S·D·C
National
Skill Development
Corporation
Transforming the skill landscape

Certificate

CURRICULUM COMPLIANCE TO QUALIFICATION PACK – NATIONAL OCCUPATIONAL STANDARDS

is hereby issued by the

IT-ITES SECTOR SKILLS COUNCIL NASSCOM

for the

MODEL CURRICULUM

Complying to National Occupational Standards of
Job Role/ Qualification Pack: '**Software Developer**' QP No. '**SSC/Q0501 NSQF Level 7**'

Date of Issuance: **December 31st, 2015**

Valid up to*: **December 31st, 2016**

* Valid up to the next review date of the Qualification Pack

Authorised Signatory
Lakshmi Narayan
(Chairman, IT-ITeS Sector Skills Council NASSCOM)

TABLE OF CONTENTS

Software Developer

CURRICULUM / SYLLABUS

This program is aimed at training candidates for the job of **Software Developer** in the **IT-ITeS** Sector/Industry and aims at building the following key competencies in the learner.

Program Name	**Software Developer**		
Qualification Pack Name & Reference ID.	Software Developer SSC/Q0501, version 1.0		
Version No.	1.0	**Version Update Date**	31/12/2015
Pre-requisites to Training	BSc (Stat, Math, Physics, Chemistry, Geology) or BE/ BTech		
Training Outcomes	**After completing this programme, participants will be able to:** • Contribute to the design of software products and applications • Develop software code to specification • Manage their work to meet requirements • Work effectively with colleagues • Maintain a healthy, safe and secure working environment • Provide data/information in standard formats • Develop their knowledge, skills and competence		

The Course encompasses all seven National Occupational Standards (NOS) of Software Developer SSC/Q0501 Qualification Pack issued by IT-ITeS Sector Skills Council NASSCOM.

Sr. No.	Module	Key Learning Outcomes	Equipment Required
1	**Programming and Algorithms** **Theory Duration** (hh:mm) 20:00 **Practical Duration** (hh:mm) 30:00 **Corresponding NOS Code** SSC/N0501	Candidates will be able to: • Design basic programming structures to implement functionality in line with requirements defined in BRS/URS, SRS and HLD	Refer to Unique Equipment Required Section
2	**Analysis and Design of Software Applications** **Theory Duration** (hh:mm) 20:00 **Practical Duration** (hh:mm) 30:00 **Corresponding NOS Code** SSC/N0501	Candidates will be able to: • Check their understanding of the Business Requirements Specification (BRS)/User Requirements Specification (URS) with appropriate people • Check their understanding of the Software Requirements Specification (SRS) with appropriate people • Check their understanding of High Level Design (HLD) with appropriate people • Review their designs with appropriate people • Analyse inputs from appropriate people to identify, resolve and record design defects and inform future designs • Document designs using standard templates and tools • Comply with organization's policies, procedures and guidelines when contributing to the design of software products and applications	Refer to Unique Equipment Required Section

3	**Application Development** **Theory Duration** (hh:mm) 20:00 **Practical Duration** (hh:mm) 80:00 **Corresponding NOS Code** SSC/N0502	Candidates will be able to: • Check their understanding of the Business Requirements Specification (BRS), Software Requirements Specification (SRS), High Level Design (HLD) and Low Level Design (LLD) with appropriate people • Access reusable components, code generation tools and unit testing tools from their organization's knowledge base • Convert technical specifications into code to meet the requirements, leveraging reusable components, where available • Create appropriate unit test cases (UTCs) • Review codes and UTCs with appropriate people • Execute UTCs and document results • Rework the code and UTCs to fix identified defects	Refer to Unique Equipment Required Section

Sr. No.	Module	Key Learning Outcomes	Equipment Required
		• Analyse inputs from appropriate people to inform future designs • Record corrective actions for identified defects to inform future designs • Submit tested code timely for approval by appropriate people • Update their organization's knowledge base with their experiences of the code developed • Comply with their organization's policies, procedures and guidelines when developing software code to specification	
4	**Self and work Management** **Theory Duration** (hh:mm) 12:00 **Practical Duration** (hh:mm) 38:00 **Corresponding NOS Code** SSC/N9001	Candidates will be able to: • Establish and agree their work requirements with appropriate people • Keep their immediate work area clean and tidy • utilize their time effectively • Use resources correctly and efficiently • Treat confidential information correctly • Work in line with organization's policies and procedures • Work within the limits of their job role • Obtain guidance from appropriate people, where necessary • Ensure their work meets the agreed requirements	Refer to Unique Equipment Required Section

5	**Team Work and Communication** **Theory Duration** (hh:mm) 12:00 **Practical Duration** (hh:mm) 38:00 **Corresponding NOS Code** SSC/N9002	Candidates will be able to: • Communicate with colleagues clearly, concisely and accurately • Work with colleagues to integrate their work effectively with them • Pass on essential information to colleagues in line with organizational requirements • Work in ways that show respect for colleagues • carry out commitments they have made to colleagues • Let colleagues know in good time if they cannot carry out their commitments, explaining the reasons • Identify any problems they have working with colleagues and take the initiative to solve these problems • Follow the organization's policies and procedures for working with colleagues	Refer to Unique Equipment Required Section
6	**Managing Health and Safety** **Theory Duration** (hh:mm) 05:00	Candidates will be able to: • Comply with their organization's current health, safety and security policies and procedures • Report any identified breaches in health, safety, and security policies and procedures to the designated person • Identify and correct any hazards that they can deal	

Sr. No.	Module	Key Learning Outcomes	Equipment Required
	Practical Duration (hh:mm) 20:00 **Corresponding NOS Code** SSC/ N 9003	with safely, competently and within the limits of their authority • Report any hazards that they are not competent to deal with to the relevant person in line with organizational procedures and warn other people who may be affected • Follow their organization's emergency procedures promptly, calmly, and efficiently • Identify and recommend opportunities for improving health, safety, and security to the designated person • Complete any health and safety	

7	**Data and Information Management** **Theory Duration** (hh:mm) 15:00 **Practical Duration** (hh:mm) 35:00 **Corresponding NOS Code** SSC/N9004	Candidates will be able to: • Establish and agree with appropriate people the data/information they need to provide, the formats in which they need to provide it, and when they need to provide it • Obtain the data/information from reliable sources • Check that the data/information is accurate, complete and up-to-date • Obtain advice or guidance from appropriate people where there are problems with the data/information • Carry out rule-based analysis of the data/information, if required • Insert the data/information into the agreed formats • Check the accuracy of their work, involving colleagues where required • Report any unresolved anomalies in the data/information to appropriate people • Provide complete, accurate and up-to-date data/information to the appropriate people in the required formats on time	Refer to Unique Equipment Required Section
8	**Learning and Self Development** **Theory Duration** (hh:mm) 05:00 **Practical Duration** (hh:mm) 20:00 **Corresponding NOS Code** **SSC/N9005**	Candidates will be able to: • Obtain advice and guidance from appropriate people to develop their knowledge, skills and competence • Identify accurately the knowledge and skills they need for their job role • Identify accurately their current level of knowledge, skills and competence and any learning and development needs • Agree with appropriate people a plan of learning and development activities to address their learning needs • Undertake learning and development activities in line with their plan • Apply their new knowledge and skills in the workplace, under supervision • Obtain feedback from appropriate people on their	Refer to Unique Equipment Required Section
Sr. No.	**Module**	**Key Learning Outcomes**	**Equipment Required**
		knowledge and skills and how effectively they apply them • Review their knowledge, skills and competence regularly and take appropriate action	

	Total Duration **Theory Duration** **109:00** **Practical Duration** **291:00**	**Unique Equipment Required:** Training room should be fully furnished with the following equipment / tools / accessories. Additional / specific resources, wherever applicable (e.g. Hardware, software) are indicated in the main text corresponding to relevant learning outcome. **For Domain NOSs:** • For NOS SSC/N0501: C/C++, UML tools such as Rational suite • For NOS SSC/N0502: JDK / Eclipse General: • Comfortable seats with adequate lighting, controlled temperature and acoustics for training and learning • White Board, Markers and Eraser • Projector with screen • Flip chart with markers • Faculty's PC/Laptop with latest configuration and internet connection • Supporting software / applications for projecting audio, video, recording, • **Presentation Tools to support learning activities:** o Intranet o Email o IMs o Learning management system e.g. Moodle, Blackboard to enable blended learning • Microphone / voice system for lecture and class activities • Handy Camera • Stationery kit – Staples, Glue, Chart Paper, Sketch Pens, Paint Box, Scale, A4 Sheets • For IT Lab sessions: Computer Lab with 1:1 PC: trainee ratio and having internet connection, MS Office / Open office, Browser, Outlook/ other Email Clients • Assessment and Test Tools for day to day online Tests and Assessments • For team discussions: Adequate seating arrangement in full / half circle format for one or more teams as per planned team composition. • Reading Resources: Access to relevant sample documents and learning forums to enable self-study before and after each training session.

Grand Total Course Duration: 400 Hours 0 Minutes
(This Syllabus/Curriculum has been approved by IT-ITeS Sector Skills Council NASSCOM.)

Notes from IT-ITeS Sector Skills Council

1. This document outlines the broad scope of coverage. This should be linked with OBF and training delivery plan.OBF (Outcome based framework) reflects the pedagogy used to ensure an expected outcome. Training delivery plan focuses on the sequence of delivery.

2. Though many NOSs have some seemingly common outcomes, notably core/generic, professional and technical skills, it is imperative to understand the contextual difference between them. For example, writing skills required to communicate results of testing (in SSC/N0501) are different from the writing skills required to prepare a time plan (in SSC/N9001). Training providers are advised to,

a. Embed such skills development in the learning pedagogy for each expected outcome
b. Prepare a detailed session plan for training delivery with focus on sequence and duration of training
c. Run a diagnostic test to assess prior learning of students and help trainers / students identify the need for gap training, optimal duration, and suitable training methodology. Accordingly, more introductory level sessions may be included in guided or self-paced mode of learning. E.g. adding some sessions on Functional English or Use of Internet and MS Office.

Trainer Prerequisites for Job role: Software Developer mapped to Qualification Pack: SSC/Q0501

Sr. No.	Area	Details
1	**Job Description**	To deliver accredited training service, mapping to the curriculum detailed above, in accordance with the Qualification Pack SSC/Q0501.
2	**Personal Attributes**	Aptitude for conducting training, and pre/ post work to ensure competent, employable candidates at the end of the training. Strong communication skills, interpersonal skills, ability to work as part of a team; a passion for quality and for developing others; well-organised and focused, eager to learn and keep oneself updated with the latest in this field.
3	**Minimum Educational Qualifications**	Minimum Bachelor's Degree in Computer Science or any related field; Preferred Master's Degree in Computer Science
4a	**Domain Certification**	Minimum accepted score in SSC Assessment is 90% per NOS being taught in QP SSC/Q0501. Certification in relevant software competencies: Software Development Certifications in C++, Embedded, C#, C, Java etc., is an added advantage.
4b	**Platform Certification**	Recommended that the Trainer is certified for the Job Role: "Trainer" mapped to the Qualification Pack: "SSC/Q1402". Minimum accepted score is 70%.
5	**Experience**	Field experience: Minimum 2 years' experience in the same domain Training experience: 1 year preferred

Annexure: Assessment Criteria

Assessment Criteria for Software Developer	
Job Role	Software Developer
Qualification Pack	SSC/Q0501
Sector Skill Council	IT-ITeS

Sr. No.	Guidelines for Assessment
1	Criteria for assessment for each Qualification Pack (QP) will be created by the Sector Skill Council (SSC). Each performance criteria (PC) will be assigned Theory and Skill/Practical marks proportional to its importance in NOS.
2	The assessment will be conducted online through assessment providers authorised by SSC.
3	Format of questions will include a variety of styles suitable to the PC being tested such as multiple choice questions, fill in the blanks, situational judgment test, simulation and programming test.
4	To pass a QP, a trainee should pass each individual NOS. Standard passing criteria for each NOS is 70%.
5	For latest details on the assessment criteria, please visit www.sscnasscom.com.

				MARKS ALLOCATION	
ASSESSMENT OUTCOME (NOS CODE AND DESCRIPTION)	ASSESSMENT CRITERIA (PC)	TOTAL MARKS	OUT OF	THEORY	SKILLS PRACTICAL
1.SSC/N0501 (CONTRIBUTE TO THE DESIGN OF SOFTWARE PRODUCTS AND APPLICATIONS)	PC1. check their understanding of the Business Requirements Specification (BRS)/User Requirements Specification (URS) with appropriate people	**100**	10	10	0
	PC2. check their understanding of the Software Requirements Specification (SRS) with appropriate people		10	10	0
	PC3. check their understanding of High Level Design (HLD) with appropriate people		10	10	0
	PC4. design basic programming structures to implement functionality in line with requirements defined in BRS/URS, SRS and HLD		30	0	30
	PC5. review their designs with appropriate people		5	5	0
	PC6. analyze inputs from appropriate people to identify, resolve and record design defects and inform future designs		15	0	15
	PC7. document their designs using standard templates and tools		10	0	10
	PC8. comply with their organization's policies, procedures and guidelines when contributing to the design of software products and applications		10	0	10
		Total	100	35	65
2.SSC/N0502 (DEVELOP SOFTWARE CODE TO SPECIFICATION)	PC1. check their understanding of the Business Requirements Specification (BRS), Software Requirements Specification (SRS), High Level Design (HLD) and Low Level Design (LLD) with appropriate people	**100**	5	5	0
	PC2. access reusable components, code generation tools and unit testing tools from their organization's knowledge base		5	0	5
	PC3. convert technical specifications into code to meet the requirements, leveraging reusable components, where available		30	0	30
	PC4. create appropriate unit test cases (UTCs)		10	0	10
	PC5. review codes and UTCs with appropriate people		5	5	0
	PC6. execute UTCs and document results		5	0	5
	PC7. rework the code and UTCs to fix identified defects		10	0	10

	PC8. analyze inputs from appropriate people to inform future designs		5	5	0
	PC9. record corrective actions for identified defects to inform future designs		10	0	10
			5	5	0

				MARKS ALLOCATION	
ASSESSMENT OUTCOME (NOS CODE AND DESCRIPTION)	ASSESSMENT CRITERIA (PC)	TOTAL MARKS	OUT OF	THEORY	SKILLS PRACTICAL
	PC10. submit tested code for approval by appropriate people				
	PC11. update their organization's knowledge base with their experiences of the code developed		5	0	5
	PC12. comply with their organization's policies, procedures and guidelines when developing software code to specification		5	0	5
		Total	100	20	80
3.NOS/N9001 (MANAGE THEIR WORK TO MEET REQUIREMENTS)	PC1. establish and agree their work requirements with appropriate people	**100**	6.25	0	6.25
	PC2. keep their immediate work area clean and tidy		12.5	6.25	6.25
	PC3. utilize their time effectively		12.5	6.25	6.25
	PC4. use **resources** correctly and efficiently		18.75	6.25	12.5
	PC5. treat confidential information correctly		6.25	0	6.25
	PC6. work in line with their organization's policies and procedures		12.5	0	12.5
	PC7. work within the limits of their job role		6.25	0	6.25
	PC8. obtain guidance from appropriate people, where necessary		6.25	0	6.25
	PC9. ensure their work meets the agreed requirements		18.75	6.25	12.5
		Total	**100**	**25**	**75**
4.SSC/N9002 (WORK EFFECTIVELY WITH COLLEAGUES)	PC1. communicate with colleagues clearly, concisely and accurately	**100**	20	0	20
	PC2. work with colleagues to integrate their work effectively with theirs		10	0	10
	PC3. pass on essential information to colleagues in line with organizational requirements		10	10	0
	PC4. work in ways that show respect for colleagues		20	0	20
	PC5. carry out commitments you have made to colleagues		10	0	10

	PC6. let colleagues know in good time if you cannot carry out their commitments, explaining the reasons		10	10	0
	PC7. identify any problems you have working with colleagues and take the initiative to solve these problems		10	0	10
	PC8. follow the organization's policies and procedures for working with colleagues		10	0	10
		Total	**100**	**20**	**80**
5.SSC/N9003 (MAINTAIN A	PC1. comply with their organization's current health, safety and security policies and procedures	**100**	20	10	10

				MARKS ALLOCATION	
ASSESSMENT OUTCOME (NOS CODE AND DESCRIPTION)	ASSESSMENT CRITERIA (PC)	TOTAL MARKS	OUT OF	THEORY	SKILLS PRACTICAL
HEALTHY, SAFE AND SECURE WORKING ENVIRONMENT)	PC2. report any identified breaches in health, safety, and security policies and procedures to the designated person		10	0	10
	PC3. identify and correct any hazards that you can deal with safely, competently and within the limits of their authority		20	10	10
	PC4. report any hazards that you are not competent to deal with to the relevant person in line with organizational procedures and warn other people who may be affected		10	0	10
	PC5. follow their organization's emergency procedures promptly, calmly, and efficiently		20	10	10
	PC6. identify and recommend opportunities for improving health, safety, and security to the designated person		10	0	10
	PC7. complete any health and safety records legibly and accurately		10	0	10
		Total	**100**	**30**	**70**
6.SSC/N9004 (PROVIDE DATA/INFORMATION IN STANDARD FORMATS)	PC1. establish and agree with appropriate people the data/information you need to provide, the formats in which you need to provide it, and when you need to provide it	**100**	12.5	12.5	0
	PC2. obtain the data/information from reliable sources		12.5	0	12.5
	PC3. check that the data/information is accurate, complete and up-to-date		12.5	6.25	6.25
	PC4. obtain advice or guidance from appropriate people where there are problems with the data/information		6.25	0	6.25

	PC5. carry out rule-based analysis of the data/information, if required		25	0	25
	PC6. insert the data/information into the agreed formats		12.5	0	12.5
	PC7. check the accuracy of their work, involving colleagues where required		6.25	0	6.25
	PC8. report any unresolved anomalies in the data/information to appropriate people		6.25	6.25	0
	PC9. provide complete, accurate and up-todate data/information to the appropriate people in the required formats on time		6.25	0	6.25
		Total	**100**	**25**	**75**
7.SSC/N9005 (DEVELOP THEIR KNOWLEDGE, SKILLS AND COMPETENCE)	PC1. obtain advice and guidance from appropriate people to develop their knowledge, skills and competence	**100**	10	0	10
	PC2. identify accurately the knowledge and skills you need for their job role		10	0	10
	PC3. identify accurately their current level of		20	10	10
				MARKS ALLOCATION	
ASSESSMENT OUTCOME (NOS CODE AND DESCRIPTION)	ASSESSMENT CRITERIA (PC)	TOTAL MARKS	OUT OF	THEORY	SKILLS PRACTICAL
	knowledge, skills and competence and any learning and development needs				
	PC4. agree with appropriate people a plan of learning and development activities to address their learning needs		10	0	10
	PC5. undertake learning and development activities in line with their plan		20	10	10
	PC6. apply their new knowledge and skills in the workplace, under supervision		10	0	10
	PC7. obtain feedback from appropriate people on their knowledge and skills and how effectively you apply them		10	0	10
	PC8. review their knowledge, skills and competence regularly and take appropriate action		10	0	10
		Total	**100**	**20**	**80**

IT-ITeS Sector Skill Council
4E-Vandana Building (4th Floor) 11, Tolstoy Marg, New Delhi-110001

Model Curriculum

User Interface (UI) Developer

User Interface (UI) Developer

SECTOR: **IT-ITeS**
SUB-SECTOR: **IT Services**
OCCUPATION: **Application Development**
REFERENCE ID: **SSC/Q0502**
NSQF LEVEL: **7**

Format: ModCur_2015_1_0

Table of Contents

User Interface (UI) Developer

Curriculum / Syllabus

This program is aimed at training candidates for the job of a **User Interface (UI) Developer** in the **IT-ITeS** Sector/Industry and aims at building the following key competencies amongst the learner.

Program Name	**User Interface (UI) Developer**		
Qualification Pack Name & Reference ID.	User Interface (UI) Developer SSC/Q0502		
Version No.	1.0	**Version Update Date**	31/01/2015
Pre-requisites to Training	Bachelor's Degree in Science/Technology/Computers or any graduate course		
Training Outcomes	**After completing this programme, participants will be able to:** • Contribute to the design of software products and applications • Develop software code to specification • Develop media content and graphic designs for software products and applications • Manage your work to meet requirements • Work effectively with colleagues • Maintain a healthy, safe and secure working environment • Provide data/information in standard formats • Develop your knowledge, skills and competence		

This course encompasses all Eight National Occupational Standards (NOS) of **User Interface (UI) Developer** Qualification Pack issued by **IT-ITeS Sector Skills Council NASSCOM**.

Sl. NO	Module	Theory Duration (hh:mm)	Practical Duration (hh:mm)	Key Learning Outcomes	Corresponding NOS Code	Equipment Required
1.	Contribute to the design of software products and applications	17:00	33:00	Candidates will be able to: • check your understanding of the Business Requirements Specification (BRS)/User Requirements Specification (URS) with appropriate people • check your understanding of the Software Requirements Specification (SRS) with appropriate people • check your understanding of High Level Design (HLD) with appropriate people • design basic programming structures to implement functionality in line with requirements defined in BRS/URS, SRS and HLD • review your designs with appropriate people analyze inputs from appropriate people to identify, resolve and record design defects and inform future designs document your designs using standard templates and tools • comply with your organization's policies, procedures and guidelines when contributing to the design of software products and applications.	SSC/N0501	Refer to Unique Equipment Required
2.	Develop software code to specification	20:00	80:00	Candidates will be able to: • check your understanding of the Business Requirements Specification (BRS), Software Requirements Specification (SRS), High Level Design (HLD) and Low Level Design (LLD) with appropriate people • access reusable components, code generation tools and unit testing tools from your organization's knowledge base • convert technical specifications into code to meet the requirements, leveraging reusable components, where available • create appropriate unit test cases (UTCs) • review codes and UTCs with appropriate		

				people • execute UTCs and document results • rework the code and UTCs to fix identified defects • analyze inputs from appropriate people to inform future designs • record corrective actions for identified defects to inform future designs • submit tested code for approval by appropriate people • update your organization's knowledge base with your experiences of the code developed comply with your organization's policies, procedures and guidelines when developing software code to specification		
3.	Develop media content and graphic designs for software products and applications	12:00	38:00	Candidates will be able to: • check your understanding of the Business Requirements Specification (BRS), Software Requirements Specification (SRS), High Level Design (HLD) and Low Level Design (LLD) with appropriate people • access reusable components, media and graphical packages and tools from your organization's knowledge base • convert requirements into media content and graphic designs, leveraging reusable components where available • review media content and graphic designs with appropriate people and analyze their feedback • record any defects and corrective actions taken to inform future work • rework media content and graphic designs, incorporating feedback • submit media content and graphic designs for approval by appropriate people • update your organization's knowledge base with your experiences of the media content and graphic designs developed • comply with your organization's policies, procedures and guidelines when developing media content and graphic designs for software products and applications	SSC/N0503	

Sr. No.	Module	Theory Duration (hh:mm)	Practical Duration (hh:mm)	Key Learning Outcomes	Corresponding NOS Code	Equipment Required
4.	Manage your work to meet requirements	12:00	38:00	Candidates will be able to: • establish and agree your work requirements with appropriate people • keep your immediate work area clean and tidy • utilize your time effectively • use resources correctly and efficiently • treat confidential information correctly • work in line with your organization's policies and procedures • work within the limits of your job role • obtain guidance from appropriate people, where necessary ensure your work meets the agreed requirements	SSC/N9001	
5.	Work effectively with colleagues	10:00	40:00	Candidates will be able to: • communicate with colleagues clearly, concisely and accurately • work with colleagues to integrate your work effectively with theirs • pass on essential information to colleagues in line with organizational requirements • work in ways that show respect for colleagues • carry out commitments you have made to colleagues • let colleagues know in good time if you cannot carry out your commitments, explaining the reasons • identify any problems you have working with colleagues and take the initiative to solve these problems • follow the organization's policies and procedures for working with colleagues	SSC/N9002	

Sr. No.	Module	Theory Duration (hh:mm)	Practical Duration (hh:mm)	Key Learning Outcomes	Corresponding NOS Code	Equipment Required
6.	Maintain a healthy, safe and secure working environment	7:00	18:00	Candidates will be able to: • comply with your organization's current health, safety and security policies and procedures • report any identified breaches in health, safety, and security policies and procedures to the designated person • identify and correct any hazards that you can deal with safely, competently and within the limits of your authority • report any hazards that you are not competent to deal with to the relevant person in line with organizational procedures and warn other people who may be affected • follow your organization's emergency procedures promptly, calmly, and efficiently • identify and recommend opportunities for improving health, safety, and security to the designated person	SSC/N9003	
7.	Provide data/information in standard formats	12:00	38:00	Candidates will be able to: • establish and agree with appropriate people the data/information you need to provide, the formats in which you need to provide it, and when you need to provide it • obtain the data/information from reliable sources • check that the data/information is accurate, complete and up-to-date • obtain advice or guidance from appropriate people where there are problems with the data/information • carry out rule-based analysis of the data/information, if required • insert the data/information into the agreed formats • check the accuracy of your work, involving colleagues where required • report any unresolved anomalies in the data/information to appropriate people provide complete, accurate and upto-date data/information to the appropriate people in the required formats on time	SSC/N9004	

Sr. No.	Module	Theory Duration (hh:mm)	Practical Duration (hh:mm)	Key Learning Outcomes	Corresponding NOS Code	Equipment Required
8.	Develop your knowledge, skills and competence	5:00	20:00	Candidates will be able to: • obtain advice and guidance from appropriate people to develop your knowledge, skills and competence • identify accurately the knowledge and skills you need for your job role • identify accurately your current level of knowledge, skills and competence and any learning and development needs • agree with appropriate people a plan of learning and development activities to address your learning needs • undertake learning and development activities in line with your plan • apply your new knowledge and skills in the workplace, under supervision • obtain feedback from appropriate people on your knowledge and skills and how effectively you apply them	SSC/N9005	

Sr. No.	Module	Theory Duration (hh:mm)	Practical Duration (hh:mm)	Key Learning Outcomes	Corresponding NOS Code	Equipment Required
	Total Duration:	**95:00**	**305:00**	**Unique Equipment Required:** Training room should be fully furnished with the following equipment / tools / accessories. Additional / specific resources, wherever applicable (e.g. Hardware, software) are indicated in the main text corresponding to relevant learning outcome. **Domain NOS requirements** • Visio, UML, freeminds, mockingbird • HTML 5, CSS, Java Script and SQL • IDEs such as Web Builder, Word Press, Joomla Wordpress, psdGraphics etc. • HTML, CSS, Flash, Photoshop, Windows media player, Eclipse, XAMPP **Common requirements** • Comfortable seats with adequate lighting, controlled temperature and acoustics for training and learning • White Board, Markers and Eraser • Projector with screen • Flip chart with markers • Faculty's PC/Laptop with latest configuration and internet connection • Supporting software / applications for projecting audio, video, recording, • Presentation Tools to support learning activities: ○ Intranet ○ Email ○ IMs ○ Learning management system e.g. Moodle, Blackboard to enable blended learning • Microphone / voice system for lecture and class activities Handy Camera • Stationery kit – Staples, Glue, Chart Paper, Sketch Pens, Paint Box, Scale, A4 Sheets • For IT Lab sessions: Computer Lab with 1:1 PC:trainee ratio and having internet connection, MS Office / Open office, Browser, Outlook / Any other Email Client and chat tools. • Assessment and Test Tools for day to day online Tests and Assessments • For team discussions: Adequate seating arrangement in full / half circle format for one or more teams as per planned team composition.		

Grand Total Course Duration: **400 Hours 0 Minutes**

*(This syllabus/ curriculum has been approved **IT-ITeS Sector Skills Council NASSCOM**.)*

Sr. No.	Module	Theory Duration (hh:mm)	Practical Duration (hh:mm)	Key Learning Outcomes	Corresponding NOS Code	Equipment Required
				⊔ Reading Resources: Access to relevant sample documents and learning forums to enable self-study before and after each training session.		

Notes from IT-ITeS Sector Skills Council NASSCOM

1. This document outlines the broad scope of coverage. This should be linked with OBF and training delivery plan. OBF (Outcome based framework) reflects the pedagogy used to ensure an expected outcome. Training delivery plan focuses on the sequence of delivery.
2. Though many NOSs have some seemingly common outcomes, notably core/generic, professional and technical skills, it is imperative to understand the contextual difference between them. Training providers are advised to,
   a. Embed such skills development in the learning pedagogy for each expected outcome
   b. Prepare a detailed session plan for training delivery with focus on sequence and duration of training
3. Run a diagnostic test to assess prior learning of students and help trainers / students identify the need for gap training and suitable training methodology. Accordingly, more introductory level sessions may be included in guided or self-paced mode of learning. E.g. adding some sessions on Functional English or Use of Internet and MS Office.

Annexure1: Assessment Criteria

Assessment Criteria for <QP Name>	
Job Role	**User Interface (UI) Developer**
Qualification Pack	**SSC/Q0502**
Sector Skill Council	**IT-ITeS**

Sr. No.	**Guidelines for Assessment**
1	Criteria for assessment for each Qualification Pack (QP) will be created by the Sector Skill Council (SSC). Each performance criteria (PC) will be assigned Theory and Skill/Practical marks proportional to its importance in NOS.
2	The assessment will be conducted online through assessment providers authorised by SSC.
3	Format of questions will include a variety of styles suitable to the PC being tested such as multiple choice questions, fill in the blanks, situational judgment test, simulation and programming test.
4	To pass a QP, a trainee should pass each individual NOS. Standard passing criteria for each NOS is 70%.
5	For latest details on the assessment criteria, please visit www.sscnasscom.com.

Assessable Outcomes	**Assessment criteria for the outcome**	**Total Mark**	**Out of**	**Theory**	**Skills Practical**
1. SSC/N0501 (Contribute to the design of software products and applications)	PC1. check your understanding of the Business Requirements Specification (BRS)/User Requirements Specification (URS) with appropriate people	**100**	10	10	0
	PC2. check your understanding of the Software Requirements Specification (SRS) with appropriate people		10	10	0
	PC3. check your understanding of High Level Design (HLD) with appropriate people		10	10	0
	PC4. design basic programming structures to implement functionality in line with requirements defined in BRS/URS, SRS and HLD		30	0	30
	PC5. review your designs with appropriate people		5	5	0
	PC6. analyze inputs from appropriate people to identify, resolve and record design defects and inform future designs		15	0	15
	PC7. document your designs using standard templates and tools		10	0	10
	PC8. comply with your organization's policies, procedures and guidelines when contributing to the design of software products and applications		10	0	10
		Total	100	35	65
2. SSC/N0502 (Develop software code to specification)	PC1. check your understanding of the Business Requirements Specification (BRS), Software Requirements Specification (SRS), High Level Design (HLD) and Low Level Design (LLD) with appropriate people	**100**	5	5	0

	PC2. access reusable components, code generation tools and unit testing tools from your organization's knowledge base		10	0	10

Assessable Outcomes	Assessment criteria for the outcome	Total Mark	Out of	Theory	Skills Practical
	PC3. convert technical specifications into code to meet the requirements, leveraging reusable components, where available		10	0	10
	PC4. create appropriate unit test cases (UTCs)		10	0	10
	PC5. review codes and UTCs with appropriate people		5	5	0
	PC6. execute UTCs and document results		10	0	10
	PC7. rework the code and UTCs to fix identified defects		10	0	10
	PC8. analyze inputs from appropriate people to inform future designs		5	5	0
	PC9. record corrective actions for identified defects to inform future designs		10	0	10
	PC10. submit tested code for approval by appropriate people		5	5	0
	PC11. update your organization's knowledge base with your experiences of the code developed		10	0	10
	PC12. comply with your organization's policies, procedures and guidelines when developing software code to specification		10	0	10
		Total	100	20	80
3. SSC/N0503 m (Develop content graphic and for designs softwar products and Applications)	PC1. check your understanding of the Business Requirements Specification (BRS), Software Requirements Specification (SRS), High Level Design (HLD) and Low Level Design (LLD) with appropriate people	**100**	10	10	0
	PC2. access reusable components, media and graphical packages and tools from your organization's knowledge base		10	0	10
	PC3. convert requirements into media content and graphic designs, leveraging reusable components where available		25	0	25
	PC4. review media content and graphic designs with appropriate people and analyze their feedback		10	10	0
	PC5. record any defects and corrective actions taken to inform future work		10	0	10
	PC6. rework media content and graphic designs, incorporating feedback		10	0	10
	PC7. submit media content and graphic designs for approval by appropriate people		5	5	0
	PC8. update your organization's knowledge base with your experiences of the media content and graphic designs developed		10	0	10

	PC9. comply with your organization's policies, procedures and guidelines when developing media content and graphic designs for software products and applications		10	0	10
		Total	100	25	75
4.SSC/N9001 (Manage your work to meet requirements)	PC1. establish and agree your **work requirements** with **appropriate people**	**100**	6.25	0	6.25
	PC2. keep your immediate work area clean and tidy		12.5	6.25	6.25
	PC3. utilize your time effectively		12.5	6.25	6.25
	PC4. use **resources** correctly and efficiently		18.75	6.25	12.5

Assessable Outcomes	Assessment criteria for the outcome	Total Mark	Out of	Theory	Skills Practical
	PC5. treat confidential information correctly		6.25	0	6.25
	PC6. work in line with your organization's policies and procedures		12.5	0	12.5
	PC7. work within the limits of your job role		6.25	0	6.25
	PC8. obtain guidance from **appropriate people**, where necessary		6.25	0	6.25
	PC9. ensure your work meets the agreed requirements		18.75	6.25	12.5
		Total	**100**	**25**	**75**
5.SSC/N9002 (Work effectively with colleagues)	PC1. communicate with colleagues clearly, concisely and accurately	**100**	20	0	20
	PC2. work with colleagues to integrate your work effectively with theirs		10	0	10
	PC3. pass on essential information to colleagues in line with organizational requirements		10	10	0
	PC4. work in ways that show respect for colleagues		20	0	20
	PC5. carry out commitments you have made to colleagues		10	0	10
	PC6. let colleagues know in good time if you cannot carry out your commitments, explaining the reasons		10	10	0
	PC7. identify any problems you have working with colleagues and take the initiative to solve these problems		10	0	10
	PC8. follow the organization's policies and procedures for working with colleagues		10	0	10
		Total	**100**	**20**	**80**
6.SSC/N9003 (Maintain a healthy, safe and secure working environment)	PC1. comply with your organization's current health, safety and security policies and procedures	**100**	20	10	10
	PC2. report any identified breaches in health, safety, and security policies and procedures to the designated person		10	0	10

	PC3. identify and correct any hazards that you can deal with safely, competently and within the limits of your authority		20	10	10
	PC4. report any hazards that you are not competent to deal with to the relevant person in line with organizational procedures and warn other people who may be affected		10	0	10
	PC5. follow your organization's **emergency procedures** promptly, calmly, and efficiently		20	10	10
	PC6. identify and recommend opportunities for improving health, safety, and security to the designated person		10	0	10
	PC7. complete any health and safety records legibly and accurately		10	0	10
		Total	**100**	**30**	**70**
	PC1. establish and agree with appropriate people the data/information you need to provide, the formats	**100**	12.5	12.5	0
Assessable Outcomes	**Assessment criteria for the outcome**	**Total Mark**	**Out of**	**Theory**	**Skills Practical**
7.SSC/N9004 (Provide data/information in standard formats)	in which you need to provide it, and when you need to provide it				
	PC2. obtain the data/information from reliable sources		12.5	0	12.5
	PC3. check that the data/information is accurate, complete and up-to-date		12.5	6.25	6.25
	PC4. obtain advice or guidance from appropriate people where there are problems with the data/information		6.25	0	6.25
	PC5. carry out rule-based analysis of the data/information, if required		25	0	25
	PC6. insert the data/information into the agreed formats		12.5	0	12.5
	PC7. check the accuracy of your work, involving colleagues where required		6.25	0	6.25
	PC8. report any unresolved anomalies in the data/information to appropriate people		6.25	6.25	0
	PC9. provide complete, accurate and up-to-date data/information to the appropriate people in the required formats on time		6.25	0	6.25
		Total	**100**	**25**	**75**
8.SSC/N9005 (Develop your knowledge, skills and competence)	PC1. obtain advice and guidance from appropriate people to develop your knowledge, skills and competence	**100**	10	0	10
	PC2. identify accurately the knowledge and skills you need for your job role		10	0	10

	PC3. identify accurately your current level of knowledge, skills and competence and any learning and development needs		20	10	10
	PC4. agree with appropriate people a plan of learning and development activities to address your learning needs		10	0	10
	PC5. undertake learning and development activities in line with your plan		20	10	10
	PC6. apply your new knowledge and skills in the workplace, under supervision		10	0	10
	PC7. obtain feedback from appropriate people on your knowledge and skills and how effectively you apply them		10	0	10
	PC8. review your knowledge, skills and competence regularly and take appropriate action		10	0	10
		Total	**100**	**20**	**80**

Annexure2: Trainer Prerequisites for Job role: User Interface (UI) Developer mapped to Qualification Pack: SSC/Q0502

Sr. No.	Area	Details
1	**Job Description**	To deliver accredited training service, mapping to the curriculum detailed above, in accordance with the Qualification Pack SSC/Q0502.
2	**Personal Attributes**	Aptitude to conduct training, and pre/ post work to ensure competent, employable candidates at the end of the training. Strong communication skills, interpersonal skills, ability to work as part of a team; a passion for quality and for developing others; well-organised and focused, eager to learn and keep oneself updated with the latest in the mentioned field. The individual should be result oriented. The individual should also be able to demonstrate skills for communication, creative and logical thinking.
3	**Minimum Educational Qualifications**	Bachelor's Degree in Science/Technology/Computers or any graduate course
4a	**Domain Certification**	Minimum accepted score in SSC Assessment is 90% per NOS being taught in SSC/Q0502. Additional certification in computers/technology/ animation/graphics
4b	**Platform Certification**	Recommended that the Trainer is certified for the Job Role: "Trainer" mapped to the Qualification Pack: "SSC/Q1402". Minimum accepted score is 70% per NOS.
5	**Experience**	Field experience: Minimum 2 years' experience in the same domain Training experience: 1 year preferred

Model Curriculum for **User Interface (UI) Developer**

IT-ITeS Sector Skills Council NASSCOM
4E-Vandana Building (4th Floor), 11, Tolstoy Marg, New Delhi-110001
T +91 11 41519230/60 | F +91 11 41519240
www.sscnasscom.com | www.nasscom.in

JSS COLLEGE OF ARTS, COMMERCE & SCIENCE

(An Autonomous College of University of Mysore)

Re-accredited by NAAC with 'A' grade

OOTY ROAD, MYSORE-570 025, KARNATAKA

ESTD-1964

SYLLABUS

B. Voc. (Food Processing & Engineering)

2018 - 2019

DEPARTMENT OF FOOD PROCESSING & ENGINEERING

Scheme of Instruction For B. Voc. (Food Processing & Engineering)								
General Education Component								
(L-Lecture; T-Tutorial; P-Practical/Practice) (1 Credit = 15 Hrs)								
Semesters	**Paper No.**	**Title**	**L:T:P**	**Theory Hours**	**Tutorial Hours**	**Practical Hours**	**Total Hours**	**Total Credits**
Sem I	FPA 020	Communication Language Kannada	3:0:0	45	0	0	45	3
	FPA 510	Biochemistry-I	2:0:1	30	0	15	45	3
	FPA 520	Microbiology-I	2:0:1	30	0	15	45	3
	FPA 540	Computer Fundamentals & DOS	2:0:1	30	0	15	45	3
								12
Sem II	FPB540	Communication Language English	3:0:0	45	0	0	45	3
	FPB 510	Biochemistry-II	2:0:1	30	0	15	45	3
	FPB 520	Microbiology-II	2:0:1	30	0	15	45	3
	FPB 550	Computer C Programming	2:0:1	30	0	15	45	3
								12
Sem III	FPC 550	Indian Constitution	3:0:0	45	0	0	45	3
	FPD 580	Bio statistics	2:0:1	30	0	15	45	3
	FPC 510	Biochemistry-III	2:0:1	30	0	15	45	3
	FPC 520	Microbiology-III	2:0:1	30	0	15	45	3
								12
Sem IV	FPC 570	ICT	2:0:1	30	0	15	45	3
	FPD 510	Biochemistry-IV	2:0:1	30	0	15	45	3
	FPD 520	Microbiology-IV	2:0:1	30	0	15	45	3
	FPD 560	Environmental Studies	3:0:0	45	0	0	45	3
								12
Sem V	FPE 510	Biochemistry-V	4:0:2	60	0	30	90	6
	FPE 520	Microbiology-V	4:0:2	60	0	30	90	6
								12
Sem VI	FPF 510	Biochemistry-V	4:0:2	60	0	30	90	6
	FPF 520	Microbiology-V	4:0:2	60	0	30	90	6
								12

DEPARTMENT OF BIOCHEMISTRY
SCHEME OF INSTRUCTION

Scheme of Instruction For B.Voc- Food Processing and Engineering 2018-19									
General Education Component									
NSQF/ NVE QF Level	**Vocational Qualification**	**Semester**	**Title**	**L:T:P**	**Theory Hours**	**Tutorial Hours**	**Practical Hours**	**Total Hours**	**Credits**
Level- IV	**Diploma**	Semester- I	Biomolecule	2:0:1	30	0	15	45	3
Level- V		Semester-II	Enzymology and Bioenergetics	2:0:1	30	0	15	45	3
Level- VI	**Advanced Diploma**	Semester-III	Metabolism	2:0:1	30	0	15	45	3
		Semester-IV	Biochemical Techniques	2:0:1	30	0	15	45	3
Level- VII	**Degree**	Semester-V	Food and Nutrition	4:0:2	60	0	30	90	6
		Semester-VI	Applied Biochemistry	4:0:2	60	0	30	90	6

Proforma of assessment For B.Voc- Food Processing and Engineering 2018-19
General Education Component-Biochemistry

NSQF/ NVE QF Level	Vocational Qualification	Semester	Title		Theory			Practical				Credits
				Exam		C-1	C-2	Exam		C-1	C-2	
				Code	Marks	Marks	Marks	Code	Marks	Marks	Marks	
Level- IV	**Diploma**	Semester- I	Biomolecule	FPA510	70	10	10	FPA530	70	05	05	3
Level- V		Semester-II	Enzymology and Bioenergetics	FPB510	70	10	10	FPB530	70	05	05	3
Level- VI	**Advanced Diploma**	Semester-III	Metabolism	FPC510	70	10	10	FPC530	70	05	05	3
		Semester-IV	Biochemical Techniques	FPD510	70	10	10	FPD530	70	05	05	3
Level- VII	**Degree**	Semester-V	Food & Nutrition	FPE510	70	10	10	FPE530	70	05	05	6
		Semester-VI	Applied Biochemistry	FPF510	70	10	10	FPF530	70	05	05	6

SCHEME OF VALUATION FOR PRACTICAL EXAMINATION

- ✓ A candidate appearing for the first time should submit a duly signed and certified practical record
- ✓ Each candidate has to perform one experiment in the specified duration of three hours for ***FORTY FIVE*** **marks**
- ✓ Practical record has to be valued for ***TEN m*****arks** by examiners at the time of examination
- ✓ Viva-voce for ***FIFTEEN marks*** in practical is awarded by continuous assessment in the lab

Sl no	Component	Marks
1	Write up of the experiment	15
2	Conducting experiment	25
3	Result	05
4	Viva-voce	15
5	Practical record	10
	TOTAL	**70**

FPA510

SEMESTER I

Paper –I **(30 hours -2 Credits)**

BIOMOLECULES

Course Outcome:

After completion of the course a student is able to

CO1: Explian the structure and properties of carbohydrates, lipids, proteins, and nucleic acids in living organisms

CO2: Describe the structure and functions of RNA and DNA

CO3: Understand the role of vitamins in our body

CO4: Understand the behaviour of proteins in solutions

SECTION-I : Amino Acids & Proteins: **09 hrs**

1. Introduction to Bio-chemistry.
2. Definition, classification and biological functions of Amino acids and proteins.
3. **Amino Acids:** Common structural features. Stereoisomerism and RS system of designating optical isomers. Classification based on the nature of "R" groups. Amino acids present in proteins and non-protein amino acids. Specialized role of amino acids.Physical and Chemical properties of amino acids.Titration of amino acids.
4. **Proteins:** Levels of protein structure. Forces stabilising structure and shape of proteins. Native proteins and their conformations. Behavior of proteins in solutions. Salting in & salting out of proteins. Denaturation of proteins.

SECTION-II: Carbohydrates: **08 hrs**

1. Definition, classification and biological functions of carbohydrates.
2. Monosaccharides-Fischer and Haworth structures of monosacharides,. Derivatives of monosaccharides (Sugar acids, deoxysugars, amino sugars and other derivatives of biological importance). Oligosaccharides (structure of maltose, lactose, sucrose, cellobiose, and trehalose).
3. Homo-and hetero-polysaccharides (structures of starch, inulin, glycogen, cellulose, chitin). Polysaccharides of bacterial cell well.

SECTION-III: Lipids **08 hrs**

1. Definition and classification of lipids, fatty acids (saturated and unsaturated).Essential fatty acids. m. p., b. p. and their relation to molecular size. Fats as source of energy.Waxes.
2. Structures and functions of lipids :Triacylglycerols, phospholipids : lecithins (PhosphotidylCholines),

cephalins (Phosphotidylethanolamines), Phosphatidylserines, phosphatidyl inositol, sphingomyelins,
plasmalogens), cerebrosides, gangliosides.

3. Lipoproteins—Composition, classification and biological functions.Liposomes.
4. Prostaglandins, Leukotrienes, Thromboxanes and their importance.
5. Sources and biochemical functions of water & fat soluble vitamins.

SECTION-IV : Nucleic Acid **05 hrs**

1. Nucleic Acids: Structure and properties of purine and pyrimidine bases. Nucleosides and nucleotides. Biologically important nucleotides. Double helical model of DNA. Denaturation of DNA. Physical and chemical properties of nucleic acids.

FPA530 **PRACTICALS** **(15 Hrs 1 Credits)**

1. Qualitative tests for : (a) Carbohydrates. (b) Amino acids and proteins (c) Cholesterol and lipids **3 Hrs X 2**
2. Estimation of amino acid by formal titration **3 Hrs**
3. Estimation of ascorbic acid by dye method. **3 Hrs**
4. Estimation of reducing sugars by DNS method **3 Hrs**

FPB510 **Semester II**

Paper II **(30 hours – 2 credits)**

ENZYMOLOGY AND BIOENERGETICS

Course Outcome:

After completion of the course a student is able to;

CO1: Describe the role and functions of enzymes.

CO2: Understand the role of cofactor and coenzymes in enzyme catalysed reactions.

CO3: Describe the applications of enzymes in diagnostics.

CO4: Discuss the commercial importance of enzymes.

SECTION-I : Enzymology
08 hrs

Introduction to enzymes - General characteristics of enzymes. Prostheticgroup. Holoenzymes, apoenzyme and cofactors. Coenzymes and their biochemical functions, assay of enzyme activity, units of enzyme activity. Active sites(s) of enzymes.IUB system of nomenclature and classification of enzymes. Enzymes as catalysts. Theories of enzymes catalysis: Acidbase catalysis, covalent catalysis.

SECTION-II: Enzyme Purification : **08 hrs**

Need for purification. Preliminary fractionation procedures and precipitation techniques, Chromatography methods : Gel filteration, adsorption–, ion exchange– and affinity chromatography. Types of support materials.Selection of appropriate conditions and elution procedures.Criteria of enzyme purity.

SECTION-III : Enzyme Kinetics **09 hrs**

Factors affecting velocity of enzyme catalysed reactions: Enzyme concentration, pH and temperature. Michaelis –Menten equation. Determination of Km and its significance.

Enzyme inhibition.Various types of enzyme inhibitions..Enzyme inhibitors and their importance.Allosteric enzymes and enzyme regulation.Isoenzymes and their clinical significance.

SECTION-IV: Bioenergetics **05 hrs**

Biological systems and concept of free energy, Endergonic processes and role of ATP & other high energy compounds. Biological oxidations. Redox potential. Commercial importence of enzymes

FPB530 **PRACTICALS (15 Hrs – 1 Credit)**

.

1. Assay of salivary amylase enzyme activity**.** **3 Hrs**
2. Effect of pH on enzyme activity**.** **3 Hrs**
3. Effect of temperature on enzyme activity **3 Hrs**
4. Effect of substrate concentration on enzyme activity and determination of Km and Vmax **3 Hrs**
5. Effect of activators (NaCl) on salivary enzyme activity **3 Hrs**

FPC510 **Semester III**

Paper – III **(30 hours- 2 Credits)**

METABOLISM

Course Outcome:

After completion of the course a student is able to;

CO1: Gain the knowledge on cellular metabolism and their regulations

CO2: Able to describe the linked pathways of metabolism

CO3: Demonstrate an understanding of the metabolic pathways - the energy-yielding and energy-requiring reactions in life.

CO4: Understand the role of enzymes in metabolic reactions.

SECTION-I

Carbohydrate Metabolism **08 hrs**

Digestion, Absorption and transport of Carbohydrates, Metabolic Pathways, Glycolysis, Pentose Phosphate Pathway, Glucuronate and glyoxylate pathway, TCA cycle, Glycogenolysis& Glycogenesis, Gluconeogenesis. Diseases associated with carbohydrate metabolism.

SECTION-II

Lipid Metabolism **08 hrs**

Digestion, absorption & Transport of Lipids, β-Oxidation of fatty acids. α and ω oxidation of fatty acids Degradation of triglycerides and phospholipids.Formation and utilization of ketone bodies.Biosynthesis of saturated fatty acids ,Biosynthesis of Cholesterol. Diseases associated with Lipid metabolism.

SECTION-III **08 hrs**

Protein Metabolism

Digestion, absorption & transport of Proteins, General Reactions of Amino Acids : Deamination, transamination and decarboxylation. Urea cycle and its significance. Ketogenic and glucogenic amino acids. Biosynthesis of amino acids (Phenyl alanine and Glutamic acid) and their degradation. Diseases associated with Proteins metabolism.

SECTION-IV **06 hrs**

Nucleic acid Metabolism

Degradation of purines and pyrimidines. Biosynthesis of purines, pyrimidines and nucleotides. Catabolism of Heme & Formation of Bile pigments. Diseases associated with Nucleic acid metabolism.

FPC530 **PRACTICALS** **(15 Hrs = 1 Credits)**

1. Estimation of protein by Biuret method. **3 Hrs**
2. Estimation of Ca+ in serum. **3 Hrs**
3. Estimation of iron in drumstics **3 Hrs**
4. Estimation of creatinine in serum. **3 Hrs**

5. Estimation of uric acid in urine **3 Hrs**

FPD510 **Semester IV**

Paper IV **(30 hours -2 Credits)**

BIOCHEMICAL TECHNIQUES

Course Outcome:

After completion of the course a student is able to;

CO1: Use selected analytical techniques for the sepration of biomolecules.

CO2: Differentiate certain functionalities of biomolecules by using spectroscopic techniques.

CO3: Understand the intersection of life and information sciences, using different sequencing and mapping like SDS-PAGE, TLC, GLC and Chromatography.

CO4: Explain the dangers and safety precautions associated with x-rays and identify the various isotopes used in radiography.

SECTION-I **08 hrs**

Spectroscopic Techniques :

Beer-Lambert's Law. Light absorption and its transmittance. Determination and application of extinction coefficient. Principle and Applications of following spectroscopic techniques - U.V.-Visible, infra-red, Fluorescent emission and NMR spectroscopy.

SECTION-II **08 hrs**

Electrophoretic Techniques :

Principles and applications of the following electrophoresis techniques. Paper electrophoresis, PAGE, SDS- PAGE.

Centrifugation Techniques :

Principle of differential and density gradient centrifugation. Ultra centrifuge – construction and applications

SECTION-III **08 hrs**

Chromatographic Techniques:

Principles of Adsorption and Partition chromatography. Techniques of ascending, descending, circular paper chromatography.

Thin Layer Chromatography-Technique and advantages over paper chromatography

Column chromatography – Principle and applications of Gel Filtration chromatography, ion – exchange chromatography.

SECTION-IV **06 hrs**

Radio Isotopic Techniques :

Properties of radioactive emissions.Units of radioactivity. Isotopes and their applications in biological studies - ^{3}H, ^{14}C, ^{131}I, ^{60}CO, and ^{32}P. Techniques used to measure radioactivity- GM counter. Biological hazards of radiation and safety measures in handling radioisotopes.

FPD530 PRACTICAL (15 Hrs = 1 Credits)

1. Identification of amino acids by circular paper chromatography. **3 Hrs**
2. Identification of amino acids by asending Paper chromatography **3 Hrs**
3. Separation of phospholipids by thin layer chromatography. **3 Hrs**
4. Separation of leaf pigments by column chromatography. **3 Hrs**
5. Separation of proteins by PAGE. **3 Hrs**

FPE510 **Semester V**

PaperV **(60 hours-4 Credits)**

FOOD AND NUTRITION

Course Outcome:

After completion of the course a student is able to;

CO1: Explain the theoretical and practical uses on micro and macronutrients.

CO2: Describe the role of electrolytes in nutritional biochemistry and their functions in metabolism.

CO3: Explain the role of nutrients in the optimal functioning of key biochemical pathways in the body.

CO4: Discuss the biological roles and deficiency disorders of proteins.

SECTION-I

15 Hrs

1. Introduction:

Concept of Nutrition, Calorific value of foods and its determination (Bomb calorimeter), different components of energy expenditure, measurement of energy expenditure by direct and indirect calorometric method (principles only) Energy expenditure at rest and work, respiratory quotient, Basal Metabolic Rate (BMR), determination of BMR by indirect calorimetric method, factors affecting BMR. Specific dynamic action of foods.

Proximate analysis of food samples:

Moisture, fiber, ash, proteins, carbohydrates, fats and their importance

Carbohydrates:

Dietary sources, dietary fibres and protein sparing action, glycemic index and its importance

Fats

Dietary sources, Visible and invisible fats, trans fats and its effects in fried foods

Water Metabolism

Distribution in the body, factors maintaining water balance and factors influencing water balance.

SECTION-II **15 Hrs**

1. Proteins:

Dietary sources, nutritional classification, Nutritional value of proteins – PER, Digestive coefficient, NPU and Biological value of proteins (BV). Essential amino acids. Nitrogen balance, mutual supplementation of proteins, Malnutrition – Kwashiorkor and marasmus (causes, clinical signs with symptoms & treatment

Vitamins

Classification, example with structure, dietary sources, daily requirement, biological roles and deficiency disorders with symptoms– Thiamine, Riboflavin, Niacin, pantothenic acid, Pyridoxine, Biotin, Folic acid,.

SECTION – III **15 Hrs**

Structures, dietary sources, daily requirement, biological roles and deficiency disorders with symptoms- Vitamin B12,C,A,D,E & K. Hypervitaminosis.

Minerals:

Dietary sources, physiological functions, deficiency disorders, absorption, balance and excretion of Macro nutrients- Ca, P, Na, K, Cl and Micronutrients – Fe, Zn, Cu, I &Mg

SECTION IV **15Hrs**

Digestion:

Gastrointestinal tract secretions - Composition and functions of Saliva, gastric, bile, pancreatic and intestinal Juices. Appetite, gastrointestinal tract hormones.

Digestion, absorption and transport of carbohydrates, proteins and fats

Antinutritional factors: Sources and harmful effects of anti vitamins (e.g.: avidin, dicumarol), Protease inhibitors, oxalates and fitates. Natural toxicants, (e.g.: Lathyrus sativa).Food adultrants- structure and harmfull effects of - Butter yellow, lead chromate and malachite green.

FPE530 **PRACTICAL** **(30 Hrs = 2 Credits)**

1. Estimation of haemoglobin in blood. **3 Hrs**
2. Identification of Sugars in fruit juice using paper chromatography. **3 Hrs**
3. Determination of nature of inhibition of alkaline phosphatase by cysteine. **3 Hrs**
4. Determination of proteins by dye binding assay. **3 Hrs**
5. Proximate analysis of food samples- Moisture, fibre, protein fat and carbohydrate (by difference) (3 experiments) **3 HrsX3**
6. Detection of adulterants in food. **3 Hrs**
7. Estimation of Calcium in ragi. **3 Hrs**
8. Estimation of Vitamin – C in lemon or gooseberries by DPPH method. **3 Hrs**

FPF510 **Semester VI**

Paper– VI **(60 hours -4 Credits)**

APPLIED BIOCHEMISTRY

Course Outcome:

After completion of the course a student is able to;

CO1: Explain concepts such as gene structure, function, and its regulation.

CO2: Discuss the molecular events and enzymes involved in DNA replication.

CO3: Understand the functions of immune system including organs, cells and receptors.

CO4: Discuss the elementary aspects of the molecular biology of cancer

SECTION-I **10 Hrs**

DNA Organization: Structure of chromatin – Histones and Nucleosomes. Active and inactive chromatin. Compaction of Chromatin. Chromosomes, Structure of Genome in eukaryotes. Rearrangements in Genetic Material. Integration of Chromosomes with viruses. Transposition, Experimental proofs for DNA as genetic material.

SECTION-II **20 Hrs**

DNA Replication : Semiconservative replication-proof. Molecular events and enzymes involved in DNA replication. DNA repair mechanisms. Mutations. RNA Synthesis : Initiation, elongation and termination during RNA synthesis. Transcription signals. Processing of RNA. Introns and Exons. Nucleases.

Genetic Code and Protein Biosynthesis : Characteristics of Genetic code, Deciphering of Genetic Code. Initiation, elongation and termination of protein chains. Post translational modifications in proteins. Inhibitors of protein biosynthesis.

SECTION-III **15 Hrs**

Definition of immune system and antigens. Cells involved in immune response. T-cell and B-cells, Immunoglobulins, chemical structure of the Antibody molecule.Haptens and carrier molecules, cell mediated immune response. Complement system, activation and its role in defense.

Brief discussion of various immunological techniques; Precipitation reactions in gels Haemagglutination, Immuno-fluorescence, radio-immunoassay (RIA), enzyme likedimmunoadsorbent assay (ELISA) and immunoblotting.

SECTION-IV **15 Hrs**

Membranes : Structure and functions of biological membranes, various models of membrane structure. Transport of solutes across membranes, Sodium pump.

Elementary aspects of the Molecular Biology of cancer and introduction to stem cells.Molecular basis of the Origin and Evolution of Life.

FPF530 **PRACTICALS** **(30 Hrs = 2 Credits)**

1. Estimation of DNA by diphenylamine method. **3 Hrs**
2. Effect of temperature on the Viscosity of DNA using Oswald's viscometer. **3 Hrs**
3. Assays of SGPT and SGOT in serum. **3 Hrs X**
4. Extraction of RNA from yeast and its estimation by Orcinol method. **3 HrsX2**
5. Determination of total protein and A/G ratio in serum. **3 Hrs**
6. Estimation of serum phospholipids. **3 Hrs**
7. Immobilization of enzymes/ cells by entrapment in alginate gel. **3 Hrs**
8. Demonstration of ELISA. **3 Hrs**

Pattern of Question Paper for Boc Voc
Semester I to VI
Paper I to VI

Time : 2 Hrs 30 Mins Max Marks 70

1. Answer all the questions in one sentence or a word 10 X 1 = 10

a. ----------
b. ----------
c. ----------
d. ----------
e. ----------
a. ----------
b. ----------
c. ----------
d. ----------
e. ----------

5. Answer any four of the following questions 4 X 5 = 20

a. ----------
b. ----------
c. ----------
d. ----------
e. ----------

6. Answer any four questions of the following 4 X 10 = 40

a. ----------
b. ----------
c. ----------
d. ----------
e. ----------

(Note- 10 Marks may be divided in to 6+4 or 5+5)

I SEMESTER PRACTICAL EXAMINATION

BIOMOLECULES

PRACTICAL I

SCHEME OF EXAMINATION

DURATION: 3 Hours

Maximum Marks: 70

Practical proper: 60

Record marks: 10

NOTE :- Candidates are required to submit the records duly signed by the teacher-in charge and certified by the Head of the Department

PART **15** Marks

The candidate has to write principle and procedure with tabular column for one experiment in the first 15 min. Then the examiner has to put his/her signature and value the paper at the end of the examination

1. Estimation of amino acid by formal titration
2. Estimation of ascorbic acid by dye method.
3. Estimation of reducing sugars by DNS method

PART B

Qualitative Analysis of Biomolecules 30 Marks

Any one of the following substances may be given for identification

1 Carbohydrate – Glucose, Fructose, Galactose, Lactose, Maltose, Sucrose and Starch.

2 Amino acids – Arginine, Tryptophan, Tyrosine, Cystein, Histidine, phenyl alanine

3 Proteins- Albumin and casein.

PART C 15 Marks

Viva

SCHEME OF VALUATION

(ASSESMENT OF EXPARIMENTAL RESULTS)

CLASS RECORDS :

i) For conducting and recording 5 experiments = 07 marks.

4 experiments = 06 marks

Less than 4 experiments = 04 marks

ii) For accuracy and neatness = 03 marks.

PART A

Principle- 7 Marks

Procedure- 8 Marks

PART B

Qualitative Analysis Of Biomolecules

1	Identification of the class of biomolecule	4 Marks
	If carbohydrate is given	
	i) Reducing test(any two test)	7 Marks
	ii) Classification test	6 Marks
	iii) Distinguishing test (aldose or ketose)	6 Marks
	iv) Preparation of osazone and identification	7 Marks
	If aminoacid or protein is given, following tests may be conducted	
	i) Precipitation test	
	ii) Xanthoproteic test	
	iii) Millons test	
	iv) Sakaguchi test	
	v) Lead acetate/Sodium nitroprusside test	5 x 6 = 30 Marks

PART C

Viva- Five questions 5 x 3 = 15 Marks

II SEMESTER PRACTICAL EXAMINATION

ENZYMOLOGY AND BIOENERGETICS

PRACTICAL II

SCHEME OF EXAMINATION

SCHEME OF EXAMINATION

DURATION: 3 Hours

Maximum Marks: 70

Practical proper: 60

Record marks: 10

NOTE:- Candidates are required to submit the records duly signed by the teacher-in charge and certified by the Head of the Department

PART A 15 Marks

The candidate has to write procedure with tabular column for one experiment in the first 15 min.

Then the examiner has to put his/her signature and value the paper at the end of the examination

1. Assay of salivary amylase enzyme activity**.**
2. Effect of pH on enzyme activity**.**
3. Effect of temperature on enzyme activity
4. Effect of substrate concentration on enzyme activity and determination of Km and Vmax
5. Effect of activators (NaCl) on salivary enzyme activity

PART B 30 Marks

Any one of the following experiment may be set

1. Determination of specific activity of Salivary amylase by DNS.
2. Determination of pH optimum of Salivary amylase.
3. Determination of Km and Vmax of Salivary amylase.
4. Determination of initial velocity (time Kinetics) of Salivary amylase.

Note-

1. Specifiv activity:

i) Standard solution of reducing sugar must be supplied by the examiner.

ii) Concentration of protein in enzyme solution must be given to the students.

2. Optimum pH: buffer of 5 different values from 5 to 9 may be given (buffer solutions is to be supplied named as A,B,C,D,E and asked to found out the buffer in which activity is maximum)
3. Optimum time: 10' , 20' , 30' , 40' and 50'range may be considered for the time kinetics.
4. Determination of Km and Vmax: substrates of different concentration range such as 2, 5, 10, 15, 20 and 30 uMole maybe given(Standard graph of the substrate must be given).

PART C 15 Marks

Viva

SCHEME OF VALUATION

(ASSESMENT OF EXPARIMENTAL RESULTS)

CLASS RECORDS :

i) For conducting and recording 5 experiments = 07 marks.

4 experiments = 06 marks

Less than 4 experiments = 04 marks

ii) For accuracy and neatness = 03 marks.

PART B

Distribution of marks for enzyme assay

1. Tabular column	5 Marks
2. For conduction of experiment	12 Marks
3. Graph	5 Marks
4. Calculation	4 Marks
5. Result	4 Marks

PART C

Viva- Five questions 5 x 3 = 15 Marks

III SEMESTER PRACTICAL EXAMINATION

METABOLISM

PRACTICAL III

SCHEME OF EXAMINATION

SCHEME OF EXAMINATION

DURATION: 3 Hours

Maximum Marks: 70

Practical proper: 60

Record marks: 10

NOTE:- Candidates are required to submit the records duly signed by the teacher-in charge and certified by the Head of the Department

PART A 15 Marks

The candidate has to write procedure with tabular column for one experiment in the first 15 min. Then the examiner has to put his/her signature and value the paper at the end of the examination

1. Estimation of protein by Biuret method.
2. Estimation of Ca+ in serum.
3. Estimation of iron in drumstics
4. Estimation of creatinine in serum
5. Estimation of uric acid in urine

PART B 30 Marks

Any one of the following experiment may be set

1. Estimation of protein by Biuret method.
2. Estimation of Ca+ in serum.
3. Estimation of iron in drumstics
4. Estimation of creatinine in serum
5. Estimation of uric acid in urine

PART C 15 Marks

Viva

SCHEME OF VALUATION

(ASSESMENT OF EXPARIMENTAL RESULTS)

CLASS RECORDS :

i) For conducting and recording 5 experiments = 07 marks.

4 experiments = 06 marks

Less than 4 experiments = 04 marks

ii) For accuracy and neatness = 03 marks.

PART A

Principle- 7 Marks

Procedure- 8 Marks

PART B

Assessment of experimental results for colorimetric estimation

Preparation standard and working solution - 5 Marks

Distribution of marks for assay

1. Tabular column	5 Marks
2. For conduction of experiment	5 Marks
3. Graph	5 Marks
4. Result	
Up to 10% error	10 Marks
Up to 15% error	8 Marks
Up to 20% error	6 Marks
Any other value	4 Marks

Assessment of experimental results for Calcium estimation

Preparation of standard solution and calculation of the normality - 6 Marks

Discripancy	Standardization	Estimation
0.1 ml	10 Marks	10 Marks
0.2 ml	8 Marks	8 Marks
0.3 ml	6 Marks	6 Marks
Any other value	4 Marks	4 Marks
Calculation	2 Marks	2 Marks

PART C

Five questions 5x 3 = 15 Marks

IV SEMESTER PRACTICAL EXAMINATION
BIOCHEMICAL TECHNIQUES

PRACTICAL IV

SCHEME OF EXAMINATION

SCHEME OF EXAMINATION

DURATION: 3 Hours

Maximum Marks: 70

Practical proper: 60

Record marks: 10

NOTE:- Candidates are required to submit the records duly signed by the teacher-in charge and certified by the Head of the Department

PART A 15 Marks

The candidate has to write procedure with tabular column for one experiment in the first 15 min. Then the examiner has to put his/her signature and value the paper at the end of the examination

1. Identification of amino acids by circular paper chromatography.
2. Identification of amino acids by asending Paper chromatography
3. Separation of phospholipids by thin layer chromatography.
4. Separation of leaf pigments by column chromatography
5. Separation of proteins by PAGE

PART B 30

Marks

Any one of the following experiment may be set

1. Identification of amino acids by circular paper chromatography.
2. Identification of amino acids by asending Paper chromatography
3. Separation of phospholipids by thin layer chromatography.
4. Separation of leaf pigments by column chromatography

PART C 15

Marks

Viva

SCHEME OF VALUATION

(ASSESMENT OF EXPARIMENTAL RESULTS)

CLASS RECORDS :

i) For conducting and recording 5 experiments = 07 marks.
4 experiments = 06 marks
Less than 4 experiments = 04 marks

ii) For accuracy and neatness = 03 marks.

PART A

Principle- 7 Marks

Procedure- 8 Marks

PART B

1. Principle and Procedure writing……12 marks

2. For development of Chromatogram…… 12 marks

3. For correct identification……6marks

PART C

Viva- Five questions 5x 3 = 15 Marks

V SEMESTER PRACTICAL EXAMINATION

FOOD AND NUTRITION

PRACTICAL V

SCHEME OF EXAMINATION

SCHEME OF EXAMINATION

DURATION: 3 Hours

Maximum Marks: 70

Practical proper: 60

Record marks: 10

NOTE:- Candidates are required to submit the records duly signed by the teacher-in charge and certified by the Head of the Department

PART A 15 Marks

The candidate has to write procedure with tabular column for one experiment in the first 15 min. Then the examiner has to put his/her signature and value the paper at the end of the examination

1. Identification of Sugars in fruit juice using paper chromatography.
2. Proximate analysis of food samples- Moisture, fibre, protein fat and carbohydrate (by difference) (3 experiments)
3. Detection of adulterants in food.

PART B 30 Marks

Any one of the following experiment may be set

1. Estimation of haemoglobin in blood.
2. Determination of nature of inhibition of alkaline phosphatase by cysteine.
3. Determination of proteins by dye binding assay.
4. Estimation of Calcium in ragi.
5. Estimation of Vitamin – C in lemon or gooseberries by DPPH method

.

PART C 15 Marks

Viva

SCHEME OF VALUATION

(ASSESMENT OF EXPARIMENTAL RESULTS)

CLASS RECORDS :

i) For conducting and recording 5 experiments = 07 marks.
4 experiments = 06 marks
Less than 4 experiments = 04 marks

ii) For accuracy and neatness = 03 marks.

PART A

Principle- 7 Marks

Procedure- 8 Marks

PART B

Assessment of experimental results for colorimetric estimation

Preparation standard and working solution - 5 Marks

Distribution of marks for assay

1. Tabular column	5 Marks
2. For conduction of experiment	5 Marks
3. Graph	5 Marks
4. Result	
Up to 10% error	10 Marks
Up to 15% error	8 Marks
Up to 20% error	6 Marks
Any other value	4 Marks

Assessment of experimental results for Calcium and vitamin C estimation

Preparation of standard solution and calculation of the normality - 6 Marks

Discripancy	Standardization	Estimation
0.1 ml	10 Marks	10 Marks
0.2 ml	8 Marks	8 Marks
0.3 ml	6 Marks	6 Marks
Any other value	4 Marks	4 Marks
Calculation	2 Marks	2 Marks

PART C

Viva- Five questions 5 x 3 = 15 Marks

VI SEMESTER PRACTICAL EXAMINATION

APPLIED BIOCHEMISTRY
PRACTICAL VI

SCHEME OF EXAMINATION

SCHEME OF EXAMINATION

DURATION: 3 Hours

Maximum Marks: 70

Practical proper: 60

Record marks: 10

NOTE:- Candidates are required to submit the records duly signed by the teacher-in charge and certified by the Head of the Department

PART A 15 Marks

The candidate has to write procedure with tabular column for one experiment in the first 15 min. Then the examiner has to put his/her signature and value the paper at the end of the examination

1. Effect of temperature on the Viscosity of DNA using Oswald's viscometer.
2. Extraction of RNA from yeast.
3. Immobilization of enzymes/ cells by entrapment in alginate gel
4. Demonstration of ELISA

PART B 30

Marks

Any one of the following experiment may be set

1. Estimation of DNA by diphenylamine method.
2. Assays of SGPT and SGOT in serum.
3. Estimation RNA by Orcinol method.
4. Determination of total protein and A/G ratio in serum.
5. Estimation of serum phospholipids.
6.

PART C 15

Marks

Viva

SCHEME OF VALUATION

(ASSESMENT OF EXPARIMENTAL RESULTS)

CLASS RECORDS :

i) For conducting and recording 5 experiments = 07 marks.
4 experiments = 06 marks
Less than 4 experiments = 04 marks
ii) For accuracy and neatness = 03 marks.

PART A

Principle- 7 Marks

Procedure- 8 Marks

PART B

Assessment of experimental results for colorimetric estimation

Preparation standard and working solution - 5 Marks

Distribution of marks for assay

1. Tabular column 5 Marks
2. For conduction of experiment 5 Marks
3. Graph 5 Marks
4. Result
   - Up to 10% error 10 Marks
   - Up to 15% error 8 Marks
   - Up to 20% error 6 Marks
   - Any other value 4 Marks

PART C

Viva- Five questions 5 x 3 = 15 Marks

REFERENCES

1. Title- Basic Inorganic chemistry, 2nd edn.,Author-Cotton,F.A.,Gaus,P.I and Wilkinson,G.(1986),

2. Publication - John Wiley

3. Title - Fundamentals of general organic chemistry and biological chemistry, 4th edn, Author-Holum,J.R.(1990), Publication- Wiley International.

4. Modern Inorganic chemistry,Jolly,W.L.(1984), McGraw Hill

5. Concise Inorganic Chemistry,4th edn, Lee,J.D.(1991),Chapman and Hall

6. General Chemistry,5th edn,Petrucci,R.H.(1989), Collier MacMillan

7. Principles Of Inorganic Chemistry,20th edn., Puri.B.R and Sharma,L.R.(1989), S.L.N.Chand and Co.

8. Textbook of Inorganic Chemistry,19th Revd.,Soni,P.L.(1989),Sulthan Chand and Sons.

9. General and Inorganic Chemistry I and II(1989,1990), Prasaranga, BangaloreUniversity.

10. Physical Chemistry For The Life Sciences,Barrow,G.M.(1974)

11. Modern Physical Chemistry, Liptrot,G.T., Thompson.J.J.and

12. Walker,G.R.(1982),ELBS/Bell and Hyman.

13. A Biologists Physical Chemistry, 2nd edn.,Morris,J.G.(1974), Edward Arnold.

14. Principles Of Physical Chemistry,30th edn.,Puri,B.R.,Sharma,L.R. and Pathania,N.S.(1989),S.L.N.Chand and Co.

15. Physical Chemistry Of Biological Systems,Raymond Change

16. Textbook Of Physical Chemistry,17th revd. Edn.,Soni,P.L. and Dharmarha,D.P(1990),Sulthan Chand and Sons.

17. Basic Physical Chemistry For The Life Sciences,2nd edn.Williams,V.R. and Williams,H.B.(1973),Freeman.

18. Physical chemistry, I and II(1988,1990),Prasaranga,Bangalore University.

19. Principles of instrumental analysis- D.A. Skoog, Holt-Saunders -1985.

20. Laboratory manual of Biochemistry- J.Jayaraman, Wiley Eastern

21. Laboratory Techniques in Biochemistry and Molecular Biology – Work and work

22. Molecular Biology and Biotechnology – 3rd Edition Ed. J. M. Walker and E. B. Gingold - Published by The Royal Society of Chemistry

23. Biochemistry of Lipid and Membranes – D. E. Vance and J. E. Vance (Eds.)

24. Principles of Biochemistry – General Aspects. White, Handler and Smith

25. Basic Principles of Organic Chemistry – Roberts and Caserio

26. Genetics – Strickberges

27. Gene Expression – R. E. Glass – 1983

28. Microbial Genetics – D. Friefelder, 1997

29. Cell and Molecular Biology - R. Schlief – 1987

30. Genetics of Bacteria and their Viruses - W. Hayes.

31. The Molecular Biology of the cell – Alberts *et al*., 1983

32. Plant Molecular Biology – A practical Approach - C. H. Shaw

33. Bacterial Plasmids – P. Breda

34. Genetic Engineering, Vol. 1-4, Villiamson (Eds.)

35. Genetic Engineering, Vol. 1-7, Setlow and Bolander (Eds.)

36. Gene Cloning – Glover, 1984

37. Recombinant DNA - Watson *et al.,* 1983

38. Esssentials of Immunology – Roitt, I. M. , 1983

39. Monoclonal Antibodies – Priniciples and Practice - J. W. Goding, 1983

40. Hybridoma Techniques – A Laboratory Course – Muthukkarppan, V. K. , Baskar, S., and Sinigagalia, F. 1986

41. Vaccines 86: New Approaches to immunisation – Brown, F., Chanak, R. M. and Lerner, R. A. ED. 1986

42. Moleculsar Biology of the Gene – J. D. Watson

43. Molecular Cell Biology – Darnell *et al*.

44. The Gene - Levine

45. Biostatistical Analysis – Zar, J. H. 1984

46. Statistics and Experimental Design – Clarke, G. M. 1980

47. Microbial Products, Biomass and Primary Product – Rehm, H. J. and Reed, G. Vol. 3

48. Food and Feed Production with Microorganisms - Rehm, H. J. and Reed, G. Vol. 5

49. Microbial Transformations and special Processes - Rehm, H. J. and Reed, G. Vol. 6

50. Plant Biotechnology – King, S. D. and Arntzen, C. D., 1989.

51. Somaclonal Variation in Crop Improvement – Bajaj, Y. P. S., (Ed.) 1990.

52. Haploids in Crop Improvement – Bajaj, Y. P. S., (Ed.) 1990.

53. Comprehensive Biotechnology - Vols. 2, 3, & 4. M. Moo-Yound, Ed. 1985.

54. Fundamentals of Biotechnology – P. Prave, V. Paunt, W. Sitting and D. A. Sukatesn (Ed.) 1987

55. Biochemical Engineering Fundamentals – J. E. Bailey and D. F. Ollis, !977.

DEPARTMENT OF MICROBIOLOGY

Revised Scheme of Instruction For B.Voc- Food Processing and Engineering 2016-17									
General Education Component									
NSQF/ NVE QF Level	**Vocational Qualification**	**Semester**	**Title**	**L:T:P**	**Theory Hours**	**Tutorial Hours**	**Practical Hours**	**Total Hours**	**Credits**
Level- IV	**Diploma**	Semester-I	Fundamentals of Microbiology	2:0:1	30	0	15	45	3
Level- V		Semester-II	Microbial Physiology And Metabolism	2:0:1	30	0	15	45	3
Level- VI	**Advanced Diploma**	Semester-III	Food Microbiology	2:0:1	30	0	15	45	3
		Semester-IV	Immunology	2:0:1	30	0	15	45	3
Level- VII	**Degree**	Semester-V	Pathogenic Microbiology	4:0:2	60	0	30	90	6
		Semester-VI	Medical Microbiology	4:0:2	60	0	30	90	6

Paper code: FPA520 **MICROBIOLOGY** **30hours-2 Credits**

I B.Voc., I Semester

TITLE: FUNDAMENTALS OF MICROBIOLOGY

Course outcome:

After successful completion of this course students are able to:

CO1: Gain basic knowledge about Microbiology starting from history to Microorganisms.

CO2: Various Culture media and their applications and also understand various physical and chemical means of sterilization.

CO3: Know about microbial techniques for isolation of pure cultures of bacteria.

CO4: To identify the bacteria based on staining and cultural characteristics.

CO5: Able to perform routine culture handling tasks safely and effectively.

CO6: The maintenance and preservation of cultures.

UNIT-I **10Hrs**

1. History: Contributions of - Antony van Leeuwenhoek,Edward Jenner, Louis Pasteur, Robert Koch, Dmitry Iwanowski, Alexander Fleming (in brief).
   Development and scope of Microbiology. Branches of Microbiology.
2. Microscopy: Types of Microscope, Construction and working principle of bright field microscope. Dark field, fluorescence and phase contrast microscopy(application). Electron microscopy- Types, applications and their limitations.
3. Staining technique: Types of stains, Principle of Simple, negative and differential staining techniques (gram's staining).

UNIT-II **06hrs**

Sterilization technique: Definition – Sterilization, disinfection, antiseptic, antibiosis, Fungicide, Bactericide.

A. Physical methods:

a) Heat – i) Dry heat – Hot air

ii) Moist heat method – Autoclave and Pressure cooker

b) Filtration–Types of filters: Membrane filter, Hepa filter (e.g., Laminar air flow)

c) Radiation methods – UV rays, Gamma rays and Cathode rays

B. Chemical method: Use and mode of action of- Alcohols, Aldehydes, Halogens and Phenols.

UNIT-III **06hrs**

Media – Types, Pure culture and Cultural characteristics: Serial dilution, pure culture by isolation – Pour plate, Spread plate, Streak plate and Micromanipulator techniques . Colony characteristics – plate cultures/solid media and broth cultures/liquid media. Maintenance and Preservation of pure cultures – Sub culturing, overlaying with mineral oil, Refigeration

(4^0C) Lyophilization and cryopreservation.

UNIT-IV **08hrs**

1. Comparative account of Prokaryotic and eukaryotic cell**.** Systems of classification: Haeckel's three-kingdom,Whittaker's five-kingdom and Cavalier-Smith's eight kingdom classification.
2. General characteristics of bacteria, fungi, actinomycete, virus, protozoa and algae. Organization of cell wall, cell membrane, flagella capsules and formation of spores in bacteria.
3. Bacteriophages : Morphology and multiplication(T-4 phage)

PRACTICALS **15 Hrs -1 Credit**

1. Staining and mounting of algae and fungi **3Hrs x1**
2. Simple,Negative and Gram's staining **3Hrs x1**
3. Preparation of culture media- Nutrient agar, PDA and NB **3Hrs x1**
4. Methods of obtaining pure cultures of microorganism-Spread plate, pour plate and streak plate and subculturing **3Hrs x1**
5. Isolation of microorganisms from soil by serial dilution technique (Bacteria and Fungi) **3Hrs x1**

Paper code: FPB520 **MICROBIOLOGY** **30hours-2 Credits**

I B.Voc.,II Semester

TITLE: MICROBIAL GROWTH AND METABOLISM

Enable the students to have sound knowledge about:

CO1. Inculcate the knowledge regarding microbial growth, functions, physiology and metabolism.

CO2. Understand the microbial transport systems and microbial metabolism

CO3. Know the microbial growth in response to environmental factors.

CO4. Get equipped with various methods of bacterial growth measurement.

CO5. Knowledge of properties, structure, function of enzymes, enzyme kinetics and their regulation.

UNIT: I **08Hrs**

1. Major nutritional type of Microorganisms.
2. Nutritional requirements of Microorganisms. Elementary nutrients: Carbon, Nitrogen, Sulphur, Oxygen and Energy sources, Vitamins and Growth factors.
3. Uptake of nutrients: Diffusion- Simple and Facilitated, Active transport (use of Proton motive force, ATP : ABC transporter), Group translocation, Iron uptake.

UNIT: II **07Hrs**

1. Definition, Growth rate and generation time. The growth curve in batch culture - Phases of growth and their significance.
2. Physical and chemical factors affecting growth-Temperature, pH, Oxygen and saline (water activity) Requirements. Measurement of growth by cell number (Haemocytometer) and cell mass (Turbidometer).

UNIT:III **05Hrs**

Microbial Enzymes: Definition, Nomenclature, Classification, Properties, Mode and Mechanism of enzyme action, Factors effecting enzyme action. Cofactors and Coenzymes.

UNIT:IV **10Hrs**

Aerobic respiration: Definition, Sugar degradation pathways - EMP, HMP and ED pathways. Ultra structure of Mitochondrion, Formation of acetyl CoA from pyruvate, TCA cycle, Electron transport system and Oxidative phosphorylation

Anaerobic respiration: Introduction, Anerobic respiration with special reference to dissimilatory Nitrate reduction. (Denitrification; nitrate /nitrite and nitrate/ammonia respiration; fermentative nitrate reduction) Fermentation - Alcohol fermentation and Pasteur effect; Lactate fermentation (homofermentative and heterofermentative pathways).

PRACTICALS

15 hours– 01 Credit

1. Effect of temperature and pH on growth of bacteria. **3Hrs x1**
2. Acid and gas production from carbohydrates- Demonstration of fermentation of lactose **3Hrs x1**
3. Turbidimetric/spectrophotometric monitoring of growth using liquid cultures **3Hrs x1**
4. Cell counting by Haemocytometer **3Hrs x1**
5. Starch hydrolysis **3Hrs x1**

Paper code: FPC520 MICROBIOLOGY 30hours-2 Credits

II B.Voc.,III Semester

TITLE: FOOD MICROBIOLOGY

Enable the students to get sufficient knowledge about:

CO1.Food related microorganisms, their contamination, spoilage and preservation

CO2. The significance and activities of microorganisms in food

CO3. Understand the food borne intoxication and infections.

CO4. Learn about food safety and quality control.

CO5. The principles involving various methods of food preservation.

UNIT:I 10Hrs

1. Introduction to Food Microbiology: Definition, Concept and Scope. Food as a substrate for microorganisms. **.**
2. Contamination, preservation and spoilage in various foods viz. – fruits and vegetables, canned foods, cereals and cereal product(cereal grains, flour, bread, pasta, macroni), sugars & sugars products (Honey, Candy), Meat (Fresh meat, fish), Milk and Milk products (cheese, butter).

UNIT:II 05Hrs

1. Methods of food preservation: Physical method – high temperature, low temperature, canning. Drying – solar drying, drum drying, spray drying. Radiation.
   Chemical methods – chemical preservatives – salient features of the chemical preservatives (propionates, benzoate, sorbates, nitrates and nitrites, sulphur dioxide and sulphates, sugar and salt)

UNIT:III 05Hrs

1. Food borne intoxication and infection:
   Bacterial intoxication- Botulism,
   Bacterial infection- Salmonellosis.
   Mycotoxin – Origin, types and importance of toxins with reference to Aflatoxins.

2.. Food safety and quality control. –A brief account on FPO, HACCP, Food laws and Food standards (in brief)

UNIT:IV 10Hrs

1. Microorganisms of industrial importance. Biology of industrial microorganisms: Isolation, Screening, Improvement and Preservation.
2. Raw materials-Molasses, corn steep liquor, sulphite waste liquor and whey. Buffers, Precursors, Inhibitors and Antifoam agents.

3. Fermenters and fermentation process: Design, types and basic function of fermenters, Fermentation process – Surface, Submerged and Solid state fermentation. Types- Batch and Continuous fermentation.

4.Yeasts (Baker's) and its uses, Production of : Wine , Alcohol and lactic acid.

PRACTICALS **3hrsX5 practicals**

1. Isolation and identification of fungi from spoiled fruits and vegetables **3hrsx1**
2. Isolation and enumeration of bacteria from spoiled fruits and vegetables **3hrsx1**
3. Production of citric acid using *Aspergillus niger*. **3hrsx1**
4. Estimation of lactic acid in milk **3hrsx1**
5. Preparation of alcohol using jaggery or molasses. **3hrsx1**

Paper code: FPD520 **MICROBIOLOGY** **30hours-2 Credits**

II B.Voc.,IV Semester

TITLE: IMMUNOLOGY

The course provides a solid foundation to understand:

CO1. Demonstrate and understanding the key concepts in immunology.

CO2. Understand the overall organization of the immune system.

CO3. To make them understand the salient features of antigen antibody reaction & its uses in diagnostics and various other studies.

CO4 .Learn about immunization , preparation and its importance.

UNIT-I **10 hrs**

Introduction and history of Immunology,

Innate immunity- Physical Barriers, Biochemical, Cellular, Genetic factors, Body temperature, inflammation and fever

Acquired Immunity- Active & Passive Immunity,

Immune organs and cells: Primary lymphoid organs (Thymus, Bone marrow) & Secondary Lymphoid organs (Lymphnodes, Spleen and tonsils). Mucosa Associated Lymphoid tissue (MALT).

Immune cells- Role of immune cells. Stem cells. Lymphocytes- B lymphocytes-lymphocytes and Null cells. Types of T-cells. Macrophages: Types and function of macrophages.

Immune Response: Humoral Immune Response, Cell Mediated Immune response and Mechanism of AMI and CMI

UNIT-II **05 hrs**

Antigens: Nature and types.

Antibodies: Basic structure of immunoglobulin-IgG, Biological properties of immunoglobulins, Monoclonal antibodies. Function and type of antibodies.

UNIT-III **08 hrs**

Antigen- Antibody reactions: Salient features of Antigen-Antibody reaction. Precipitation reaction**:** Immunodiffusion test, Wasserman's test, RPR Test. Agglutination reaction: Blood grouping, Widal test. Complement fixation tests, Opsonization, Immunotechniques: ELISA

UNIT-IV **07 hrs**

Immunoprophylaxis: Types of vaccines- Live and Attenuated (Bacterial and Viral) and Toxoid with an example each. National Immunization program (Tabular form).

PRACTICALS **3hrsX5=15 practicals**

1. Demonstration of Immune organs (through photographs).
2. Demonstration of Immune cells in the smears prepared from Immune organs. (through photographs)
3. Agglutination- Blood Grouping test
4. Precipitation: Immunodiffusion test –ODD

5. Precipitation: Immunodiffusion test –RID

Paper code: FPE520 MICROBIOLOGY 60 hours -4 Credits

III B.Voc., V Semester

TITLE: PATHOGENIC MICROBIOLOGY

The course provides a solid foundation to understand:

CO1. The human immune response towards microbes in medical microbiology

CO2. Knowledge is gained about the relationship between microorganism and human disease, pathogenicity, Laboratory diagnosis, treatment and prophylaxis.

UNIT-I 20 Hrs

Introduction to important diseases caused by Streptococcus, Pneumococcus, Neisseria, Corynebacterium, Bacillus, Clostridium, Enterobacteriaceae (Proteus, Shigella, Salmonella), Vibrio, Yersinia, Hemophilus, Mycobacterium, The operative pathogenic mechanisms, laboratory diagnosis, prevention and control of these diseases.

UNIT-II 15 Hrs

Morphology, pathogenesis, life cycle, laboratory diagnosis, prevention and control of viral diseases viz. Rabies, Polio, Small pox, Herpes, Measles, Influenza and AIDS.

UNIT-III 15 Hrs

Introduction to Human mycotic infections vizCryptococcosis, Dermatophytosis, Blastomycosis, Opportunisitc Mycosis; Candidiasis and Aspergillosis.

UNIT-IV 10 Hrs

Life cycle, pathogenic, mechanisms and control of parasitic infections viz. amoebiasis, Kala-azar, toxoplasmosis, ascariasis, filarasis, hook worm infections.

PRACTICALS 3 hrsX10 practicals

1- 4. Identification of both gram positive and gram negative microorganisms on the basis of :

(i) Morphology.

(ii) Bio-chemical characteristics.

(iii) Serological reactions.

5.Stainings – Alberts, ZNCF.

6-7. Demonstration of pathogens (Viruses, fungi, parasites) through photographs/ permanent mounted slides.

8-9. Demonstration of cysts/ovas of protozoa/Helminths through photographs.

10. Isolation of dermatophytes from human skin.

Paper code: FPF520 **MICROBIOLOGY** **60 hours -4 Credits**

III B.Voc., VI Semester

TITLE: MEDICAL MICROBIOLOGY

Course outcome

On successful completion of this course the student will gain knowledge about:

CO1. Health clinics such as examination, collection of clinical samples and diagnosis.

CO2. Beneficial and harmful effect of normal flora

CO3. Host pathogen interaction

CO4. Determining level of antimicrobial activity and Mechanism of action of antimicrobial agents

UNIT-I **15 Hrs**

Brief introduction to terminology of Infectious diseases, Frequency of disease- morbidity and mortality rate. Characteristics of infectious disease.

Infections – Classification, sources, mode of transmission and types of infections.

Disease cycle –Sources, reservoirs, carriers and transmission of pathogen. Emerging (HIV/AIDS, Avian influenza) and reemerging (Tuberculosis, Malaria) Infectious diseases, Global travel & Health considerations.

UNIT-II **15 Hrs**

Normal flora of human body –Resident flora and transient flora. Beneficial and harmful effect of Normal Flora. Distribution and occurrence of Normal Flora of Skin, Eye, Respiratory Tract, Mouth, Intestinal Tract & Genitourinary Tract. Germfree and Gnotobiotic Life.

UNIT-III **10 Hrs**

Host pathogen interaction –Factors predisposing to microbial pathogenicity- Virulence, Exaltation and attenuation. Determinants of virulence-transmissibility, adhesion, invasiveness, toxigenicity-exotoxins and endotoxins. Avoidance of host defence mechanism.

UNIT-IV **20 Hrs**

Development of chemotherapy, General characteristics of antimicrobial drugs, Determining level of antimicrobial activity, Mechanism of action of antimicrobial agents, factors influencing the effectiveness of antimicrobial drugs, Antibacterial drugs viz Sulfonamides,Streptomycin, Quinolones, Penicillins, Cephalosporins, Tetracyclines, Erythromycin, Chloramphenicol, Drug Resistance, Antifungal and Antiviral drugs.

PRACTICALS : 10X3Hrs **30 Hrs -2 Credits**

1. Sterilization – Introduction to autoclave, hot air oven, filter sterilization.
2. Microbial flora off mouth-teeth crevices
3. Estimation of urine bacteria by calibrated loop method-Direct streak method.
4. Normal flora of human skin
5. Antibiotic sensitivity test
6. Streptomycin resistant mutant strain isolation by gradient plate technique

7. Identification of enteric pathogens using triple sugar iron agar medium
8.Determination of susceptibility to dental caries by synder test
9.Evaluation of antiseptics by filter paper disk method
10.Study of antimicrobial drugs as per theory syllabus.

REFERENCES

Alexopoulos, C.J., Mims, C.W (1979). **Introductory Mycology**, Third edition. Weastern limited, New Delhi.

Alexopoulos, C.J., Mims, C.W.and Blackwell.M. (1996). **Introductory Mycology**, Fourth edition. Wiley eastern limited, New Delhi.

Ananthanarayana, C. and Paniker, C.K.J. (1996) **Textbook of Microbiology**, sixth edition. Orient Longman limited, Chennai.

Aneja, K.R. (1993). **Experiments in Microbiology,Plant Pathology.** Rasthogi and company, Meerut.

Atlas, R.M. (1986). **Basic and Practical Microbiology**. Macmillan Company. New York.

Balasubramanian,D.,Bryee,C.F.A., Dharmalingam,K., Green,K. and Jayaraman,K (1996).

Concepts in Biotechnology.Costed-IBN. University press.

Banwart, G.J. (1987). **Basic Food Microbiology**. CBS publishers and distributors, New Delhi.

Benson,H.J. **Microbiological applications- laboratory manual in general microbiology,** fifth edition.C.Brown publishers.

Cappuccino,J.G., And Sherman,N. (1999). **Microbiology- A Laboratory Manual,** Fourth edition.

Casida, Jr, L.E. (1996).**Industrial Microbiology**. New age International publishers, New Delhi.

Dubey,R.C. and Maheshwari, D.K. (1999). **A text book of Microbiology** .S.Chand and company limited , Ramnagar, New Delhi.

Frazier,W.C. and Westhoff,C.D. (1995). **Food Microbiology**.Tata McGraw- Hill publishing Company limited, New Delhi.

Freifelder,D. (1984). **Essentials of Molecular Biology**. Narosa Publishing House, New Delhi.

Gunashekaran,P. (1996). **Laboratory Manual in Microbiology**. New age International Pvt limited publishers, New Delhi

Gupta,R.K. (1993-94). **Cytology, Genetics, Biotechnology and Biostatistics**. Rastogi

Publications, meerut.
Gupta,R.K.(1996) **.Elements of Biotechnology**. Rastogi Publications, meerut.

Gupte,S.M.D.(1986). **The Short Text book of Medical Microbiology**.Jaypee Brothers Medical Publishers, New Delhi.

Jay,J.M. (1987).**Modern Food Microbiology**. CBS publishers and distributors, New Delhi.

Joshua, A. (1998). **Microbiology,** Fourth edition. Popular Book Depot, Chennai.

Kumar, H.D. (1997). Molecular Biology and Biotechnology**, second edition. Vikas publishing House Pvt Ltd,New Delhi.**
Kumar, H.D. and Swathi Kumar (1998).**Modern Concepts of Microbiology**. Vikas publishing House Pvt Ltd, New Delhi.

Mani, A., Selvaraj, A.M. Narayanan, L.M. and Armugam, N. (1996). **Microbiology General and Applied**. Saros publication.

Mitchell,R. (1992). **Environmental microbiology.** Wiley- Liss, Inc. New York.

Moore ,L.E. (1982). **Fundamentals of the Fungi,** Second edition. Prentice Hall, Inc New Jersey. In aghriculture.

Natesh, S., Chopra, V.L. and Ramachandran, S. (1994). **Biotechnology in Agriculture.** Oxford IBH publishing company Ltd. New Delhi.

Pelczar, Jr, J.M., Chan, E.C.S .and Kreig, N.R. (1993). **Microbiology.** Tata McGraw- Hill publishing Company limited, New Delhi.

Powar and Daginwala. (1996). **General Microbiology**, Vol I. Himalaya publishing House Bombay.

Powar and Daginwala.(1996). **General Microbiology**, Vol II. Himalaya publishing House Bombay.

Prescott, L.M., Harley, J.P. and Klein, D.A. (1999**). Microbiology**, International edition, Fourth edition, WBC Mc Graw Hill.5.

Rangaswamy.G.(1996). **Diseases of crop plants in India**. 3 rd edition .Prentice- Hall of India Pvt Ltd. New Delhi.

Rao,A.S. (1997). **Introduction to Microbiology**. Prentice- Hall of India Pvt Ltd. New Delhi

Rao, M.N. and Datta, A.K. (1987). **Waste water treatment.** Oxford IBH ublic

Salle, A.J. (1967).**Fundamentals principles of Bacteriology**, Sixth edition. Tata McGraw- Hill publishing Company limited, New Delhi.

Seeley, H.W.Jr. and Denmark, J.V. (1972).**Microbes in Action-A laboratory Manual of Microbiology.**D.P.Taraporevala Sons and Co., Ltd, Bombay.

Sharma,P.D. (1999).**Microbiology** Rostogi and company,Meerut.

Shasstry K.S., Padmanabhan, G. and Subramanian, C. **A Text Book of Molecular Biology**.

Mac Millan Publications India Ltd, New Delhi.

Sullia, S.B. and Shantharam, S. (1998). **General Microbiology**. Subbarao, N.S. (1986) Oxford IBH publishing company Ltd. New Delhi.

Verma,S.K. (1999). **A Text Book of Biotechnology.** S. Chand and company Ltd, New Delhi.

PATTERN OF QUESTION PAPER FOR B.VOC
SUBJECT: MICROBIOLOGY
(THEORY:I SEMESTER TO VI SEMESTER)

Time: 3hours Max marks: 70

I. Define/Explain any ten in one/two sentences: 3X10=30
(Twelve questions to be given and ten to be answered)
1
2
3
4
5
6
7
8
9
10
11
12

II Answer any FOUR of the following: 4X4=16
(Six questions to be given and four to be answered)-short answer type

13
14
15
16
17
18

III (Three essay type questions- with all internal choices) 8X3=24
19
20
21

Test+ Assessment (C-1+C-2) = 30 (15+15)

SCHEME OF PRACTICAL EXAMINATION

I B.Voc., I SEMESTER: PRACTICAL- I

Time: 3hours **Max marks: 70**

I. Write critical notes on **A, B** and **C** 5X3=15

(Stains, Media, Pure culture plates) as per syllabus

II. Stain the given material D by…….method. Write the principle, procedure and leave the preparation for evaluation.

(Simple staining/Gram-staining/Wet mounting of Algae and fungi/Negative staining)

(Preparation-10marks; Principle and Procedure-10 marks) 20

III Demonstrate/ Perform the experiment E giving the principle and procedure. Record the result. 25

(Demonstration- 10 marks; principle-5mark; procedure-5marks; result-05)

(Serial dilution/ Pour plate/Spread plate/Streak plate/subculturing)

IV. Record. 10

……

……

SCHEME OF PRACTICAL EXAMINATION

I B.Voc.,II SEMESTER: PRACTICAL- II

Microbial physiology and Metabolism

Time: 3hours **Max marks: 70**

I. Write critical notes on **A, B** and **C** 5X3=15

(Haemocytometer, Effect of temperature and pH, Acid and gas production from carbohydrates, Turbidimetry/spectrophotometry, Starch hydrolysis.)

II. Demonstrate/ Perform the experiment **A** giving the principle and procedure. Record the result. 20

(Cell counting by Haemocytometer)

(Preparation-10marks; Principle and Procedure-10 marks)

III Demonstrate/ Perform the experiment **A** giving the principle and procedure. Record the result. 25

(Demonstration- 10 marks; principle-5mark; procedure-5marks; result-05)

(Acid and gas production from carbohydrates, Starch hydrolysis ,Effect of temperature and pH)

IV. Record. 10

SCHEME OF PRACTICAL EXAMINATION
II B.Voc.,III Semester
FOOD MICROBIOLOGY

Time: 3hours. **Max.marks:70**

I. Demonstrate / Perform the experiment **A**, giving principle and procedure.Record and interpret the result.

(Demonstration -10marks; principle-5marks;procedure-3marks;results and interpretation-2marks).

(Isolation of microorganisms from spoiled vegetables/spoiled fruits). 25

II. Conduct the test for **B**. Write the principle and procedure. Record and interpret the results.

(Demonstration -10 marks; principle-5marks; procedure-3marks; results and interpretation-2marks). (Estimation of lactic acid in milk,Estimation of citric acid) 20

III. Write critical notes on **C, D** and **E**. (Identification -1mark; critical comments-1marks).

(Citric acid production, Estimation of lactic acid in milk,alcohol from jaggarey) 5X3=15

IV Record 10

……..

SCHEME OF PRACTICAL EXAMINATION
II B.Voc.,IV Semester
IMMUNOLOGY

Time:3hours **Max.marks:70**

I. Demonstrate / Perform the experiment **A**, giving principle and procedure. Record and interpret the result.

(Demonstration -10marks; principle-5marks;procedure-5marks;results and interpretation-5marks).

(Determination of blood group and Rh factor /Demonstration of RID ,ODD). 25

II. Demonstrate the experiment **B.** write the principle and procedure. Record and interpret the results.

(Demonstration -10marks; principle-5marks;procedure-3marks;results and interpretation-2marks).

(Blood grouping, ODD, RID) 20

III. Write critical notes on **C, D**, and **E**. (Identification -1mark; critical comments-1marks)

(Immune organs and immune cells) as per syllabus 5x3=15

IV Record 10

SCHEME OF PRACTICAL EXAMINATION
III B.Voc.,V Semester
PATHOGENIC MICROBIOLOGY

Time:3hours **Max.marks:70**

I. Demonstrate / Perform the experiment **A**, giving principle and procedure.Record and interpret the result.
(Demonstration -10marks; principle-5marks; procedure-5marks;results and interpretation-5marks).
(Serological test, Biochemical test). 25

II. Stain the given material D by…….method. Write the principle, procedure and leave the preparation for evaluation.
(Morphology- Simple staining/Gram-staining/Negative staining)
(Preparation-10marks; Principle and Procedure-10 marks) 20

III. Write critical notes on **C, D**, and **E**. (Identification -1mark; critical comments-1marks)
(pathogens ,cysts,ovas of protozoa/helminths) as per syllabus 5x3=15

IV. Record 10

……

SCHEME OF PRACTICAL EXAMINATION
III B.Voc.,VI Semester
PATHOGENIC MICROBIOLOGY

Time:3hours **Max.marks:70**

I. Demonstrate / Perform the experiment **A**, giving principle and procedure.Record and interpret the result.
(Demonstration -10marks; principle-5marks;procedure-5marks;results and interpretation-5marks).
(Normal flora of skin, Antibiotic sensitivity test, Microbial flora off mouth-teeth crevices, Estimation of urine bacteria by calibrated loop method-Direct streak method, Evaluation of antiseptics by filter paper disk method, Determination of susceptibility to dental caries by synder test, TSIA test). 25

.

II. Demonstrate the experiment **B.** write the principle and procedure. Record and interpret the results.
(Demonstration -10marks; principle-5marks;procedure-3marks;results and interpretation-2marks).
(Streptomycin resistant mutant strain isolation by gradient plate technique, Antibiotic sensitivity test,estimation of urine bacteria by calibrated loop method, Normal flora of skin, Antibiotic sensitivity test, Microbial flora off mouth-teeth crevices,TSIA test). 20

III. Write critical notes on **C, D**, and **E**. (Identification -1mark; critical comments-1marks)
(Results of Streptomycin resistant mutant strain isolation by gradient plate technique,Antibiotic sensitivity test,estimation of urine bacteria by calibrated loop method ,Normal flora of skin,mouth-teeth autoclave, hot air oven, filter sterilization, Antibiotics as per syllabus,TSIA test,Instruments) 5x3=15

IV .Report 10

Approved list of Paper setters

Sl No.	Name	College address
1.	Dr..M .Seema	Chairperson, Dept. of Microbiology JSS College, Ooty road, Mysore
2.	Dr..K.Sumana	Assistant prof. Dept. of Microbiology JSS College, Ooty road, Mysore
3	Dr.S.Mahadevamurthy	Associate Prof & HOD Dept. of Microbiology Yuvaraja's college Mysore.
4	Dr.Syeda Kauser Fathima	Associate Prof. of Microbiology Maharani's Science College for women JLB road Mysore.
5	Dr. H.S. Jayanth.	Asso.Prof.of Microbiology Dept. of Microbiology Yuvaraja's college Mysore.
6	Dr.Nagarathnamma	Asso. Prof. of Microbiology Government women college Mandya
7	Dr. Mashooda Begum	Asso.Prof.of Microbiology Maharani's Science College for women JLB road, Mysore.
8	Sri. M. Girish	Assistant prof. Dept. of Microbiology JSS College for Women Saraswathipuram,Mysore
9	Dr. P.K.Maheshwar	Assistant Prof. Dept. of Microbiology Dept. of Microbiology Yuvaraja's college,Mysore.
10	Smt. M.S.Shobha	Assistant Prof, Dept. of Microbiology Maharani's Science College Mysore
11	Sri. Shankaregowda	Asso.Prof.of Microbiology Government Science College Mandya
12	Sri. R.A. Manjunath	Assistant Prof. Dept. of Microbiology Saradavilas College,Mysore
13	Dr.M.P. Ragavendra	Assistant Prof. Dept. of Microbiology Maharani's Science College,Mysore
14	Dr.K.Girish	Assistant Prof.

		Dept. of Microbiology Maharani's Science College, Mysore
15	Sri. G.S. Siddegowda	Assistant Prof. Dept. of Microbiology Maharani's Science College Mysore
16	Smt. M.S. Poornima	Assistant Prof. Dept. of Microbiology Yuvaraja's College,Mysore
17	Dr.N.S.Devaki	Assistant Prof. Dept. of Molecular Biology Yuvaraja's College , Mysore
18	Syeda Farahna Parveen	Assistant Prof. Dept. of Microbiology St.Philomina's College, Mysore

19	Smt. Vanitha	Assistant Prof. Dept. of Microbiology Maharani's Science College,Mysore
20	Smt. Revanamba	Assistant Prof. Dept. of Microbiology Maharani's Science College,Mysore
21	Uzma Bathool	Assistant Prof. Dept. of Microbiology St.Philomina's College, Mysore
22	Mahadeva prasad	Assistant Prof. Dept. of Microbiology JSS College for Women Saraswathipuram,Mysore

DEPARTMENT OF COMPUTER SCIENCE

SEMESTER I

FPA 540 COMPUTER SCIENCE

PAPER - I

COMPUTER FUNDAMENTALS & DOS

(2 hrs theory / week) 30 hours - 2 Credits

CO1.Master the basic knowledge of applications of MS office package
CO2.Get the skill of office productivity tool
CO3.Learn the usage of internet
CO4.Skill to develop program using C language

SECTION- I **15 Hours**

INTRODUCTION

Computer, Characteristic of Computer, History of Computer, Generation of Computers, Components of Computer and Applications of Computers.

Key Factors of Computers: Hardware, Software - types of Software (Application and system), forms of software (firmware, shareware, freeware), Translator - Assembler, Compiler and Interpreters. Computer Application – Business, Scientific, Entertainment and educational.

CLASSIFICATION OF COMPUTERS

Mode of operations – Analog, Digital and hybrid Computers.

Size and capabilities – Micro, Mini, Main frame and Super computer.

MEMORY UNITS

Primary memory - RAM, ROM, PROM, EPROM, EEPROM, Flash memory, cache memory.

Secondary memory – Magnetic disk (Hard disk, Floppy disk, Zip disk, Jaz disk, Super disk), Optical disk (CD, CD – R, CD – RW, DVD).

COMPUTER PERIPHERALS DEVICES AND INTERFACES

Input devices – Working principle of Keyboard and mouse, Functional capabilities of Scanner, Digital Camera, OMR, OCR, touch pad, touch screen. Output Devices – Monitor, Printer, Plotter and projector.

PROGRAMMING LANGUAGES

Machine, Assembly language and High Level Language.

INFORMATION SYSTEM

Data and Information, types of information, what is an information System, Types of Information Systems — System development life cycle.

SECTION- II **15 Hours**

OPERATING SYSTEM AND THE USER INTERFACE

Operating System– Functions, services, Types-Batch, Single, Multiprogramming, and Multiprocessing.

Operating System – the user interface –running programs –managing hardware –enchaining the operating system with utility software- typical operating systems in use

COMPUTERS AND COMMUNICATION

Single user, multi-user, workstation, and client server systems. Computer networks, Types of Network LAN, WAN, Internet, Internet applications, WWW, Email, FTP, web browsers (Internet explorer, Google Chrome, Mozilla).

DISK OPERATING SYSTEM (DOS)

Introduction, History & version of DOS. DOS basics – physical structures of disk, drive, Name, FAT, File & Directory structure and Naming Rules, Booting Process, DOS System files, role of config.sys file.

DOS COMMANDS

Internal – DIR, MD, CD, RD, COPY, DEL REN, VOL, DATE, TIME, CLS, PATH, TYPE etc.

External – CHKDSK, XCOPY, PRINT, DISK COPY, DISKCOMP, DOSKEY, TREE, MOVE, LABEL, APPEND, FORMAT, SORT, FDISK, BACKUP, EDIT, MODE, ATTRIB, HELP, SYS, WILD CARD Characters etc.

Executable V/S Non executable Files in DOS.

TEXT BOOKS:

- Peter Norton's 'Introduction to Computers', Second Edition, TMH
- Computer Fundamentals – P K Sinha, BPB

REFERENCE BOOKS :

- Introduction to Computers – N Subramanian, TMH
- Understanding Computers – R Rajagopalan. TMH
- Computers Today – Donald Sanders, MGH

Practical

(1Hour per week X 15 Weeks = 15 Hours)

Experiments are based on topics mention in the Paper designed by concerned Faculty

SEMESTER II
COMPUTER SCIENCE
PAPER – II

FPB 550 **PROGRAMMING IN C**

(2 hrs theory / week) **30 hours - 2 Credits**

CO1.Master the basic knowledge of applications of MS office package

CO2.Get the skill of office productivity tool

CO3.Learn the usage of internet

CO4.Skill to develop program using C language

SECTION-I **15 Hours**

PROBLEM SOLVING TECHNIQUES

Problem Definition, Problem Analysis, Design of problem solutions and use of design tools, Algorithm, Flowcharts, Coding, Testing, Debugging, Program documentation.

INTRODUCTION TO C LANGUAGE

History Features and Applications of 'C ', Structure of C Program.

PROGRAMMING PRELIMINARIES

Character set, definitions and declarations of identifiers, Variables, Escape Sequence Characters.
Constants, Keywords, Data types with examples.

OPERATORS AND EXPRESSIONS

Various operators and expressions, Operator precedence with example programs.

INPUT-OUTPUT STATEMENTS

Various types of standard input output statements, standard mathematical functions, with example programs.

SECTION - II **15 Hours**

CONTROL STRUCTURES

Decision makes and branching statements, Decisions making and looping statements, break statement, continue statement and goto statement with example programs.

ARRAYS

Definitions and need of arrays, 1-d and 2-d arrays with example programs, introduction to multidimensional arrays.

STRING HANDLING

Declarations, Initialization, reading and writing of strings, operations and string functions with example programs, array of pointers to strings.

FUNCTIONS

Definitions and need of functions. Library functions, user defined functions in detail, function declaration and prototypes call by value, call by reference and functions and arrays, recursion, storage classes with example program.

STRUCTURE

Definition of structure, Array in Structures, Structure with Array, Difference between array and structure

TEXT BOOKS:

- Programming with ANSI C by: E. Balagurusamy

REFERENCE BOOKS :

- Let us C - Yashwanth kanetkar
- Computer concepts and C programming by - P. B. Kotur
- The Complete Reference C by Herbert Schildt

Practical

(1Hour per week X 15 Weeks = 15 Hours)

Experiments are based on topics mention in the Paper designed by concerned Faculty

Scheme of Examination

Sl. No	Semester	Paper	Marks for theory	Marks for internal assessment		Total
1	I	COMPUTER FUNDAMENTALS & DOS	70	C1 = 15 C2 = 15	30	100
2	II	PROGRAMMING IN C	70	C1 = 15 C2 = 15	30	100

Distribution of Internal assessment

1) **CLASS TEST (C1) -15 MARKS.**
2) **CLASS TEST (C2) -15 MARKS.**

} **= 30 marks**

Scheme of Practical Examination

Sl. No	Semester	Paper	Marks for Practical	Marks for Record	Marks for Viva	Total
1	I	COMPUTER FUNDAMENTALS & DOS	60	05	05	70
2	II	PROGRAMMING IN C	60	05	05	70

Pattern of Question Paper for B.Voc

Semester I
COMPUTER SCIENCE

Time : 2 Hrs 30 Mins Max Marks 70

1. Answer all the questions in one sentence or a word 5 X 1 = 5
   a. ----------
   b. ----------
   c. ----------
   d. ----------
   e. ----------

2. Tick the correct answer 5 X 1 = 5
   f. ----------
   g. ----------
   h. ----------
   i. ----------
   j. ----------

3. State whether the following statements are true or false 5 X 1 = 5
   a. ----------
   b. ----------
   c. ----------
   d. ----------
   e. ----------

4. Fill in the blanks with suitable answers 5 X 1 = 5
   a. ----------
   b. ----------
   c. ----------
   d. ----------
   e. ----------

5. Answer any ten of the following questions 10 X 3 = 30
   a. ----------
   b. ----------
   c. ----------
   d. ----------
   e. ----------
   f. ----------
   g. ----------
   h. ----------
   i. ----------
   j. ----------
   k. ----------

l. ----------

6. Answer any four questions of the following 4 X 5 = 20

a. ----------
b. ----------
c. ----------
d. ----------
e. ----------

Pattern of Question Paper for B.Voc
Semester II
COMPUTER SCIENCE

Time : 2 Hrs 30 Mins Max Marks 701. Answer all the questions in one sentence or a word 10 X 1 = 10

f. ----------
g. ----------
h. ----------
i. ----------
j. ----------
k. ----------
l. ----------
m. ----------
n. ----------
o. ----------

5. Answer any four of the following questions 4 X 5 = 20

f. ----------
g. ----------
h. ----------
i. ----------
j. ----------

6. Answer any four questions of the following 4 X 10 = 40

f. ----------
g. ----------
h. ----------
i. ----------
j. ----------
k. (Note- 10 Marks may be divided in to 6+4 or 5+5

FPA 020

FPA 020

I Semester

B.Voc Programme

Language kannada

Credits.3(45 hours)

¸Á»vÀå WÀlPÀ

12 UÀAmÉUÀ¼ÀÄ

1. PÁªÀå

1. AiÀiÁªÀ PÁ®zÀ ±Á¸ÀÛçªÉÃ£ÀÄ ºÉÃ½zÀgÉÃ£ÀÄ? - PÀÄªÉA¥ÀÄ
2. ¥ÀÄlÖ «zsÀªÉ - ¨ÉÃAzÉæ
3. gÀAUÉÆÃ° - ¥ÀÄw£À
4. ªÀÄÄA¨ÉÊ eÁvÀPÀ – fJ¸ïJ¸ï
5. CqÀÄUÉ ªÀÄ£ÉAiÀÄ ºÀÄqÀÄV - ªÉÊzÉÃ»
6. £À£Àß d£ÀUÀ¼ÀÄ -¹zÀÞ°AUÀAiÀÄå

2. UÀzÀå 12 UÀAmÉUÀ¼ÀÄ

1. ¤gÀAvÀgÀ ¤ÃjUÁV ¤AvÀ¯ÉèÃ Nl -£ÁUÉÃ±ï ºÉUÀqÉ
2. ªÀiÁ»w vÀAvÀæeÁÕ£À : MAzÀÄ ¸ÀÆÜ® £ÉÆÃl – f.J£ï. £ÀgÀ¹AºÀªÀÄÄÆwð
3. ªÀÄÆqsÀ£ÀA©PÉUÀ¼À ©Ãr£À°è - ¨sÀÄªÀ£ÉÃ±Àéj ºÉUÀqÉ
4. ¨ÉÃqÀzÀ CwyUÀ¼ÀÄ - J J£ï ªÀÄÄÆwðgÁAiÀÄgÀÄ

¨sÁµÁ WÀlPÀ

3. DqÀ½vÀ ªÀÄvÀÄÛ ªÁtÂdÅå PÀ£ÀßqÀ 21 UÀAmÉUÀ¼ÀÄ

1. DqÀ½vÀ ¨sÁµÉAiÀiÁV PÀ£ÀßqÀ ¸ÀégÀÆ¥À ªÀÄvÀÄÛ ®PÀët
2. ¸ÀPÁðj ¥ÀvÀæ ¸ÀégÀÆ¥À – C¢üPÀÈvÀ eÁÕ¥À£À ªÀÄvÀÄÛ ¸ÀÄvÉÆÛÃ¯É
3. ««zsÀ jÃwAiÀÄ CfðUÀ¼ÀÄ - gÀeÉ, ªÉÃvÀ£À, §rÛ, ¥ÀzÉÆÃ£Àßw EvÀgÉ
4. ªÁtÂdå PÀ£ÀßqÀzÀ ¸ÀégÀÆ¥À ªÀÄvÀÄÛ ®PÀët
5. ªÁtÂdå ¥ÀvÀæzÀ ««zsÀ CAUÀUÀ¼ÀÄ
   ªÁtÂdå ¥ÀvÀæUÀ¼ÀÄ- «ZÁgÀuÁ ¥ÀvÀæ, DzÉÃ±À ¥ÀvÀæ, GzÀj¥ÀvÀæ, ªÀ¸ÀÆ° ¥ÀvÀæ, ¥ÀjZÀAiÀÄ ¥ÀvÀæ, ¥ÀgÁªÀÄ±Àð£À ¥ÀvÀæ, ªÀåªÀºÁgÉÆÃfÓªÀ£À ¥ÀvÀæ, ¥Àj¥ÀvÀæ

6. UÀtPÀzÀ°è PÀ£ÀßqÀ – PÀ£ÀßqÀzÀ CAvÀeÁð® vÁtUÀ¼ÀÄ- £ÀÄr, §gÀºÀ- ¥Áj¨sÁ¶PÀ ¥ÀzÀUÀ¼ÀÄ
7. ¨sÁµÁAvÀgÀ : ¸ÀégÀÆ¥À ªÀÄvÀÄÛ ®PÀët- PÀ£ÀßqÀ¢AzÀ EAVè¶UÉ- EAVè¶¤AzÀ PÀ£ÀßqÀPÉÌ

¥ÀgÁªÀÄ±Àð£À UÀæAxÀUÀ¼ÀÄ

1. ¸ÀªÀÄUÀæPÁªÀå - f J¸ï ²ªÀgÀÄzÀæ¥Àà
2. ©AzÀÄ ©A¢UÉ - ªÉÊzÉÃ»
3. ¥ÀQëPÁ² - PÀÄªÉA¥ÀÄ
4. ¸ÀªÀÄUÀæPÁªÀå - ¨ÉÃAzÉæ
5. ±ÀvÀÄæ«®èzÀ ¸ÀªÀÄgÀ - £ÁUÉÃ±ïºÉUÉØ
6. ªÁåªÀºÁjPÀ PÀ£ÀßqÀ - JZï J¸ï PÉ
7. DqÀ½vÀPÀ£ÀßqÀ - qÁ C±ÉÆÃPïPÀÄªÀiÁgï gÀAeÉÃgÀ

ªÀÄvÀÄÛ EvÀgÀgÀÄ

8. PÀbÉÃj PÉÊ¦r - PÀÄªÉA¥ÀÄ PÀ£ÀßqÀ CzsÀåAiÀÄ£À ¸ÀA¸ÉÜ
9. ¯ÉÃR£ÀPÀ¯É - J¸ï ¥ÀæºÁèzÀgÁªï
10. DqÀ½vÀ¨sÁµÉ PÉ®ªÀÅ «ªÀgÀUÀ¼ÀÄ - ¥ÀæzsÁ£À UÀÄgÀÄzÀvÀÛ

B.Voc Programme

Language kannada

I Semester

¥Àæ±Éß¥ÀwæPÉ ¸ÀégÀÆ¥À

3.00 UÀAmÉUÀ¼ÀÄ 70 CAPÀUÀ¼ÀÄ

«¨sÁUÀ-1

1. ¨sÁªÁxÀð §gÉ¬Äj : 1óó*5=5

C)

CxÀªÁ

D)

2. ¸ÀAzÀ¨sÀð ¸À»vÀ «ªÀj¹ 1óó*5=5

C)

CxÀªÁ

D)

3. PÉ¼ÀV£À ¥Àæ±ÉßUÉ GvÀÛj¹: 1*10=10

C)

CxÀªÁ

D)

«¨sÁUÀ-2

5. PÉ¼ÀV£À ¥Àæ±ÉßUÉ GvÀÛj¹: 1óó*10=10

C)

CxÀªÁ

D)

5. PÉ¼ÀV£À ¥Àæ±ÉßUÉ GvÀÛj¹: 1*10=10

C)

CxÀªÁ

D)

«¨sÁUÀ-3

6. LzÀPÉÌ n¥ÀàtÂ §gÉ¬Äj: 3*5=15

C)

CxÀªÁ

D)

7. PÉ¼ÀV£À ¥Àæ±ÉßUÉ GvÀÛj¹: 1*10=10

C)

CxÀªÁ

D)

9. PÀ£ÀßqÀPÉÌ ¨sÁµÁAvÀj¹: 1*5=5

10. EAVè¶UÉ ¨sÁµÁAvÀj¹: 1*5=5

FPB540

B.Voc- II Semester

Communicative English

No. of Credits : 3 No. of Instruction hrs : 3 / Week(45 hrs)

AIMS: 1) To familiarize students to basic English

2) To enable them to develop listening & speaking skills

OBJECTIVES: Students should be able to ___

1) Write English without grammatical errors
2) Speak English Language effectively and accurately
3) Listen and understand public announcements and news on TV & Radio

Module – 1 Grammar

		Marks	Hrs/ Week
1.	Subject and Verb Agreement	5	6
2.	Voice	5	5
3.	Articles	5	3
4.	Speech	5	6
5.	Question tag	5	5
6.	Framing of Questions	5	Q=05

Module – 2 Writing Skills

1.	Letter Writing Letter of Application/Letter of Grievances/Resume Preparation	10	4
2.	Comprehension	10	3
3.	Essay Writing	10	3

Module – 3 Speaking Skills

1.	Greeting		
2.	Requesting		
3.	Enquiring		
4.	Explaining	10	Q=05
5.	Reporting		
6.	Permission		
7.	Thanking		
		70	**45**

PAPER CODE **:FPB540**

B.Voc II SEMESTER

COMMUNICATIVE ENGLISH

MODEL QUESTION PAPER

TIME: 3 Hrs **MAX MARKS: 70**

Instructions to students: All sections are compulsory.

SECTION A

I Fill in the blanks with correct form of verbs: 5 X 1 = 05

a) Slow and Steady _____ the race.(to win)
b) Christians _____ to church on Sundays. (to go)
c) They have _____ the work. (to complete)
d) He _____ absent yesterday. (to be)
e) We _____ learning grammar now. (to be)

II Change the voice of the following sentences: 5 X 1 = 05

a) He is writing a poem.
b) We have won the match.
c) The poet took the second road.
d) A song will be sung by her.
e) Close the door.

III Fill in the blanks with suitable article: 5 X 1 = 05

a) My father is _____ MLA.
b) _____ earth moves round the sun.
c) The poet rejected ____ first road.
d) The Nyle is _____ long river.
e) Brutus was _____ honest man.

IV Change the speech of the following: 5 X 1 = 05

a) The King said to people," I am happy to be here".
b) Mother said to the child," Don't go near water".
c) Raju asked Rosie who she was.
d) Velan said to Venu," Why are you crying?"
e) The lady told the writer that he was very humorous.

V Add question tag to the following: 5 X 1 = 05

a) He is a good singer.
b) The poet observed the daffodils.
c) Behrman saves the life of Johnsy.
d) English is not a difficult language.
e) India has won the second test.

VI Frame questions so as to get the underlined words as answers: 5 X 1 = 05

a) <u>Shakespeare</u> wrote 'Macbeth'
b) Rama killed <u>Ravana</u>.
c) He goes to college <u>by car.</u>
d) The College starts <u>at 10.30 am</u>

e) Lear's daughters were selfish.

SECTION B P.T.O

VII Letter Writing: 10 X 1 = 10

a) Write a letter of application to the post of a Computer Programmer at SkillTec Ltd. Mysuru

OR

b) Prepare your resume.

VIII Read the following essay carefully and answer the questions set on it: 5 X 2 =10

I was wrong to think that city life is altogether unhealthy. Perhaps it was so at one time, now a days with proper roads, pavements and drainage systems, sickness is kept at bay. Cities are planned in such a way as to provide open space with parks and playgrounds for the benefit of the dwellers.

Even when sickness does strike, there are doctors and hospitals near at hand. This is not the case in the country where people frequently suffer and sometimes die for want of medical facilities.

1) What does the writer think of the city life?
2) What causes sickness?
3) Where do you find doctors and hospitals in plenty?
4) How does the passage distinguish between city and country life?
5) Give a suitable title to the passage.

IX Write an essay on one of the following: 10 X 1 = 10

a) Use and abuse of social media.
b) Role of students in nation building
c) Afforestation?

X Answer the following: 5 X 2 = 10

1. Write an imaginary conversation between a customer and Bank Manager regarding opening an account.
2. Write a dialogue between two friends who meet after a long time.

B.Voc II SEMESTER
COMMUNICATIVE ENGLISH
QUESTION PAPER SCHEME

TIME: 3 Hrs MAX MARKS: 70

Instructions to Students: All sections are compulsory.

SECTION A

I Fill in the blanks with correct form of verbs 5 X 1 = 05

a)
b)
c)
d)
e)

II Change the voice of the following sentences 5 X 1 = 05

a)
b)
c)
d)
e)

III Fill in the blanks with suitable article 5 X 1 = 05

a)
b)
c)
d)
e)

IV Change the speech of the following 5 X 1 = 05

a)
b)
c)
d)
e)

V Add question tag to the following 5 X 1 = 05

a)
b)
c)
d)
e)

VI Frame questions so as to get the underlined words as answers 5 X 1 = 05

a)
b)
c)
d)
e)

SECTION B

VII 10 X 1 = 10

1. Write a letter of application

OR

2. Prepare a Resume.

VIII Read the following essay carefully and answer the questions. 10 X 1 = 10

a)
b)
c)
d)
e)

IX Write an essay on one of the following: 10 X 1 = 10

a)
b)
c)

X Answer the following :(Dialogue writing) 5 X 2 = 10

1)
2)

FPC 550 INDIAN CONSTITUTION

COMMON PAPER TO ALL DEGREE CLASSES (FOR B.Voc 45 HOURS 3/WEEK)

70 MARKS

UNIT I **08 hrs**

a) Preamble of the Indian Constitution

b) Salient features of Indian Constitution

UNIT II **10 hrs**

a) Fundamental Rights

b) Fundamental Duties

c) Directive principles of State Policy

UNIT III **14 hrs**

a) President – Election Method, Powers and Functions

b) The Role of the Prime Minister

c) The Parliament – Structure, Power and Functions(Lok Sabha and Rajya Sabha)

d) Supreme Court – Organization and Jurisdiction

UNIT IV **13 hrs**

a) The Role of Governor in the Administration of State

b) Powers and Functions of the Chief Minister

c) Composition , Powers and Functions of both the Houses of State Legislature

d) High Court – Organization and Jurisdiction

TEXT BOOKS

- An introduction to the Constitution of India by M V Pylee
- Introduction to the Constitution of India by D D Basu
- Understanding the Constitution of India by Dr. H M Rajashekar
- Indian Constitution by Sommanna, Brahamananda, H B Mallikarjuna swamy,
- Indian Constitution by H T Ramakrishana, Rajiv

Sl. no.	Information Communication Technology	Hrs
1	The humanitarian supply chain – Definition, system of organizations, people, technology, activities, information and resources involved in moving a product or service from supplier to customer	5
2	Technology framework – Front-end services, Middleware services and Infrastructure services: Supporting the food assistance supply chain; Mapping technologies; Web portals	5
3	Mobile technologies - Combining hand-held and wireless communications technologies	5
4	Beneficiary identification - Challenges in food assistance to ensure that assistance goes to the right beneficiaries	5
5	ICT in emergencies – Requirement inputs of Food assistance interventions during emergencies	5
6	Linking the humanitarian supply chain - Ways in which WFP uses technology and technological techniques to fulfill its role as the provider of food assistance in development and emergencies	5

Sl. no.	Practical	Hrs
1.	Identification of software related to Food Processing and Engineering	3
2.	Practicing the use of software	6
3.	Requirement development for Food Processing Software	6

MODEL QUESTION PAPER

CODE NO: **FPC 570**

Semester - III

INFORMATION AND COMMUNICATION TECHNOLOGY

TIME: 3 hrs **Max marks: 70**

Instructions: Draw neat and labeled diagram wherever necessary.

PART-A

I. Write short notes for the following(any 5): (5x2=10)

1. ----------
2. ----------
3. ----------
4. ----------
5. ----------
6. ----------

PART-B

II. Answer any 4 of the following: (4x5=20)

1. ----------
2. ----------
3. ----------
4. ----------
5. ----------

PART –C

III. Answer any 4 of the following: (4x10=40)

IV.

1. ----------
2. ----------
3. ----------
4. ----------
5. ----------

INFORMATION AND COMMUNICATION TECHNOLOGY

PRACTICAL

SCHEME OF EXAMINATION

DURATION: 3 Hours

Maximum Marks: 70

Practical proper: 60

Record marks: 10

NOTE :- Candidates are required to submit the records duly signed by the teacher-in charge and certified by the Head of the Department

1. Identification of software related to Food Processing and Engineering.
2. Practicing the use of software.
3. Requirement development for Food Processing Software.

FPD 560 **DEPARTMENT OF ENVIRONMENTAL STUDIES**

(3 Hrs Theory / week) **3 Credits (45 Hrs)**

Environmental Studies (One-Semester Compulsory Core Module for B.Voc Programmes)

Unit 1: Environment and natural systems **4 hrs**

- Introduction to Environment and Environmental Studies
- Definition and Components of Environment, Relationship between the different components of Environment
- Man and Environment relationship
- Impact of technology on Environment, Environmental Degradation
- Multidisciplinary nature of the Environment studies
- Its scope and importance in the present day Education System

UNIT 2: Ecology and Ecosystems: **7 hrs**

- Introduction: Ecology- Objectives and Classification
- Concept of an ecosystem- structure and functions of ecosystem
- Components of ecosystem- Producers, Consumers, Decomposers
- Bio-Geo- Chemical Cycles- Hydrologic Cycle, Carbon cycle, Energy Flow in Ecosystem, Food Chains, Food webs ,Ecological Pyramids
- Major Ecosystems: Forest Ecosystem, Grassland Ecosystem, Desert Ecosystem, Aquatic Ecosystem, Estuarine Ecosystem**.**

Unit 3: Natural Resources **7 hrs**

Renewable and Nonrenewable resources, exploitation and conservation,

- Water resources: Surface and Ground water sources, Indian and Global scenario.
  Land as a resource, land use change and land degradation
- Forest resources: Definition and Classification of Forests
  Ecological and Economic importance and benefits of forest, Indian scenario,
  Deforestation: causes and effects, case studies remedial measures
- Food resources: Sources of food, Global and Indian food demand scenario,
  Limits of food production, Environmental effects of Agriculture
- Energy resources: Renewable and non renewable energy sources, use of alternate energy sources, growing energy needs, case studies
- Mineral resources: Definition and Classification of minerals, mining issues Case studies.
- Role of individual in conservation of natural resources.

Unit 4 : Biodiversity and its Conservation **6 hrs**

- Biodiversity : Definition, Levels of biological diversity : genetic, species and ecosystem diversity
- Biogeographic zones of India
- Hot spots of biodiversity
- Ecosystem and biodiversity services: Ecological, economic, social, ethical, aesthetic and Informational values
- Biodiversity patterns
- India as a mega-biodiversity nation

- Threats to biodiversity: Habitat loss, poaching of wildlife, man-wildlife conflicts, biological invasions.
- Endangered and endemic species of India
- Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

UNIT 5: Environmental pollution: 9 hrs

- Types of Environmental Pollution:
- Water Pollution: Introduction – Water Quality Standards, Sources of Water Pollution: Industrial Agricultural, Municipal; Classification of water pollutants, Effects of water pollutants, Eutrophication.
- b) Marine pollution: Causes, effects and control.
- c) Air Pollution: Composition of air, Structure of atmosphere, Ambient Air Quality Standards, Classification of air pollutants, Sources of common air pollutants like PM, SO2, NOX, Natural & Anthropogenic Sources, Effects of common air pollutants
- d) Soil Pollution: causes, effects and control.
- e) Noise Pollution: Introduction, Sound and Noise, Noise measurements, Causes and Effects
- f) Thermal Pollution: Causes, effects and control.
- g) Nuclear hazards and human health risks.
- Solid waste management: Control measures of urban and industrial waste.
- Role of individual in the prevention of pollution,Pollution case studies.

UNIT 6: Sustainable development and Environmental issues and Policies. 7 hrs

- Sustainable development: Meaning, changes in resource utilization, urbanization.
- Water conservation: watershed management and Rain water harvesting.
- Environmental issues: Climate change, global warming, acid rain, ozone layer depletion.
- Disaster management: floods, drought,earthquake, cyclones and landslides.
- Wasteland reclamation.
- Environment Protection Act: Air, Water, Wildlife (Prevention and Control of Pollution)
- Forest Conservation Act.
- Issues involved in enforcement of environmental legislation.
- Environment: rights and duties**.**

Unit 7 : Human Population and the Environment 5 hrs

- Population growth, Explosion, demographic variation among nations.
- Family welfare Program.
- Environment, human health and welfare; infectious and lifestyle diseases in contemporary world.
- Value Education: Environmental ethics.
- HIV/AIDS
- Women and Child welfare.
- Role of information technology in Environment and human health

Unit 8: Field visit 5 hrs

- Field work Visit to an area to document environmental assets :river/ forest/ grassland/ hill/ mountain
- Visit to a local polluted site-Urban/Rural/Industrial/Agricultural.
- Visit to the solid waste treatment plant and water treatment plant.
- Video: The one degree • (Equal to 5 lectures)

REFERENCE BOOKS:

1. Textbook of Environmental Studies for Undergraduate Courses by Erach Bharucha Second edition, 2013 Publisher: Universities Press (India) Private Ltd, Hyderabad.
2. Basics of Environmental Studies by Prof Dr N S Varandani, 2013 Publisher: LAP -Lambert Academic Publishing, Germany
3. Environmental Studies by Anindita Basak, 2009 Publisher: Drling Kindersley(India)Pvt. Ltd Pearson
4. Textbook of Environmental Studies by Deeksha Dave & S S Kateva , Cengage Publishers.
5. Environmental Sciences by Daniel B Botkin & Edward A Keller Publisher: John Wiley & Sons.
6. Environmental Studies by R. Rajagopalan, Oxford University Press
7. Environmental Studies by Benny Joseph, TMH publishers
8. Environmental Studies by Dr. Suresh K Dhameja, 2007 Published by : S K Kataria & Sons New Delhi
9. Basics of Environmental Studies by U K Khare, 2011 Published by Tata McGraw Hill.
10. Environmental Studies by N.Arumugam & V.Kumaresan, saras publication.

Scheme of Examination

Sl. No	Semester	Paper	Marks for theory	Marks for internal assessment	Total
1	Even sem	Environmental studies	70	30	100

ENVIRONMENTAL STUDIES (ONE-SEMESTER COMPULSORY CORE MODULE FOR B.VOC PROGRAMMES)

Scheme of examination

Question paper pattern

Sl.no	Types of questions	Marks	No. of questions	Total marks
1	Short notes	**2**	**5**	**10**
2	Medium type	**5**	**4**	**20**
3	Long answers	**10**	**4**	**40**
			Total	**70 marks**

Distribution of Internal assessment

3) **ASSIGNMENT/SEMINAR-15 MARKS.**
4) **CLASS TEST-15 MARKS.**

MODEL QUESTION PAPER

CODE NO: FPD 560 **COMMON TO EVEN SEMESTER**

ENVIRONMENTAL STUDIES

TIME: 3 hrs **Max marks: 70**

Instructions: Draw neat and labeled diagram wherever necessary.

PART-A

V. Write short notes for the following(any 5): **(5x2=10)**

7. ----------
8. ----------
9. ----------
10. ----------
11. ----------
12. ----------

PART-B

VI. Answer any 4 of the following: **(4x5=20)**

6. ----------
7. ----------
8. ----------
9. ----------
10. ----------

PART –C

VII. Answer any 4 of the following: **(4x10=40)**

6. ----------
7. ----------
8. ----------
9. ----------
10. ----------

FPD 580 **B.Voc Semester - IV**

Sl. no.	Biostatistics	Hrs
1.	Statistical concepts: Data structure, sampling methods, collection, classification and tabulation of data, graphical and diagrammatic representation, histogram, frequency polygon, frequency curve, bar graph, pie chart etc.	4
2.	Measure of Central Frequency: Mean, median, mode.	2
3.	Measure of dispersion of data: Range, semi-interquartile range, mean deviation, standard deviation, standard error, coefficient of variation, confidence limits.	5
4.	Types of distribution of data: Normal, Binomial, Poisson.	7
5.	Z-test, t-test, ANOVA, multiple comparisons, LSD and DMRT, Chi-square test.	4
6.	Regression estimate, correlation coefficient.	4
7.	Experimental designs, data transformation.	4

Sl. no.	Practical	Hrs
1.	Analytical Problems / calculations	15

MODEL QUESTION PAPER

Semester-IV

CODE NO: FPD 580

BIOSTATISTICS

TIME: 3 hrs **Max marks: 70**

Instructions: Draw neat and labeled diagram wherever necessary.

PART-A

VIII. Write short notes for the following(any 5): (5x2=10)

13. ----------
14. ----------
15. ----------
16. ----------
17. ----------
18. ----------

PART-B

IX. Answer any 4 of the following: (4x5=20)

11. ----------
12. ----------
13. ----------
14. ----------
15. ----------

PART –C

X. Answer any 4 of the following: (4x10=40)

XI.

11. ----------
12. ----------
13. ----------
14. ----------
15. ----------

IV SEMESTER PRACTICAL EXAMINATION

BIOSTATISTICS
PRACTICAL
SCHEME OF EXAMINATION

DURATION: 3 Hours
Maximum Marks: 70

Practical proper: 60

Record marks: 10

NOTE :- Candidates are required to submit the records duly signed by the teacher-in charge and certified by the Head of the Department

4. Analytical Problems / calculations.

JSS COLLEGE OF ARTS, COMMERCE AND SCIENCE

(Autonomous)

Ooty Road, Mysuru-570025

Model Curriculum Structure for
Bachelor of Computer Applications (BCA)Programme
(Basic and Honours degree),
Model Syllabus for I and II Semesters
and
Open Elective Courses in Computer Applications

As per

NATIONAL EDUCATION POLICY - 2020
(NEP-2020)

2021-22

DEPARTMENT OF COMPUTER SCIENCE

The objectives of the BCA Program

1. The primary objective of this program is to provide a foundation of computing principles and business practices for effectively using/managing information systems and enterprise software
2. It helps students analyze the requirements for system development and exposes students to business software and information systems
3. This course provides students with options to specialize in legacy application software, system software or mobile applications
4. To produce outstanding IT professionals who can apply the theoretical knowledge into practice in the real world and develop standalone live projects themselves
5. To provide opportunity for the study of modern methods of information processing and its applications.
6. To develop among students the programming techniques and the problem- solving skills through programming
7. To prepare students who wish to go on to further studies in computer science and related subjects.
8. To acquaint students to Work effectively with a range of current, standard, Office Productivity software applications

Program Outcomes: BCA (3 Years) Degree

1. **Discipline knowledge:** Acquiring knowledge on basics of Computer Science and ability to apply to design principles in the development of solutions for problems of varying complexity
2. **Problem Solving:** Improved reasoning with strong mathematical ability to Identify, formulate and analyze problems related to computer science and exhibiting a sound knowledge on data structures and algorithms.
3. **Design and Development of Solutions:** Ability to design and development of algorithmic solutions to real world problems and acquiring a minimum knowledge on statistics and optimization problems. Establishing excellent skills in applying various design strategies for solving complex problems.
4. **Programming a computer:** Exhibiting strong skills required to program a computer for various issues and problems of day-to-day applications with thorough knowledge on programming languages of various levels.
5. **Application Systems Knowledge**: Possessing a sound knowledge on computer application software and ability to design and develop app for applicative problems.
6. **Modern Tool Usage:** Identify, select and use a modern scientific and IT tool or technique for modeling, prediction, data analysis and solving problems in the area of Computer Science and making them mobile based application software.
7. **Communication:** Must have a reasonably good communication knowledge both in oral and writing.
8. **Project Management:** Practicing of existing projects and becoming independent to launch own project by identifying a gap in solutions.
9. **Ethics on Profession, Environment and Society:** Exhibiting professional ethics to maintain the integrality in a working environment and also have concern on societal impacts due to computer-based solutions for problems.
10. **Lifelong Learning:** Should become an independent learner. So, learn to learn ability.
11. **Motivation to take up Higher Studies:** Inspiration to continue educations towards advanced studies on Computer Science.

Additional Program Outcomes: BCA Degree (Hons)

The Bachelor of Computer Application (BCA (Hons)) program enables students to attain following additional attributes besides the afore-mentioned attributes, by the time of graduation:

1. Apply standard Software Engineering practices and strategies in real -time software project development
2. Design and develop computer programs/computer -based systems in the areas related to AI, algorithms, networking, web design, cloud computing, IoT and data analytics.
3. Acquaint with the contemporary trends in industrial/research settings and thereby innovate novel solutions to existing problems
4. The ability to apply the knowledge and understanding noted above to the analysis of a given information handling problem.
5. The ability to work independently on a substantial software project and as an effective team member.

I-C. Model Program Structures for the Under-Graduate Programs in Universities and Colleges in Karnataka

Bachelor of Computer Applications (Basic/Hons.) with Computer Applications as core subject

Sem.	Discipline Core (DSC) (Credits) (L+T+P)	Discipline Elective (DSE) / Open Elective (OE) (Credits) (L+T+P)	Ability Enhancement Compulsory Courses (AECC),		Skill Enhancement Courses (SEC)			Total Credits
					Skill based credits (L+T+P)	Value based (Credits) (L+T+P)		
I	CA C-1 (3+2) CA C-2 (3+2) CA C-3 (3)	OE-1 (3)	L1-1(3), L2-1(3) (4 hrs. each)	Environmental Studies (3)		Physical Education for fitness (1) (0+0+2)	Health & Wellness (1) (0+0+2)	26
II	CA C-4 (3+2) CA C-5 (3+2) CA C-6 (3)	OE-2 (3)	L1-2(3), L2-2(3) (4 hrs. each)		SEC-1: Alternative SEC in place of digital Fluency (2) (1+0+2)	Physical Education – Yoga (1) (0+0+2)	NCC/NSS/R&R(S&G) / Cultural (1) (0+0+2)	26
Exit option with Certificate in Computer Applications (50 credits)								
III	CA C-7 (3+2) CA C-8 (3+2) CA C-9 (3)	OE-3 (3)	L1-3(3), L2-3(3) (4 hrs each)	Constitution of India (3)		Physical Education-Sports (1)(0+0+2)	NCC/NSS/R&R(S&G)/Cultural (1) (0+0+2)	26
IV	CA C-10 (3+2) CA C-11 (3+2) CA C-12 (3)	OE-4 (3)	L1-4(3), L2-4(3) (4 hrs each)		SEC-2: Alternative SEC in place of AI (2) (1+0+2)	Physical Education - Games (1) (0+0+2)	NCC/NSS/R&R(S&G)/Cultural (1) (0+0+2)	26
Exit option with Diploma in Computer Applications (100 credits)								
V	CA C-13 (3+2) CA C-14 (3+2) CA C-15 (3)	CA E-1 (3) Vocational-1 (3)			SEC-4: Professional Communication (3)			23
VI	CA C-16 (3+2) CA C-17 (3+2) CA C-18 (3)	CA E-2 (3) Vocational-2 (3)			SEC-3: Alternative SEC in place of Cyber(2) (1+0+2)			23
Exit Option with Bachelor of Computer Applications Degree, BCA Degree (142 credits)								
VII	CA C-19(3+2) CA C-20(3+2) Internship (2)	CA E-3 (3) Vocational-3 (3) Res. Methodology (3)						21
VIII	CA C-21 (3+2) CA C-22 (3)	CA E-4 (3) Vocational-4 (3) Research Project(6)*						20
Award of Bachelor of Computer Applications Honours Degree, BCA (Hons.) Degree (183 credits)								

NEP 2020 Syllabus - BCA. for 2021-22 onwards

Year	Sem	Corse Code	Title	Hours / Week			Credits			Maximum Marks						Exam Duration	Total Marks
										Th. IA		Pr. IA		Exam			
				L	T	P	L	T	P	C1	C2	C1	C2	Th.	Pr.		
I	I	**FAA410** [CAC 01]	Fundamentals of Computers	3	0	0	3	0	0	20	20	-	-	60	-	3 Hours	100
		FAA410 [CAC 01P]	LAB: Information Technology	0	0	4	0	0	2	-	-	10	15*	-	25	3 Hours	50
		FAA420 [CAC 02]	Programming in C	3	0	0	3	0	0	20	20	-	-	60	-	3 Hours	100
		FAA420 [CAC 02P]	LAB: C Programming	0	0	4	0	0	2	-	-	10	15*	-	25	3 Hours	50
		FAA430 [CAC 03 A /B]	Mathematical Foundation/ Accountancy	3	0	0	3	0	0	20	20	-	-	60	-	3 Hours	100
	II	**FAB410** [CAC 04]	Data Structures using C	3	0	0	3	0	0	20	20	-	-	60	-	3 Hours	100
		FAB410 [CAC 04P]	LAB: Data Structure	3	0	0	3	0	0	-	-	10	15*	60	25	3 Hours	50
		FAB420 [CAC 05]	Object Oriented Concepts using JAVA	0	0	4	0	0	2	20	20	-	-	60	-	3 Hours	100
		FAB420 [CAC 05P]	LAB: JAVA Lab	0	0	4	0	0	2	-	-	10	15*	-	25	3 Hours	50
		FAB430 [CAC 06]	Discrete Mathematical Structures	3	0	0	3	0	0	20	20	-	-	60	-	3 Hours	100

Exit option with Certificate in Computer Applications (50 credits)																	
II	**III**	CAC 07	Data Base Management Systems	**3**	**0**	**0**	**3**	**0**	**0**	**20**	**20**	**-**	**-**	**60**	**-**	**3 Hours**	**100**
		CAC 07P	DBMS LAB	**0**	**0**	**4**	**0**	**0**	**2**	**-**	**-**	**10**	**15***	**-**	**25**	**3 Hours**	**50**
		CAC 08	C# and DOT NET Framework	**3**	**0**	**0**	**3**	**0**	**0**	**20**	**20**	**-**	**-**	**60**	**-**	**3 Hours**	**100**
		CAC 08P	C# and DOT NET Framework LAB	**0**	**0**	**4**	**0**	**0**	**2**	**-**	**-**	**10**	**15***	**-**	**25**	**3 Hours**	**50**
		CAC 09	Computer Communication and Networks	**3**	**0**	**0**	**3**	**0**	**0**	**20**	**20**	**-**	**-**	**60**	**-**	**3 Hours**	**100**
		OE – 3	**OPEN ELECTIVE – 3**	**3**	**0**	**0**	**3**	**0**	**0**								
			Constitution of India	**3**	**0**	**0**	**3**	**0**	**0**								

Year	Sem	Corse Code	Title	Hours / Week			Credits			Maximum Marks						Exam Duration	Total Marks
										Th. IA		Pr. IA		Exam			
				L	T	P	L	T	P	C1	C2	C1	C2	Th.	Pr.		
II	IV	CAC10	Python Programming	3	0	0	3	0	0	20	20	-	-	60	-	3 Hours	100
		CAC10P	Python programming LAB	0	0	4	0	0	2	-	-	10	15*	-	25	3 Hours	50
		CAC11	Computer Multimedia and Animation	3	0	0	3	0	0	20	20	-	-	60	-	3 Hours	100
		CAC11P	Multimedia and Animation LAB	0	0	4	0	0	2	-	-	10	15*	-	25	3 Hours	50
		CAC12	Operating System Concepts	3	0	0	3	0	0	20	20	-	-	60	-	3 Hours	100
		OE – 4	**OPEN ELECTIVE – 4**	3	0	0	3	0	0								
		SEC – 2	**Artificial Intelligence or some other**	1	0	1	1	0	2								
Exit option with Diploma in Computer Applications (100 credits)																	
III	V	CAC13	Internet Technologies	3	0	0	3	0	0	20	20	-	-	60	-	3 Hours	100
		CAC13P	JAVA Script, HTML and CSS LAB	0	0	4	0	0	2	-	-	10	15*	-	25	3 Hours	50
		CAC14	Statistical Computing and R Programming	3	0	0	3	0	0	20	20	-	-	60	-	3 Hours	100
		CAC14P	R Programming LAB	0	0	4	0	0	2	-	-	10	15*	-	25	3 Hours	50
		CAC15	Software Engineering	3	0	0	3	0	0	20	20	-	-	60	-	3 Hours	100
		CAE-1A	**DISCIPLINE SPECIFIC ELECTIVE - 1**	3	0	0	3	0	0	20	20	-	-	60	-	3 Hours	100
		VOC-1	**VOCATIONAL 1 (Anyone from table -IA)**	3	0	0	3	0	0	20	20	-	-	60	-	3 Hours	100
		SEC – 4	**Professional Communication**	2	0	0	2	0	0								
	VI	CAC 16	PHP and MySQL	3	0	0	3	0	0	20	20	-	-	60	-	3 Hours	100
		CAC 16P	LAB: PHP and MySQL	0	0	4	0	0	2	-	-	10	15*	-	25	3 Hours	50
		CAC 17	Artificial Intelligence and Applications	3	0	0	3	0	0	20	20	-	-	60	-	3 Hours	100
		CA -P1	PROJECT Work	0	0	4	0	0	2	-	-	10	15*	-	25	3 Hours	50
		CAE 2A	**DISCIPLINE SPECIFIC ELECTIVE - 2**	3	0	0	3	0	0	20	20	-	-	60	-	3 Hours	100
		VOC-2	**VOCATIONAL 2 (Anyone from table -IA)**	3	0	0	3	0	0	20	20	-	-	60	-	3 Hours	100
		SEC – 2	**Cyber Security or some other SEC**	1	0	1	1	0	2								
Exit Option with Bachelor of Computer Applications Degree, BCA Degree (142 credits)																	

Year	Sem	Corse Code	Title	Hours / Week			Credits			Maximum Marks						Exam Duration	Total Marks
										Th. IA		Pr. IA		Exam			
				L	T	P	L	T	P	C1	C2	C1	C2	Th.	Pr.		
IV	VII	CAC 18	Analysis and Design of Algorithms	3	0	0	3	0	0	20	20	-	-	60	-	3 Hours	100
		CAC 18P	Algorithms LAB	0	0	4	0	0	2	-	-	10	15*	-	25	3 Hours	50
		CAC 19	Data Mining and KnowledgeManagement	3	0	0	3	0	0	20	20	-	-	60	-	3 Hours	100
		CAC 19P	Data Mining and KnowledgeManagement LAB	0	0	4	0	0	2	-	-	10	15*	-	25	3 Hours	50
		CAI 01	Internship	0	0	4	0	0	2	-	-	10	15*	-	25	3 Hours	50
		CAE 2A	**DISCIPLINE SPECIFIC ELECTIVE - 3**	3	0	0	3	0	0	20	20	-	-	60	-	3 Hours	100
			Research Methodology	3	0	0	3	0	0	20	20	-	-	60	-	3 Hours	100
	VIII	CAC 20	Automata Theory and CompilerDesign	3	0	0	3	0	0	20	20	-	-	60	-	3 Hours	100
		CAC 20P	Compiler Lab	0	0	4	0	0	2	-	-	10	15*	-	25	3 Hours	50
		CAC 21	Cryptography and Network Security	3	0	0	3	0	0	20	20	-	-	60	-	3 Hours	100
		CA-P2	**Research Project**	0	0	12	0	0	6	-	-	20	20	-	60	3 Hours	100
		CAE 4A	**DISCIPLINE SPECIFIC ELECTIVE - 4**	3	0	0	3	0	0	20	20	-	-	60	-	3 Hours	100
Award of Bachelor of Computer Applications Honours Degree, BCA (Hons.) Degree (183 credits)																	

Note: 15* is spilt 10 marks for Practical's C2 + 5 marks for practical Record/Report

Table - IA

Course-Type	Course Code	Compulsory/ Elective	Listof option of elective courses. (A suggestive list)	
DISCIPLINE SPECIFIC ELECTIVE COURSES	**DSE 1A**	**Elective**	Cyber Law and CyberSecurity	
			Cloud Computing	
			Business Intelligence	
	DSE 2A	**Elective**	Fundamentals of DataScience	
			Mobile ApplicationDevelopment	
			Embedded Systems	
	DSE 3A	**Elective**	Data Compression	
			IoT	
			Data Analytics	
	CAE 4A	**Elective**	Open-Source Programming	
			Storage Area Networks	
			Pattern Recognition	
			Machine Learning	
VOCATIONAL	**VOC 1** **VOC 2** **VOC 3** **VOC 4**	**Elective**	DTP, CAD and Multimedia	
			Hardware and Server Maintenance	
			Web Content Management Systems	
			Computer Networking	
			Health Care Technologies	
			Digital Marketing	
			Office Automation	
OPEN ELECTIVE OFFER TO OTHER PROGRAMME STUDENTS (L: T: P) = (3: 0:0)				
OPEN ELECTIVE (For BA, BSc, BCom, BSW, BBA, BBM students studying Core Courses other than Computer Science/ Computer Applications)	**OE – 1** **OE – 2** **OE – 3** **OE – 4**	**Elective**	Business Intelligent	
			Big Data Analytics	

Model Course Content for BCA, Semesters I and II

Semester: I

Course Code: CAC01	**Course Title:** Fundamentals of Computers
Course Credits: 03	Hours/Week: 03
Total Contact Hours: 42	Formative Assessment Marks: 40
Exam Marks:60	Exam Duration: 03

Course Outcomes (COs):

• Introduction to computers, classification of computers, anatomy of computer, constituents and architecture, microcontrollers

• Operating systems, functions of operating systems, classification of operating systems, kernel, shell, basics of Unix, shell programming, booting

• Databases, why databases are used, users, SQL, data types in SQL, introduction of queries - select, alter, update, delete, truncate, using where, and or in not in

• Internet basics, features, applications, services, internet service providers, domain name system, browsing, email, searching

• Web Programming basics, introduction of HTML and CSS programming

• Introduction of computers, classification of computers, anatomy of computer, constituents and architecture, microcontrollers.

Course Content

Content	Hours
Unit - 1	
Fundamentals of Computers: Introduction to Computers - Computer Definition, Characteristics of Computers, Evolution and History of Computers, Types of Computers, Basic Organisation of a Digital Computer; Number Systems – different types, conversion from one number system to another; Computer Codes – BCD, Gray Code, ASCII and Unicode; Boolean Algebra – Boolean Operators with Truth Tables; Types of Software – System Software and Utility Software; Computer Languages - Machine Level, Assembly Level & High Level Languages, Translator Programs – Assembler, Interpreter and Compiler; Planning a Computer Program - Algorithm, Flowchart and Pseudo code with Examples. **Introduction to computers:** Characteristics of computers, Classification of Digital Computer Systems: Microcomputers, Minicomputers, Mainframes, Super computers.	14
Unit-2	
Anatomy of Computer: Introduction, Functions & Components of a Computer, Central Processing Unit, Microprocessor, Storage units, Input and output Devices. How CPU and memory works. Program execution with illustrative examples. Introduction to microcontrollers. **Operating System Fundamentals :** Operating Systems: Introduction, Functions of an operating System, Classification of Operating Systems, System programs, Application programs, Utilities, The Unix Operating System, Basic Unix commands, Microkernel	14

Based Operating System, Booting.	
Unit-3	
Introduction to Database Management Systems: Database, DBMS, Why Database - File system vs DBMS, Database applications, Database users, Introduction to SQL, Data types, Classification of SQL-DDL with constraints, DML, DCL, TCL **Internet Basics:** Introduction, Features of Internet, Internet application, Services of Internet, Logical and physical addresses, Internet Service Providers, Domain Name System. **Web Basics:** Introduction to web, web browsers, http/https, URL, HTML5, CSS	14

Text Books:

1. Pradeep K. Sinha and Priti Sinha: Computer Fundamentals (Sixth Edition), BPB Publication

2. David Riley and Kenny Hunt, Computational thinking for modern solver, Chapman & Hall/CRC,

Reference:

1. J. Glenn Brook shear," Computer Science: An Overview", Addision-Wesley, Twelfth Edition,

2. R.G. Dromey, "How to solve it by Computer", PHI,

Course Code: **CAC01P**	**Course Title: Information Technology Lab**
Course Credits: 02	Hours/Week: 04
Total Contact Hours: 52	Formative Assessment Marks: 10
Exam Marks: 40	Exam Duration: 04

Part A: Hardware

1. Identification of the peripherals of a computer, components in a CPU and their functions.

2. Assembling and disassembling the system hardware components of personal computer.

3. Basic Computer Hardware Trouble shooting.

4. LAN and WiFi Basics.

5. Operating System Installation – Windows OS, UNIX/LINUX, Dual Booting.

6. Installation and Uninstallation of Software – Office Tools, Utility Software (like Anti-Virus, System Maintenance tools); Application Software - Like Photo/Image Editors, Audio Recorders/Editors, Video Editors …); Freeware, Shareware, Payware and Trialware; Internet Browsers, Programming IDEs,

7. System Configuration – BIOS Settings, Registry Editor, MS Config, Task Manager, System Maintenance, Third-party System Maintenance Tools (Similar to CCleaner and Jv16 PowerTools …)

Part B: Software

1. Activities using Word Processor Software

2. Activities using Spreadsheets Software

3. Activities using Presentation Software

4. Activities involving Multimedia Editing (Images, Video, Audio …)

5. Tasks involving Internet Browsing

6. Flow charts: Installation and using of flowgarithms software for different arithmetic tasks like sum, average, product, difference, quotient and remainder of given numbers, calculate area of Shapes (Square, Rectangle, Circle and Triangle), arrays and recursion.

NOTE: In addition to the ones listed above, universities can include other activities so as for the student to become proficient in using personal computers for multiple purposes for which modern computers can be put to use.

Reference:

1. Computational Thinking for the Modern Problem Solver, By Riley DD, Hunt K.A CRC press, 2014

2. Ferragina P, Luccio F. Computational Thinking: First Algorithms, Then Code. Springer

Web References:

http://www.flowgorithm.org/documentation/

Evaluation Scheme for Lab Examination

Assessment Criteria		**Marks**
Activity – 1 from Part A	Write up on the activity/ task	5
	Demonstration of the activity/ task	5
Activity-2 from Part B	Write up on the activity/ task	5
	Demonstration of the activity/ task	5
Viva Voice based on Lab Activities		05
Total		**25**

Course Code: CAC02	**Course Title: Programming in C**
Course Credits: 03	Hours/Week: 03
Total Contact Hours: 42	Formative Assessment Marks: 40
Exam Marks: 60	Exam Duration: 03

Course Outcomes (COs):

After completing this course satisfactorily, a student will be able to:

- Confidently operate Desktop Computers to carry out computational tasks
- Understand working of Hardware and Software and the importance of operating systems
- Understand programming languages, number systems, peripheral devices, networking, multimedia and internet concepts
- Read, understand and trace the execution of programs written in C language
- Write the C code for a given problem
- Perform input and output operations using programs in C
- Write programs that perform operations on arrays

Course Content

Content	**Hours**
Unit - 1	
Introduction to C Programming: Overview of C; History and Features of C; Structure of a C Program with Examples; Creating and Executing a C Program; Compilation process in C. **C Programming Basic Concepts:** C Character Set; C tokens - keywords, identifiers, constants, and variables; Data types; Declaration & initialization of variables; Symbolic constants. **Input and output with C:** Formatted I/O functions - *printf* and *scanf,* control stings and escape sequences, output specifications with *printf* functions; Unformatted I/O functions to read and display single character and a string - *getchar, putchar, gets* and *puts* functions. **C Operators & Expressions:** Arithmetic operators; Relational operators; Logical operators; Assignment operators; Increment & Decrement operators; Bitwise operators; Conditional operator; Special operators; Operator Precedence and Associatively; Evaluation of arithmetic expressions; Type conversion.	14
Unit - 2	
Control Structures: Decision making Statements - S*imple if, if_else*, *nested if_else, else_if ladder, Switch Case*, *goto, break* & *continue* statements; Looping Statements - Entry controlled and exit controlled statements, *while, do-while, for* loops, Nested loops. **Derived data types in C:** Arrays: One Dimensional arrays - Declaration, Initialization and Memory representation; Two Dimensional arrays - Declaration, Initialization and Memory representation.	14

Strings: Declaring & Initializing string variables; String handling functions - *strlen, strcmp, strcpy and strcat;* Character handling functions - *toascii, toupper, tolower, isalpha, isnumeric* etc.	

Unit - 3	
Pointers in C: Understanding pointers - Declaring and initializing pointers, accessing address and value of variables using pointers; Pointers and Arrays; Pointer Arithmetic; Advantages and disadvantages of using pointers; **User Defined Functions:** Need for user defined functions; Format of C user defined functions; Components of user defined functions - return type, name, parameter list, function body, return statement and function call; Categories of user defined functions - With and without parameters and return type. **User defined data types:** Structures - Structure Definition, Advantages of Structure, declaring structure variables, accessing structure members, Structure members initialization, comparing structure variables, Array of Structures; Unions - Union definition; difference between Structures and Unions.	14

Text Books:

1. C: The Complete Reference, By Herbert Schildt.
2. C Programming Language, By Brain W. Kernighan
3. Kernighan & Ritchie: The C Programming Language (PHI)

Reference Books:

1. P. K. Sinha & Priti Sinha: Computer Fundamentals (BPB)
2. E. Balaguruswamy: Programming in ANSI C (TMH)
3. Kamthane: Programming with ANSI and TURBO C (Pearson Education)
4. V. Rajaraman: Programming in C (PHI – EEE)
5. S. Byron Gottfried: Programming with C (TMH)
6. Yashwant Kanitkar: Let us C
7. P.B. Kottur: Programming in C (Sapna Book House)

Course Code: CAC02P	Course Title: C Programming Lab
Course Credits: 02	Hours/Week: 04
Total Contact Hours: 52	Formative Assessment Marks:25
Exam Marks: 25	Exam Duration: 03

Programming Lab

Part A:

1. Program to read radius of a circle and to find area and circumference
2. Program to read three numbers and find the biggest of three
3. Program to demonstrate library functions in math.h
4. Program to check for prime
5. Program to generate n primes
6. Program to read a number, find the sum of the digits, reverse the number and check it for palindrome
7. Program to read numbers from keyboard continuously till the user presses 999 and to find the sum of only positive numbers
8. Program to read percentage of marks and to display appropriate message (Demonstration of else-if ladder)
9. Program to find the roots of quadratic equation (demonstration of switch Case statement)

10. Program to read marks scored by n students and find the average of marks (Demonstration of single dimensional array)
11. Program to remove Duplicate Element in a single dimensional Array
12. Program to perform addition and subtraction of Matrices

Part B:

1. Program to find the length of a string without using built in function
2. Program to demonstrate string functions.
3. Program to demonstrate pointers in C
4. Program to check a number for prime by defining isprime( ) function
5. Program to read, display and to find the trace of a square matrix
6. Program to read, display and add two m x n matrices using functions
7. Program to read, display and multiply two m x n matrices using functions
8. Program to read a string and to find the number of alphabets, digits, vowels, consonants, spaces and special characters.
9. Program to Reverse a String using Pointer
10. Program to Swap Two Numbers using Pointers
11. Program to demonstrate student structure to read & display records of n students.
12. Program to demonstrate the difference between structure & union.

Note: Student has to execute a minimum of 10 programs in each part to complete the Lab course

Evaluation Scheme for Lab Examination

Assessment Criteria		**Marks**
Program – 1 from Part A	Flowchart / Algorithm	02
	Writing the Program	05
	Execution and Formatting	03
Program -2 from Part B	Flowchart/Algorithm	02
	Writing the Program	05
	Execution and Formatting	03
Viva Voice based on Lab Activities		05
Total		**25**

Course Code: CAC03(a)	**Course Title:** Mathematical Foundation
Course Credits: 03	Hours/Week: 03
Total Contact Hours: 42	Formative Assessment Marks: 40
Exam Marks: 60	Exam Duration: 03

Course Outcomes (COs):

- Study and solve problems related to connectives, predicates and quantifiers under different situations.
- Develop basic knowledge of matrices and to solve equations using Cramer's rule.
- Know the concept of Eigen values.
- To develop the knowledge about derivatives and know various applications of differentiation.
- Understand the basic concepts of Mathematical reasoning, set and functions

Content	**Hours**
Unit - 1	
Basic concepts of set theory: Mathematical logic introduction-statements Connectives-negation, conjunction, disjunction- statement formulas and truth tables- conditional and bi Conditional statements- tautology contradiction-equivalence of formulas-duality law-Predicates and Quantifiers, Arguments.	14
Unit - 2	
Operations on sets: power set- Venn diagram Cartesian product-relations -functions-types of functions - composition of functions. **Matrix algebra:** Introduction-Types of matrices-matrix operations- transpose of a matrix -determinant of matrix - inverse of a matrix- Cramer's rule	14
Unit - 3	
Matrix: finding rank of a matrix - normal form-echelon form cayley Hamilton theorem-Eigen values **Differential calculus:** Functions and limits - Simple Differentiation of Algebraic Functions – Evaluation of First and Second Order Derivatives – Maxima and Minima	14

Text Books:

P. R. Vittal-Business Mathematics and Statistics, Margham Publications, Chennai,

Reference Books:

B. S. Vatsa-Discrete Mathematics –New Age International Limited Publishers, New Delhi

Course Code: CAC03(b)	**Course Title:** Accountancy
Course Credits: 03	Hours/Week: 03
Total Contact Hours: 42	Formative Assessment Marks: 40
Exam Marks: 60	Exam Duration: 03

Course Outcomes (COs):

- Study and understand Accounting, systems of Book, Branches of accounting advantage and limitations
- Know the concept of accounting, financial accounting process and Journalization
- Maintenance different account book and reconciliations
- Preparations of different bills, and trial balance.
- Understand the basic concepts of Mathematical reasoning, set and functions

Content	**Hours**
Unit - 1	
Introduction: History and Development of Accounting, Meaning, Objectives and functions of Accounting, Book keeping V/s Accounting, Users of accounting data, systems of book keeping and accounting, branches of accounting, advantages and limitations of accounting **Accounting Concepts and Convention:** Meaning, need and classification, accounting standards meaning, need and classification of Indian accounting standards. Accounting principles V/s accounting standard	14
Unit - 2	
Financial Accounting Process: Classification of accounting transactions and accounts, rules of debit and credit as per Double Entry System. Journalization and Ledger posting. **Preparation of Different Subsidiary Books:** Purchase Day book Sales Day Book, Purchase Returns Day Book, Sales Returns Day Book, Cash Book. Bank Reconciliation Statement: Meaning, Causes of Difference, Advantages, Preparation of Bank Reconciliation Statements.	14
Unit - 3	
Account Procedure: Honor of the Bill, Dishonor of the Dill, Endorsement, Discounting, Renewal, Bill for collection, Retirement of the Bill, Accommodation Bills, Bill Receivable Book and Payable Book. Preparation of Trial Balance: Rectification of errors and Journal Proper **Preparation of Final Accounts:** Meaning, need and classification, Preparation of Manufacturing, Trading, Profit and loss account and Balance – Sheet of sale-traders and partnership firms.	14

Text Books:

1. S. Ramesh, B.S. Chandrashekar, A Text Book of Accountancy.
2. V.A. Patil and J.S. Korihalli, Book – keeping and accounting, (R. Chand and Co. Delhi).
3. R. S. Singhal, Principles of Accountancy, (Nageen Prakash pvt. Lit. Meerut).
4. M. B. Kadkol, Book – Keeping and Accountancy, (Renuka Prakashan, Hubil)
5. Vithal, Sharma:Accounting for Management, Macmillan Publishers, Mumbai.

Reference Books:

1. B.S. Raman, Accountancy, (United Publishers, Mangalore).
2. Tulsian, Accouning and Finacial Management – I: Financial Accounting – Person Education.

Semester: II

Course Code: CAC04	**Course Title: Data Structures using C**
Course Credits: 03	Hours/Week: 03
Total Contact Hours: 42	Formative Assessment Marks: 40
Exam Marks: 60	Exam Duration: 03 Hours

Course Outcomes (COs):

After completing this course satisfactorily, a student will be able to:

• Describe how arrays, records, linked structures, stacks, queues, trees, and graphs are represented in memory and used by algorithms

• Describe common applications for arrays, records, linked structures, stacks, queues, trees, and graphs

• Write programs that use arrays, records, linked structures, stacks, queues, trees, and graphs

• Demonstrate different methods for traversing trees

• Compare alternative implementations of data structures with respect to performance

• Describe the concept of recursion, give examples of its use

• Discuss the computational efficiency of the principal algorithms for sorting, searching, and hashing

Course Content

Content	**Hours**
Unit - 1	
Introduction to data structures: Definition; Types of data structures - Primitive & Non-primitive, Linear and Non-linear; Operations on data structures. Dynamic memory allocation: Static & Dynamic memory allocation; Memory allocation and de-allocation functions - *malloc*, *calloc*, *realloc* and *free.* Algorithm Specification, Performance Analysis, Performance Measurement Recursion: Definition; Types of recursions; Recursion Technique Examples - GCD, Binomial coefficient ${}_nC_r$, Towers of Hanoi; Comparison between iterative and recursive functions. **Arrays:** Basic Concepts – Definition, Declaration, Initialisation, Operations on arrays; Types of arrays; Arrays as abstract data types (ADT); Representation of Linear Arrays in memory;	14
Unit - 2	
Traversing linear arrays; Inserting and deleting elements; Sorting – Selection sort, Bubble sort, Quick sort, Selection sort, Insertion sort; Searching - Sequential Search, Binary search; Iterative and Recursive searching; Multidimensional arrays; Representation of multidimensional arrays; Sparse matrices. **Linked list**: Basic Concepts – Definition and Representation of linked list, Types of linked lists - Singly linked list, Doubly liked list, Header liked list, Circular linked list; Representation of Linked list in Memory; Operations on Singly linked lists – Traversing, Searching, Insertion, Deletion; Memory allocation; Garbage collection,	14

Unit - 3	
Stacks: Basic Concepts – Definition and Representation of stacks; Operations on stacks; Applications of stacks; Infix, postfix and prefix notations; Conversion from infix to postfix using stack; Evaluation of postfix expression using stack; Application of stack in function calls. **Queues**: Basic Concepts – Definition and Representation of queues; Types of queues - Simple queues, Circular queues, Double ended queues, Priority queues; Operations on Simple queues; **Trees:** Definition; Tree terminologies –node, root node, parent node, ancestors of a node, siblings, terminal & non-terminal nodes, degree of a node, level, edge, path, depth; **Binary tree:** Type of binary trees - strict binary tree, complete binary tree, binary search tree and heap tree; Array representation of binary tree. Traversal of binary tree; preorder, inorder and postorder traversal;	14

Text Books

1. Ellis Horowitz and Sartaj Sahni: Fundamentals of Data Structures

References

1. Tanenbaum: Data structures using C (Pearson Education)
2. Kamathane: Introduction to Data structures (Pearson Education)
3. Y. Kanitkar: Data Structures Using C (BPB)
4. Kottur: Data Structure Using C
5. Padma Reddy: Data Structure Using C
6. Sudipa Mukherjee: Data Structures using C – 1000 Problems and Solutions (McGraw Hill Education, 2007))

Course Code: CAC04P	**Course Title: Data Structures Lab**
Course Credits: 02	Hours/Week: 04
Total Contact Hours: 52	Formative Assessment Marks: 25
Exam Marks: 25	Exam Duration: 03 Hours

Programming Lab

Part A:

1. Program to find GCD using recursive function
2. Program to display Pascal Triangle using binomial function
3. Program to generate n Fibonacci numbers using recursive function.
4. Program to implement Towers of Hanoi.
5. Program to implement dynamic array, find smallest and largest element of the array.
6. Program to create two files to store even and odd numbers.
7. Program to create a file to store student records.
8. Program to read the names of cities and arrange them alphabetically.
9. Program to sort the given list using selection sort technique.

10. Program to sort the given list using bubble sort technique.

Part B:

1. Program to sort the given list using insertion sort technique.
2. Program to sort the given list using quick sort technique.
3. Program to sort the given list using merge sort technique.
4. Program to search an element using linear search technique.
5. Program to search an element using recursive binary search technique.
6. Program to implement Stack.
7. Program to convert an infix expression to postfix.
8. Program to implement simple queue.
9. Program to implement linear linked list.
10. Program to display traversal of a tree.

Evaluation Scheme for Lab Examination

Assessment Criteria		**Marks**
Program – 1 from Part A	Flowchart / Algorithm	02
	Writing the Program	05
	Execution and Formatting	03
Program -2 from Part B	Flowchart/Algorithm	02
	Writing the Program	05
	Execution and Formatting	03
Viva Voice based on C Programming		05
Total		**25**

Course Code: CAC05	**Course Title: Object Oriented Programming with JAVA**
Course Credits: 03	Hours/Week: 03
Total Contact Hours: 42	Formative Assessment Marks: 40
Exam Marks: 60	Exam Duration: 03 Hours

Course Outcomes (COs):

After completing this course satisfactorily, a student will be able to:

• Understand the features of Java and the architecture of JVM

• Write, compile, and execute Java programs that may include basic data types and control flow constructs and how type casting is done

• Identify classes, objects, members of a class and relationships among them needed for a specific problem and demonstrate the concepts of polymorphism and inheritance

• The students will be able to demonstrate programs based on interfaces and threads and explain the benefits of JAVA's Exceptional handling mechanism compared to other Programming Language

• Write, compile, execute Java programs that include GUIs and event driven programming and also programs based on files

Course Content

Content	**Hours**
Unit - 1	
Introduction to Java: Basics of Java programming, Data types, Variables, Operators, Control structures including selection, Looping, Java methods, Overloading, Math class, Arrays in java. **Objects and Classes:** Basics of objects and classes in java, Constructors, Finalizer, Visibility modifiers, Methods and objects, Inbuilt classes like String, Character, String Buffer, File, this reference.	14
Unit - 2	
Inheritance and Polymorphism: Inheritance in java, Super and sub class, Overriding, Object class, Polymorphism, Dynamic binding, Generic programming, Casting objects, Instance of operator, Abstract class, Interface in java, Package in java, UTIL package. **Event and GUI programming:** Event handling in java, Event types, Mouse and key events, GUI Basics, Panels, Frames, Layout Managers: Flow Layout, Border Layout, Grid Layout, GUI components like Buttons, Check Boxes, Radio Buttons, Labels, Text Fields, Text Areas, Combo Boxes, Lists, Scroll Bars, Sliders, Windows, Menus, Dialog Box, Applet and its life cycle, Introduction to swing, Exceptional handling mechanism.	14
Unit - 3	
I/O programming: Text and Binary I/O, Binary I/O classes, Object I/O, Random Access Files. **Multithreading in java:** Thread life cycle and methods, Runnable interface, Thread synchronization, Exception handling with try catch-finally, Collections in java, Introduction to JavaBeans and Network Programming.	14

Text Books

1. Programming with Java, By E Balagurusamy – A Primer, Fourth Edition, Tata McGraw Hill Education Private Limited.
2. Core Java Volume I – Fundamentals, By Cay S. Horstmann, Prentice Hall
3. Object Oriented Programming with Java : Somashekara, M.T., Guru, D.S., Manjunatha, K.S

Reference Books:

1. Java 2 - The Complete Reference – McGraw Hill publication.
2. Java - The Complete Reference, 7th Edition, By Herbert Schildt– McGraw Hill publication.

Course Code: CAC05P	**Course Title:** JAVA Lab
Course Credits: 02	Hours/Week: 04
Total Contact Hours: 52	Formative Assessment Marks: 25
Exam Marks: 25	Exam Duration: 03 Hours

Course Outcomes (COs):

After completing this course satisfactorily, a student will be able to:

- Implement Object Oriented programming concept using basic syntaxes of control Structures
- Identify classes, objects, members of a class and the relationships among them needed for a finding the solution to specific problem
- Demonstrates how to achieve reusability using inheritance
- Demonstrate understanding and use of interfaces, packages, different exception handling mechanisms and concept of multithreading for robust faster and efficient application development.
- Identify and describe common user interface components to design GUI in Java using Applet & AWT along with response to events

Practice Lab

1. Program to print the following triangle of numbers

1
1 2
1 2 3
1 2 3 4
1 2 3 4 5

2. Program to simple java application, to print the message, “Welcome to java”
3. Program to display the month of a year. Months of the year should be held in an array.
4. Program to find the area of rectangle.
5. program to demonstrate a division by zero exception
6. Program to create a user defined exception say Pay Out of Bounds.

Programming Lab

PART A: Java Fundamentals OOPs in Java

1. Program to assign two integer values to X and Y. Using the ‘if’ statement the output of the program should display a message whether X is greater than Y.
2. Program to list the factorial of the numbers 1 to 10. To calculate the factorial value, use while loop. (Hint Fact of 4 = 4*3*2*1)

3. Program to add two integers and two float numbers. When no arguments are supplied, give a default value to calculate the sum. Use function overloading.

4. Program to perform mathematical operations. Create a class called AddSub with methods to add and subtract. Create another class called MulDiv that extends from AddSub class to use the member data of the super class. MulDiv should have methods to multiply and divide A main function should access the methods and perform the mathematical operations.

5. Program with class variable that is available for all instances of a class. Use static variable declaration. Observe the changes that occur in the object's member variable values.

6. Program

a. To find the area and circumference of the circle by accepting the radius from the user.

b. To accept a number and find whether the number is Prime or not

7. Program to create a student class with following attributes;

Enrollment No: Name, Mark of sub1, Mark of sub2, mark of sub3, Total Marks. Total of the three marks must be calculated only when the student passes in all three subjects. The pass mark for each subject is 50. If a candidate fails in any one of the subjects his total mark must be declared as zero. Using this condition write a constructor for this class. Write separate functions for accepting and displaying student details. In the main method create an array of three student objects and display the details.

8. In a college first year class are having the following attributes Name of the class (BCA, BCom, BSc), Name of the staff No of the students in the class, Array of students in the class

9. Define a class called first year with above attributes and define a suitable constructor. Also write a method called best Student () which process a first-year object and return the student with the highest total mark. In the main method define a first-year object and find the best student of this class

10. Program to define a class called employee with the name and date of appointment. Create ten employee objects as an array and sort them as per their date of appointment. ie, print them as per their seniority.

11. Create a package 'student. Fulltime. BCA 'in your current working directory

a. Create a default class student in the above package with the following attributes: Name, age, sex.

b. Have methods for storing as well as displaying

PART B: Exception Handling & GUI Programming

1. Program to catch Negative Array Size Exception. This exception is caused when the array is initialized to negative values.

2. Program to handle Null Pointer Exception and use the "finally" method to display a message to the user.

3. Program which create and displays a message on the window

4. Program to draw several shapes in the created window

5. Program to create an applet and draw grid lines

6. Program which creates a frame with two buttons father and mother. When we click the father button the name of the father, his age and designation must appear. When we click mother similar details of mother also appear.

7. Create a frame which displays your personal details with respect to a button click

8. Create a simple applet which reveals the personal information of yours.

9. Program to move different shapes according to the arrow key pressed.

10. Program to create a window when we press M or m the window displays Good Morning, A or a the window displays Good After Noon E or e the window displays Good Evening, N or n the window displays Good Night

11. Demonstrate the various mouse handling events using suitable example.

12. Program to create menu bar and pull-down menus.

Note: Student has to execute a minimum of 10 programs in each part to complete the Lab course

Evaluation Scheme for Lab Examination

Assessment Criteria		**Marks**
Program – 1 from Part A	Flowchart / Algorithm	02
	Writing the Program	05
	Execution and Formatting	03
Program -2 from Part B	Flowchart/Algorithm	02
	Writing the Program	05
	Execution and Formatting	03
Viva Voice based on **Object Oriented Programming with JAVA**		05
Total		**25**

Course Code: CAC06	**Course Title: Discrete Mathematical Structures**
Course Credits: 03	Hours/Week: 03
Total Contact Hours: 42	Formative Assessment Marks: 40
Exam Marks: 60	Exam Duration: 03 Hours

Course Outcomes (COs):

After completing this course satisfactorily, a student will be able to:

- To understand the basic concepts of Mathematical reasoning, set and functions.
- To understand various counting techniques and principle of inclusion and exclusions.
- Understand the concepts of various types of relations, partial ordering and
- equivalence relations.
- Apply the concepts of generating functions to solve the recurrence relations.
- Familiarize the fundamental concepts of graph theory and shortest path algorithm

Course Content

Content	Hours
Unit - 1	
The Foundations: Logic and proofs: Propositional Logic, Applications of Propositional Logic, Propositional Equivalences, Predicates and Quantifiers, Nested Quantifiers, Rules of Inference, Introduction to Proofs, Proof Methods and Strategy. **Basic Structures**: Sets, Functions, Sequences, Sums, and Matrices: Sets, set operations, Functions, Sequences and Summations, matrices.	14
Unit - 2	
Counting: Basics of counting, Pigeonhole principle, Permutation and combination, Binomial Coefficient and Combination, Generating Permutation and Combination**.** **Advanced Counting Techniques**: Applications of Recurrence Relations, Solving Linear Recurrence, Relations, Divide and Conquer Algorithms and Recurrence Relations, Generating functions, Inclusion-Exclusion, Applications of Inclusion-exclusion. **Induction and Recursion**: Mathematical Induction, Strong Induction and Well-Ordering, Recursive Definitions and Structural Induction, Recursive Algorithms, Program Corrections.	14
Unit - 3	
Relation: Properties of relation, Composition of relation, Closer operation on relation, Equivalence relation and partition. Operation on relation, Representing relation. **Graphs**: Graphs and Graph models, Graph Terminology and Special Types of Graphs, Representing Graphs and Graph Isomorphism, Connectivity, Euler and Hamilton Paths, Shortest-Path Problems, Planar Graphs, Graph Coloring.	14

Text Book:

1. Discrete Mathematics and Its Applications, Kenneth H. Rosen: Seventh Edition, 2012.

References:

2. Discrete Mathematical Structure, Bernard Kolman, Robert C, Busby, Sharon Ross, 2003.
3. Graph Theory with Applications to Engg and Comp. Sci: Narsingh Deo-PHI 1986.
4. Discrete and Combinatorial Mathematics Ralph P. Grimaldi, B. V. Ramatta, Pearson, Education, 5 Edition.
5. Discrete Mathematical Structures, Trembley and Manobar.

Course Code: OE-1	**Course Title:** Business Intelligence
Course Credits: 3 (3: 0:0) / (2: 1: 0)	Hours/Week: 03
Total Contact Hours: 42	Formative Assessment Marks: 40
Exam Marks: 60	Exam Duration: 03

Course outcomes:

- gain knowledge of Business Intelligence
- build business projects
- generate and manage BI reports
- do BI Deployment, Administration & Security.

Course Content

Content	Hours
Unit - 1	
Introduction to Business Intelligence: Understanding the scope of today's BI solutions and how they fit into existing infrastructure Assessing new options such as SaaS and cloud-based technology. Describe BI, its components & architecture, previewing the future of BI Crafting a better experience for all business users, End User Assumptions, setting up Data for BI, The Functional Area of BI Tools, Query Tools and Reporting, OLAP and Advanced Analytics, Supporting the requirements of senior executives, including performance management.	14
Unit - 2	
Elements of Business Intelligence Solutions: Reports & ad hoc queries; Analyze OLAP data; Dashboards & Scorecards development, Metadata Models; Automated tasks & events; Mobile & disconnected BI; Collaboration capabilities; Real time monitoring capabilities; Software development kit; Consume BI through portals, web applications, Desktop applications. **Building the BI Project:** Planning the BI project, Project Resources; Project Tasks, Risk Management and Mitigation, Cost-justifying BI solutions and measuring success, Collecting User Requirements, Requirements-Gathering Techniques; Prioritizing & Validating BI Requirements, Changing Requirements; BI Design and Development, Best Practices for BI Design; Post-Implementation Evaluations, Maintaining Your BI Environment.	14
Unit - 3	
Reporting authoring: Building reports with relational vs Multidimensional data models; Types of Reports Data Grouping & Sorting, Filtering Reports, Adding Calculations to Reports, Conditional formatting, Adding Summary Lines to Reports. Drill up, drill- down, drill-through capabilities. Run or schedule report, different output forms. **BI Deployment, Administration & Security:** Centralized Versus Decentralized Architecture, BI Architecture Alternatives, phased & incremental BI roadmap, System Sizing, Measurements and Dependencies, System Sizing, Measurements, and Dependencies. Setting Early Expectations and Measuring the Results. End-User Provisos. OLAP Implementations. Expanding BI Authentication Authorization, Access Permissions, Groups and Roles, Single-sign on Server Administration, Manage Status & Monitoring, Audit, Mail server & Portal integration, Back Up and Restore.	14

TEXT BOOKS

1. Business Intelligence (IBM ICE Publication).

REFERENCE BOOKS

1. http://en.wikipedia.org/wiki/Business_intelligence.
2. http://www.webopedia.com/TERM/B/Business_Intelligence.html.
3. Http://www.cio.com/article/40296/Business_Intelligence_Definition_and_Solutions.

Course Code: OE-2	**Course Title:** Big Data Analytics
Course Credits: 3 (3: 0:0) / (2: 1: 0)	Hours/Week: 03
Total Contact Hours: 42	Formative Assessment Marks: 40
Exam Marks: 60	Exam Duration: 03

Course outcomes:

- Explain the importance of data and data analysis.
- Interpret the probabilistic models for data.
- Illustrate hypothesis, uncertainty principle.
- Demonstrate the regression analysis

Course Content

Content	Hours
Unit - 1	
Overview Of Big Data: History of big data, its elements, career related knowledge, advantages, disadvantages. Using Big Data in Businesses: Focus on the application perspective of Big Data covering, using big data in marketing, analytics, retail, hospitality, consumer good, defense etc. Technologies for Handling Big Data: Introduction to Hadoop, functioning of Hadoop, Cloud computing (features, advantages, applications) etc	14
Unit - 2	
Understanding Hadoop Ecosystem: Hadoop and its ecosystem which includes HDFS, Map Reduce, YARN, HBase, Hive, Pig, Sqoop, Zookeeper, Flume, Oozie etc. Dig Deep to understand the fundamental of Map Reduce and HBase: framework of Map Reduce and uses of map reduce. Understanding Big Data Technology Foundations: big data stack i.e. data source layer, ingestion layer, source layer, security layer, visualization layer, visualization approaches etc.	14
Unit - 3	
Databases And Data Warehouses: Databases, polygot persistence and their related introductory knowledge. Using Hadoop to store data: Module of HDFS, HBase and ways to store and manage data along with their commands. Learn to Process Data using Map Reduce: Emphasizes on developing simple map reduce framework and the concept applied.	14

Text Books:

1. Big Data Now: 2014 Edition by "Raymond I Morrison"
2. Analytics in a Big Data World: The essential guide to data science and its application

References:

1. Hadoop For Dummies, Dirk deRoos, For Dummies, 2014
2. Big Data Analytics, Introduction to Hadoop, Spark, and Machine-Learning by Raj Kamal Preeti Saxena.
3. Big Data Analytics: A Hands-On Approach Paperback – 7 Sep 2018, by Arshdeep Bahga, Vijay Madisetti.

ECC21101

III SEMESTER

DSC 7A: Programming in JAVA Lab
Credit (L: T: P = 0: 0: 2)

Software Lab based on Java

PART A

1. Write a java program to find whether given number is positive, negative or zero
2. Write a java program to find the largest of three number using ternary operator
3. Write a java program to find out roots of the quadratic Equation
4. Write a java program to check whether given date is valid or not
5. Write a java program to implement ATM Transaction Using Switch statement
6. Write a java program to generate the following pattern

```
        A
      A B A
    A B C B A
  A B C D C B A..
```

7. Write a java program to find sum of all digits of a given number until given number become a single digit
8. Write a program to create an array of 10 integers. Accept values from the user in that array. Input another number from the user and find out how many numbers are equal to the number passed, how many are greater and how many are less than the number passed.
9. Write a java program to sort the given element using selection sort
10. Write a java program to find the trace and norm of the given square matrices

PART B

1. Write a java program to Generate Employee Salary slip Using Class and Object
2. Write a java program to check whether entered character is a vowel or consonant using Constructor
3. Write a java program to Demonstrate Method Overloading
4. Write java program to generate Student marks card Using Inheritance
5. Write a java program to calculate bonus for different departments using abstract class
6. Write a java program to Demonstrate Method Overriding
7. Write a java program to that reads two integer numbers for the variables a and b. If any other character except number (0-9) is entered then the error is caught by Number Format Exception object. After that ex. getMessage () prints the information about the error occurring causes
8. Write a java program to Demonstrate multiple Inheritance using Interface
9. Write a java program to Demonstrate multithreading
10. Write a applet program to generate the following pattern

ECC22001

III SEMESTER
DSC 8A: Database Management Systems
Credit (L: T: P = 4: 0: 0)

Course Outcome

After successful completion of the course, the student is able to
CO 1. Understand the characteristics of DBMS with examples
CO 2. Deliberate the details of types of database languages with examples
CO 3. Learn the details of ER- Diagrams and Relationship
CO 4. Understand in depth Basic concepts of Relational Model
CO 5. Learn in details with examples MYSQL Commands
CO 6. Learn in details with examples in PL-SQL

Unit - 1 **15 Hours**

Introduction to Database Management Systems: Definition of Data, Information, DBMS, Data base system application, Purpose of database systems, Characteristics of DB – Self describing nature, Insulation between programs, data and data Abstraction (data Independence), support of multiple views of the data, sharing of data and multiples transaction processing, Storage management, Database language – DDL, DML,DCL. File processing system v/s DBMS, Data models, Levels of Abstraction in a DBMS, Three Schema architecture, Characteristics of database approach,, data models, DBMS architecture and data independence.

Unit - 2 **15 Hours**

Entity Relationship and Enhanced ER Modelling: Entity types, Entity Sets, Attributes, and Keys, Relationships, Relationship Types, Roles, and Structural Constraints, Weak Entity Types, ER Diagrams, Naming Conventions, SQL99: Schema Definition, constraints, and object modelling

Unit - 3 **15 Hours**

Relational Data Model: Basic concepts, Relational Constraints and Relational Database Schemas, Update Operations and Dealing with Constraint Violations, Basic Relational Algebra Operations.
Database design: ER and EER to relational mapping, functional dependencies, normal forms-first normal form, second normal forms. Third normal form BCNF

Unit - 4 **15 Hours**

MYSQL (SQL/PL-SQL): sql vs. Sql * plus: sql commands and data types, operators and expressions, introduction to sql * plus.
Managing tables and data: Creating and altering tables (including constraints)
Data manipulation command like insert, update, delete
Select statement with where, group by and having, order by, distinct, special operator like - in, any, all between, exists, like SQL Wildcards
joins, built in functions other database objects
Views

Synonyms, index transaction control statements
Commit, rollback, save point
Introduction to pl/sql: sql v/s pl/sql, pl/sql block structure
Language construct of pl/sql (variables, basic and composite data type, conditions, looping ...
% type and % row type using cursor (implicit, explicit)
Trigger and its types

Reference Books:

1. R. Elmasri, S.B. Navathe, Fundamentals of Database Systems 6th Edition, Pearson Education, 2010.
2. R. Ramakrishanan, J. Gehrke, Database Management Systems 3rd Edition, McGraw-Hill, 2002.
3. A. Silberschatz, H.F. Korth, S. Sudarshan, Database System Concepts 6th Edition, McGraw Hill, 2010.
4. R. Elmasri, S.B. Navathe Database Systems Models, Languages, Design and application Programming, 6th Edition, Pearson Education,2013.

ECC22101

III SEMESTER
DSC 8A: Database Management Systems Lab
Credit (L: T: P = 0: 0: 2)

Software Lab based on Database Management Systems

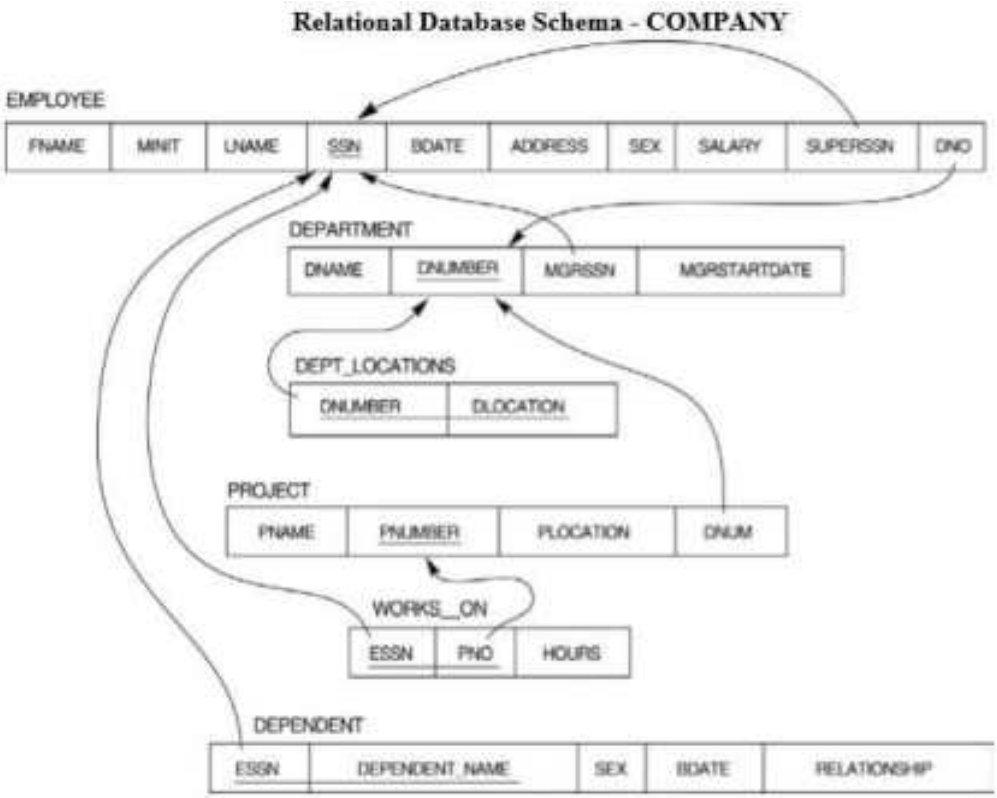
The following concepts must be introduced to the students: **Note:** MS Access / MySQL may be used.

DDL Commands

- Create table, alter table, drop table

DML Commands

- Select, update, delete and insert statements
- Condition specification using Boolean and comparison operators (and, or, not,=,<>,>,<,>=,<=)
- Arithmetic operators and aggregate functions (Count, sum, avg, Min, Max)
- Multiple table queries (join on different and same tables) • Nested select statements
- Set manipulation using (any, in, contains, all, not in, not contains, exists, not exists, union, intersect, minus, etc.)
- Categorization using group by.....having
- Arranging using order by



1. Create tables with relevant foreign key constraints
2. Populate the tables with data
3. Perform the following queries on the database:
   a. Display all the details of all employees working in the company.
   b. Display ssn, lname, fname, address of employees who work in department no 7.
   c. Retrieve the birthdate and address of the employee whose name is ‘Franklin T. Wong'
4. Retrieve the name and salary of every employee
5. Retrieve all distinct salary values
6. Retrieve all employee names whose address is in ‘Bellaire’
7. Retrieve all employees who were born during the 1950s
8. Retrieve all employees in department 5 whose salary is between 50,000 and 60,000(inclusive)
9. Retrieve the names of all employees who do not have supervisors
10. Retrieve SSN and department name for all employees
11. Retrieve the name and address of all employees who work for the ‘Research’ department 12. For every project located in 'Stafford', list the project number, the controlling department number, and the department manager's last name, address, and birth date.
13. For each employee, retrieve the employee's name, and the name of his or her immediate supervisor.
14. Retrieve all combinations of Employee Name and Department Name

15. Make a list of all project numbers for projects that involve an employee whose last name is 'Narayan' either as a worker or as a manager of the department that controls the project. 16. Increase the salary of all employees working on the 'ProductX' project by 15%. Retrieve employee name and increased salary of these employees.
17. Retrieve a list of employees and the project name each works in, ordered by the employee's department, and within each department ordered alphabetically by employee first name.
18. Select the names of employees whose salary does not match with salary of any employee in department 10.
19. Retrieve the name of each employee who has a dependent with the same first name and same sex as the employee.
20. Retrieve the employee numbers of all employees who work on project located in Bellaire, Houston, or Stafford.
21. Find the sum of the salaries of all employees, the maximum salary, the minimum salary, and the average salary. Display with proper headings.
22. Find the sum of the salaries and number of employees of all employees of the 'Marketing' department, as well as the maximum salary, the minimum salary, and the average salary in this department
23. Select the names of employees whose salary is greater than the average salary of all employees in department 10.
24. For each department, retrieve the department number, the number of employees in the department, and their average salary.
25. For each project, retrieve the project number, the project name, and the number of employees who work on that project.
26. Change the location and controlling department number for all projects having more than 5 employees to 'Bellaire' and 6 respectively. 27. For each department having more than 10 employees, retrieve the department no, no of employees drawing more than 40,000 as salary.
28. Insert a record in Project table which violates referential integrity constraint with respect to Department number. Now remove the violation by making necessary insertion in the Department table.
29. Delete all dependents of employee whose ssn is '123456789'.
30. Delete an employee from Employee table with ssn = '12345' (make sure that this employee has some dependents, is working on some project, is a manager of some department and is supervising some employees). Check and display the cascading effect on Dependent and Works on table. In Department table MGRSSN should be set to default value and in Employee table SUPERSSN should be set to NULL 31. Perform a query using alter command to drop/add field and a constraint in Employee table.

ECC23001

III SEMESTER

DSC 9A: Web Technologies
Credit (L: T: P = 4: 0: 0)

Course Outcome:

After successful completion of the course, the student is able to
CO 1. Learn the details of HTML tags
CO 2. Understand in details with examples Document object Model
CO 3. Understand the details of Basic CSS and implements
CO 4. Understand the details of Basic Concepts of Java Scripts
CO 5. Write down in details with application and Usage of Java scripts
CO 6. Deliberate in depth JQuery& Bootstrap with Examples

Unit - 1 15 Hours

Introduction to Web Design: Introduction to HyperText Markup Language (HTML), header, footer, formatting tags, graphical elements, inserting images, lists, hyperlinks, tables. **Frames-** Introduction, frameset. Forms- attributes of forms. Creating web pages
DOM: Basics of DOM, DOM methods, functions Forms collection, table collections Inner HTML.

Unit - 2 15 Hours

Cascading Style Sheets: Introduction, Understanding the Basic CSS syntax, Types of style sheets, multiple sheets, and Background properties, Text properties, Font properties, and Border properties, Margin properties padding list & table properties. DIV, SPAN, CSS Layout - The position Property, float and clear, the display-inline-block Property, Overflow
CSS Advanced - Rounded Corners, Border Images, Backgrounds, Colors, Gradients, Shadows, Text Effects, Web Fonts, 2D & 3D Transforms, Transitions, Animations

Unit - 3 15 Hours

JavaScript: Introduction, Java script in HTML, Java script statement, comments, Expressions, Data types, operators, Conditional statements, Loop statements, functions, Popup boxes ,Array & Boolean Objects Math & Date Objects String & Number Objects, events and event handling & form document object.

Unit - 4 15 Hours

JQuery: Introduction, Syntax, Selectors, Events, Effects, Hide/Show, Fade, Slide, Animate, stop (), Callback, Chaining
JQuery HTML Interface: Get, Set, Add, Remove, CSS Classes, css (), Dimensions
JQuery Traversing: Ancestors, Descendants, Siblings & Filtering
Bootstrap 4: Introduction, Grid Basic, Typography, Colors, Tables, Images, Jumbotron, Alerts, Buttons, Badges, List Groups, Cards, Dropdowns, Collapse, Navs, Navbar, Forms, Inputs, Input Groups, Custom Forms, Carousel, Modal, Tooltip, Popover, Toast, Scrollspy, Utilities, Flex, Icons, Media Objects, Filters

Reference Books:

1. M.Deitel, P.J.Deitel, A.B.Goldberg: Internet & World Wide Web How to program, 3rd Edition, Pearson Education / PHI, 2004.
2. Chris Bates: Web Programming Building Internet Applications, 3rd Edition, Wiley India, 2006.
3. 3. XueBai et al: The Web Warrior Guide to Web Programming, Thomson, 2003.
4. Learning jQuery Fourth Edition-Jonathan Chaffer.
5. Web Development with jQuery -Richard York
6. Bootstrap-Jake Spurlock
7. Mastering Bootstrap4- Benjamin Jakobus, Jason Marah

ECC23101

III SEMESTER

DSC 9A: Web Technologies Lab
Credit (L: T: P = 0: 0: 2)

1. Program for formatting tags.
2. Creating a Webpage having Hyperlink.
3. Creating Types of Lists (Ordered, Unordered, Definition).
4. Creating a Nested List.
5. Creating a Time Table.
6. Creating a HTML document having vertical frames.
7. Creating Student Application Form.
8. Program to insert audio & video files
9. Creating Internal & External Style Sheets.
10. Program to Margin & Padding.
11. Program to create a Greeting card
12. Program to Image Transparency
13. Program to generate Fibonacci series in JavaScript.
14. Program to display Rainbow Colors in JavaScript.
15. Program to create Pop-Up Boxes.
16. Program to generate multiplication table.
17. Program to find even and odd numbers.
18. Program to add 2 numbers.
19. Program to find factorial of a numbers.
20. Program to generate 2 different patterns.
21. Program to change background color after 5 sec of page load.
22. Display reverse of a given number.
23. Display Time Using Jquery
24. Design Simple Department web Site Using Bootstrap
25. Design Web page using Bootstrap and Jquery

ECD21001

IV SEMESTER
DSC 10A: Numerical Analysis and Statistics
Credit (L: T: P = 4: 0: 0)

Course Outcome:

After successful completion of the course, the student is able to

CO1. Understand the details of Computer Numerical data and arithmetic
CO2. Understand the classification and characteristics of Iterative Methods in numerical analysis
CO3. Deliberate in details with examples Matrices and linear system of Equations
CO4. Specify in details with examples Interpolation
CO5. Understand in depth Numerical integration and differentiation
CO6. Learn the details of Importance and limitations of statistics

Unit - 1 **15 Hours**

Computer Arithmetic: Fixed and Floating point representation, Normalization of numbers. Errors in numbers.

Iterative methods: Bisection method, Regula-Falsi method, Secant method, Newton-Raphson method

Unit - 2 **15 Hours**

Matrices and Linear System of Equations: LU decomposition method, Gauss elimination, Gauss serial and Gauss Jordan for solving system of equations

Interpolation: Polynomial interpolation, Newton-Gregory forward and backward interpolation, Newton's divided differences interpolation formulae.

Unit - 3 **15 Hours**

Numerical Integration: Trapezoidal rule, Simpson's 1/3rd and 3/8th rule,

Numerical Differentiation: Euler's, modified Euler's and Runge-Kutta (RK) 2nd order and 4th order.

Unit - 4 **15 Hours**

Statistics: Definition, Importance, Functions and Limitations of statistics.

Graphic presentation: Frequency distribution, Histogram, Frequency polygon, frequency curve and O gives Measures of central tendency: (Mean, Median, Mode) Dispersion, Correlation, Regression.

Reference Books:

1. K.E. Atkinson, W. Han, Elementary Numerical Analysis, 3rd Ed., Wiley, 2003.
2. C. Xavier, S.S. Iyengar, Introduction to Parallel Algorithms, Wiley-Interscience, 1998.
3. A. Kharab, R.B. Guenther, An Introduction to Numerical Methods: A MATLAB Approach,1st Ed. Chapman and Hall/CRC, 2001.
4. B. Bradie, A Friendly Introduction to Numerical Analysis, Pearson Education, 2007.
5. S.R. Otto and J.P. Denier, An Introduction to Programming and Numerical Methods in MATLAB, Springer, 2005.
6. M.K. Jain, S.R.K. Iyengar and R.K. Jain, Numerical Methods for Scientific and Engineering Computation, 7th Ed., New Age International Publishers, 2007.
7. Computer oriented numerical methods by V Rajaraman
8. Statistics Theory and Practice by R S N Pillai, Bagavathi
9. Practical statistics by S P Gupta

ECD21101

IV SEMESTER
DSC 10A: Numerical Analysis and Statistics Lab
Credit (L: T: P = 0: 0: 2)

Software lab based on numerical techniques and statistics

1. Brute force method
2. Bisection method
3. regula –falsi method
4. NewtonRaphson
5. Secant
6. LU decomposition
7. Gauss elimination
8. GaussJordan
9. Gauss seidal
10. Euler's
11. modified Euler's
12. Runge Kutta ii order
13. Runge Kutta iv order
14. Trapezoidal
15. Simpson's 1/3 rd Rule
16. Simpson's 3/8 th Rule
17. Finding the mean, median and mode of a set of data
18. Finding the range of a set of data
19. Finding the standard deviation of a set of data
20. Newton's forward and backward interpolation
21. Newton's divided difference

ECD22001

II SEMESTER
DSC 11A: J2EE
Credit (L: T: P = 4: 0: 0)

Course Outcome:

After successful completion of the course, the student is able to

CO 1. Learn the details of Basic elements of J2EE
CO 2. Deliberate the details of Concepts of Multi-Tier Architectures
CO 3. Understand the characteristics of Enterprise Application Strategy
CO 4. Write down in depth Basic Concepts of JDBC
CO 5. Identify in details with examples implementation of SQL Commands Using JDBC objects
CO 6. Learn in details with examples Basic Concepts of Servlets
CO 7. Learn in details with examples Basic Concepts of JSP

Unit - 1 15 Hours

Introduction: The ABC of Programming Languages, taking programming languages up a notch, the beginning of java, java byte-code, the advantages of Java, J2EE and J2SE.

J2EE Multi-Tier Architecture: Distributive systems, the Tier, J2EE Multi-Tier Architecture, Client Tier Implementation, Web Tier Implementation, Enterprise JavaBeans Tier Implementation, Enterprise Information Systems Tier Implementation, Challenges.

J2EE Nest Practices: Enterprise Application Strategy, The enterprise application, clients, Sessions Management, Web Tier and Java Server pages, Enterprise Java Beans Tier, The Myth of using inheritance, Maintainable classes, Performance Enhancements, The power of Interfaces, The power of threads, The power of Notification.

Unit - 2 15 Hours

J2EE Database Concepts: Data, Database, Database Schema, the Art of Indexing.

JDBC Objects: The concept of JDBC, JDBC Driver Types, JDBC packages, A Brief overview of the JDBC Process, Database Connection, Associating the JDBC / ODBC Bridge with the database, Statement Objects, Result Set, Transaction Processing, and Metadata.

Unit - 3 15 Hours

JDBC and Embedded SQL: Model Programs: Model A Program, Model B Program, Tables: Creating a Table, Dropping a Table, Indexing: Creating an Index, Dropping an Index, Inserting Data into tables: Inserting a Row, Inserting the systems date into a column, Inserting the system Time into a column, Inserting a Timestamp into a column, Selecting Data from a Table: Selecting all data from a Table, Requesting one column, Requesting Multiple column, Requesting rows, Requesting rows and columns, AND, OR, and NOT clauses, Joining multiple compound expressions, equal & not equal operators, Less than & greater than operators, Less than equal to & greater than equal to, BETWEEN, LIKE, IS NULL Operator, DISTINCT Modifier, IN modifier,

Unit - 4 **15 Hours**

Metadata: Number of columns in result set, Data type of a column, Name of a column, Column Size, updating Tables: Updating a row and column, updating multiple rows, Deleting Data from a table: Deleting a Row from a table, Joining tables, Calculating Data, Grouping and ordering data, sub queries, view.

Java Servlets: Java Servlets and common gateway interface programming: Benefits of using a Java servlet, A simple Java Servlets, Anatomy of a java Servlets: Development Descriptor, Reading Data from a client, Reading HTTP request Headers, Sending Data to a Client & writing the HTTP response Header, Working with cookies, Tracking Sessions, Quick reference guide.

JAVA Server Pages: JSP installation, JSP Tags: Variables & objects, Methods, Control Statements, Loops, Tomcat, Request string: Parsing other information, User sessions, cookies, Session objects, Quick reference guide.

Reference Books:

1. The complete reference J2EE seventh edition - Java 2 Enterprise edition overview
2. J2EE: The complete Reference - McGraw-Hill Education

ECD22101

IV SEMESTER
DSC 11A: J2EE Lab
Credit (L: T: P = 0: 0: 2)

1. Program to Create Jdbc Connection
2. Application to access the database using the Java Database Connectivity (JDBC).
3. Perform a Database Query and View Results.
4. Write a program to display a day of a given date
5. Write a program to Display request header information.
6. Write a program to calculate income tax of a customer using database
7. Write a program to display cookie value, cookie age and cookie path.
8. Write a program in JSP file to set and then display the cookie.
9. Write a program for Java script validation.
10. Write a JAVA Servlets Program to implement a dynamic HTML using Servlets(user name and password should be accepted using HTML and displayed using a Servlets).
11. Write a JAVA Servlets Program to Download a file and display it on the screen(A link has to be provided in HTML, when the link is clicked corresponding file has to be displayed on Screen)
12. Write a JAVA Servlets Program to implement Request Dispatcher object (use include () and forward () methods)
13. Write a JAVA Servlets Program to implement and demonstrate get() and Post methods(Using HTTP Servlets Class).
14. Write a JAVA Servlets Program to implement send Redirect () method (using HTTP Servlets Class).
15. Write a JAVA Servlets Program to implement sessions (Using HTTP Session Interface).
16. Write a JAVA JSP Program to print 10 even and 10 odd numbers.
17. Write a JAVA JSP Program to implement verification of a particular user login and display a welcome page.
18. Write a JAVA JSP Program to get student information through a HTML and create a JAVA Bean Class, populate Bean and display the same information through another JSP.
19. Write a JAVA JSP Program which uses <jsp:plugin> tag to run a applet
20. Write a JAVA JSP Program which implements nested tags and also use TagSupport Class.

ECD23001

IV SEMESTER

DSC 12A: Software Engineering and Software Testing
Credit (L: T: P = 4: 0: 0)

Course Outcome:

After successful completion of the course, the student is able to
CO 1. Understand in details with examples Concepts of Software process
CO 2. Specify the details of Software requirements and analysis
CO 3. Learn in depth Design concepts and principles of software engineering
CO 4. Understand in depth software Configuration Management and Project Management
CO 5. Learn in details with examples Software Tastings
CO 6. Specify in depth trends in software engineering

Unit - 1 15 Hours

Software Process: Introduction, S/W Engineering Paradigm, life cycle models (water fall, incremental, spiral, evolutionary, prototyping, object oriented), System engineering, computer based system, verification, validation, life cycle process, development process, system engineering hierarchy.

Software requirements: Functional and non-functional, user, system, requirement engineering process, feasibility studies, requirements, elicitation, validation and management, software prototyping, prototyping in the software process, rapid prototyping techniques, user interface prototyping, S/W document.

Unit - 2 15 Hours

Software Analysis: Analysis and modeling, data, functional and behavioral models, structured analysis and data dictionary.

Design Concepts and Principles: Design process and concepts, modular design, design heuristic, design model and document, Architectural design, software architecture, data design, architectural design, transform and transaction mapping, user interface design, user interface design principles. Real time systems, Real time software design, system design, real time executives, data acquisition system, monitoring and control system.

Unit - 3 15 Hours

Software Configuration Management: The SCM process, Version control, Change control, Configuration audit, SCM standards.

Software Project Management: Measures and measurements, S/W complexity and science measure, size measure, data and logic structure measure, information flow measure. Estimations for Software Projects, Empirical Estimation Models, Project Scheduling.

Unit - 4 15 Hours

Testing: Taxonomy of software testing, levels, test activities, types of s/w test, black box testing, and testing boundary conditions, structural testing, test coverage criteria based on data flow, mechanisms, regression testing, testing in the large. S/W testing strategies, strategic approach and issues, unit testing, integration testing, validation testing, system testing and debugging.

Trends in Software Engineering: Reverse Engineering and Re-engineering – wrappers – Case Study of CASE tools.

Reference Books:

1. Roger S. Pressman, Software engineering- A practitioner's Approach, McGraw-Hill
2. Ian Sommerville, Software engineering, Pearson education Asia, 6th edition, 2000.
3. PankajJalote- An Integrated Approach to Software Engineering, Springer Verlag, 1997.
4. James F Peters and WitoldPedryez, "Software Engineering – An Engineering Approach", John Wiley and Sons, New Delhi, 2000.
5. Ali Behforooz and Frederick J Hudson, "Software Engineering Fundamentals", Oxfor University Press, New Delhi, 1996.
6. Pfleeger, "Software Engineering", Pearson Education India, New Delhi, 1999.
7. Carlo Ghezzi, Mehdi Jazayari and Dino Mandrioli, "Fundamentals of Software Engineering", Prentice Hall of India, New Delhi, 1991.

ECD23101

IV SEMESTER

DSC 12A: Software Engineering and Software Testing Lab

Credit (L: T: P = 0: 0: 2)

Lab based on Software Engineering

1. Practical Title
   - Problem Statement,
   - Process Model
2. Requirement Analysis
   - Creating a Data Flow
   - Data Dictionary,
   - Use Cases
3. Project Management
   - Computing FP
   - Effort
   - Schedule, Risk Table, Timeline chart
4. Design Engineering
   - Architectural Design
   - Data Design, Component Level Design
5. Testing
   - Basis Path Testing

Sample Projects like

- DTC Route Information: Online information about the bus routes and their frequency and fares
- Car Pooling: To maintain a web based intranet application that enables the corporate
- Employees within an organization to avail the facility of carpooling effectively.
- Patient Appointment and Prescription Management System
- Organized Retail Shopping Management Software
- Parking Allocation System
- Wholesale Management System

ECE21001

III SEMESTER
DSE 1A: Elective: Data Communication and Computer Networks
Credit (L: T: P = 4: 0: 0)

Course Outcome:

After successful completion of the course, the student is able to

CO1. Learn in depth Elements of Data Communications and network Systems
CO2. Learn in depth Transmission Media
CO3. Understanding the various classifications and characteristics of Signals
CO4. Understand in details with examples Network Models
CO5. Learn in depth Error Detection and Corrections Algorithms
CO6. Deliberate in details with examples Switching Concepts
CO7. Deliberate the classification and characteristics of networking and internetworking Devices

Unit - 1 15 Hours

Data Communications: Components, Data Representation, Dataflow
Networks: Network criteria, Physical Structures, Topology (Mesh, Star, Tree, Bus, Ring, Hybrid)
Categories of Network: LAN, MAN, WAN
History of Network: Protocols and Standards: Protocols (Standards organization),
Addressing: Physical, Logical, Port Specific.

Unit - 2 15 Hours

Transmission Media: Guided Media – Twisted pair cable, co-axial cable, optical fibre, Unguided Media – Radio waves, microwaves, Infrared.
Signals: Analog and Digital Data, Analog and Digital Signals, periodic and non periodic signals. Analog Signals – Sine wave, Peak Amplitude, Period and frequency, Phase, wave length, composite signals. Digital Signals – Band width, Bit length, Bit rate, base band transmission, Digital v/s Analog. Transmission Impairment, Data rate limits (Noisy and noiseless channel)

Unit - 3 15 Hours

Network Models: Layered tasks, OSI model (peer – to – peer), Layered Architecture. Functions of Layers (OSI), TCP / IP Protocol suite
Multiplexing: FDM (MUX and DEMUX process, Application of FDM), WDM, TDM (Interleaving, synchronizing, bit padding)
Switching Concept: Working principle of circuit switching and packet switching. Circuit switched networks, three phases' efficiency, delay. Data grams network, routing table, delay efficiency, virtual.
Error Detection and Correction: Types of Errors, Redundancy, Error detection virus Error Correction.
Error Detection: Parity check, Cyclic Redundancy Check (CRC), Check Sum. Error Correction - Retransmission, Forward Error Correction, Burst error Correction.

Unit - 4 15 Hours

Networking And Internetworking Devices: Connecting Devices - Hubs, Repeaters, Amplifiers, Bridges – LAN bridges, transparent bridges, Source-route bridges, Routers, Gateways, 2 layer and 3 layers switches.
Routing Concepts: Types, Shortest path, flooding.
Wireless Lan's: Blue tooth - Architecture, Blue tooth layers.
Network Layer: IPV4, IPV6 addresses
Transport Layer: UDP – user datagram, operations, Application. TCP - Services, TCP segment, SCTP - Services, packet format.
Application Layer: - SMTP, SNMP, HTTP, FTP

Reference Books:

1. Data Communication and Networking – Forouzan
2. Computer Network – Tanenbaurn – 3rd Editions
3. Computer Network – Larry L. Peterson & Bruce S. Davie

ECE21101

V SEMESTER
DSE 1A: Elective: Data Communication and Computer Networks Lab
Credit (L: T: P = 0: 0: 2)

1. Program for Identifying well known Ports
2. Program for Data Retrieval from Remote Database.
3. Program for Simulating SMTP Client.
4. Program for Simulating Telnet Client
5. Program for Simple file transfer between two systems, (without using Protocols)
6. Program for implementing HTTP.
7. Program for Downloading Image files.
8. Simulate Checksum Algorithm.
9. Simulate Stop & Wait Protocol.
10. Simulate Go-Back-N Protocol.
11. Simulate Selective Repeat Protocol.
12. Take an example subnet of hosts. Obtain broaECAst tree for it.
13. Network address with automatic subnet address generation:

ECE21201

V SEMESTER

DSE 1B: Elective: Computer Graphics
Credit (L: T: P = 4: 0: 0)

Course Outcome:

After successful completion of the course, the student is able to
CO1. Learn the classification and characteristics of Elements of Graphics Systems
CO2. Learn in depth Graphics Algorithms
CO3. Deliberate the classification and characteristics of 2D Graphics
CO4. Understand the characteristics of 3D Graphics
CO5. Deliberate the details of Transformation and Viewing Techniques
CO6. Learn the details of Illumination and Color Models

Unit - 1 15 Hours

INTRODUCTION: Survey of computer graphics, Overview of graphics systems – Video display devices, Raster scan systems, Random scan systems, Graphics monitors and Workstations, Input devices, Hard copy Devices, Graphics Software; Output primitives – points and lines, line drawing algorithms, loading the frame buffer, line function; circle and ellipse generating algorithms; Pixel addressing and object geometry, filled area primitives.

Unit - 2 15 Hours

TWO DIMENSIONAL GRAPHICS: Two dimensional geometric transformations – Matrix representations and homogeneous coordinates, composite transformations; Two dimensional viewing – viewing pipeline, viewing coordinate reference frame; widow-to-viewport coordinate transformation, Two dimensional viewing functions; clipping operations – point, line, and polygon clipping algorithms.

Unit - 3 15 Hours

THREE DIMENSIONAL GRAPHICS: Three dimensional concepts; Three dimensional object representations – Polygon surfaces Polygon tables- Plane equations – Polygon meshes; Curved Lines and surfaces, Quadratic surfaces; Blobby objects; Spline representations – Bezier curves and surfaces -B-Spline curves and surfaces.

TRANSFORMATION AND VIEWING: Three dimensional geometric and modeling transformations – Translation, Rotation, Scaling, composite transformations; three dimensional viewing – viewing pipeline, viewing coordinates, Projections, Clipping; Visible surface detection methods.

Unit - 4 15 Hours

ILLUMINATION AND COLOUR MODELS: Light sources – basic illumination models – halftone patterns and dithering techniques; Properties of light – Standard primaries and chromaticity diagram; Intuitive color concepts – RGB color model – YIQ color model – CMY colour model – HSV color model – HLS color model; Color selection.

Reference Books:

1. Computer Graphics C Version by Donald Hearn & M. Pauline Baker Pearson Education, New Delhi, 2004
2. Procedural Elements for Computer Graphics by David F. Rogers, Tata McGraw Hill Book Company, New Delhi, 2003
3. Computer Graphics: Principles & Practice in C by J. D. Foley, S. K Feiner, A Van Dam F. H John, Pearson Education, 2004
4. Computer Graphics using Open GL by Franscis S Hill Jr Pearson Education, 2004.

ECE21301

V SEMESTER
DSE 1B: Elective: Computer Graphics Lab
Credit (L: T: P = 0: 0: 2)

1. Implementation of Bresenham's Algorithm – Line, Circle, Ellipse.
2. Implementation of Line, Circle and ellipse attributes
3. Two Dimensional transformations - Translation, Rotation, Scaling, Reflection, Shear.
4. Composite 2D Transformations
5. Cohen Sutherland 2D line clipping and Windowing
6. Sutherland – Hodgeman Polygon clipping Algorithm
7. Three dimensional transformations - Translation, Rotation, Scaling
8. Composite 3D transformations
9. Drawing three dimensional objects and Scenes
10. Generating Fractal images

ECE21**01**

V SEMESTER

DSE 1C: Elective: Multimedia Systems and Applications
Credit (L: T: P = 4: 0:0)

Course Outcome:

After successful completion of the course, the student is able to

CO1. Understand the details of Components of Multimedia with applications

CO2. Identify in details with examples Text, Images, Sound and Videos

CO3. Learn in depth Animation Techniques

CO4. Understand the details of Multimedia in internet

CO5. Deliberate the characteristics of Making Multimedia

CO6. Deliberate in depth Multimedia Making Tools

Unit - 1 15 Hours

Multimedia: Introduction to multimedia, components, uses of multimedia, multimedia applications, virtual reality.

Text: Fonts & Faces, Using Text in Multimedia, Font Editing & Design Tools, Hypermedia & Hypertext.

Images: Still Images – bitmaps, vector drawing, 3D drawing & rendering, natural light &colours, computerized colours, colour palettes, image file formats.

Unit - 2 15 Hours

Sound: Digital Audio, MIDI Audio, MIDI vs Digital Audio, Audio File Formats.

Video: How video works, analog video, digital video, video file formats, video shooting and editing.

Unit - 3 15 Hours

Animation: Principle of animations, animation techniques, animation file formats.

Internet and Multimedia: www and HTML, multimedia on the web – web servers, web browsers, web page makers and site builders.

Unit - 4 15 Hours

Making Multimedia: Stages of a multimedia project, Requirements to make good multimedia, Multimedia Hardware - Macintosh and Windows production Platforms, Hardware peripherals - Connections, Memory and storage devices, Multimedia software and Authoring tools.

Reference Books:

1. Tay Vaughan, “Multimedia: Making it work”, TMH, Eighth edition.
2. Ralf Steinmetz and KlaraNaharstedt, “Multimedia: Computing, Communications Applications”, Pearson.
3. Keyes, “Multimedia Handbook”, TMH.
4. K. Andleigh and K. Thakkar, “Multimedia System Design”, PHI.

ECE22**01**

V SEMESTER
DSE 1C: Elective: Multimedia Systems and Applications Lab
Credit (L: T: P = 0: 0: 2)

Practical exercises based on concepts listed in theory using Presentation tools in office automation tool/ GIMP/Blender / Audacity/ Animation Tools/ Image Editors/ Video Editors.

Implement the followings using Blender -

1. Create an animation using the tools panel and the properties panel to draw the following – Line, pie, oval, circle, rectangle, square, pencil, brush and lasso tool
2. Create an animation using text tool to set the font, size, colour etc.
3. Create an animation using free transform tool that should use followings-
   - Move Objects
   - Skew Objects
   - Stretch Objects
   - Rotate Objects
   - Stretch Objects while maintaining proportion
   - Rotate Objects after relocating the centre dot
4. Create an animation using layers having following features- Insert layer, Delete layer, guide layer, Mask layer.
5. Modify the document (changing background color etc.)using the following tools
   - Eraser tool
   - Hand tool
   - Ink bottle tool
   - Zoom tool
   - Paint Bucket tool
   - Eyedropper tool
6. Create an animation for bus car race in which both starts from the same point and car wins the race.
7. Create an animation in which text Hello gets converted into Good Bye (using motion/shape tweening).
8. Create an animation having five images having fade-in fade-out effect.
9. Create an scene to show the sunrise (using multiple layers and motion tweening)
10. Create an animation to show the ripple effect.
11. Create an animation (using Shape tweening and shape hints) for transforming one shape into another.
12. Create an animation for bouncing ball (you may use motion guide layer).

OR

Project:

Design a minimum 10 page interactive website using Joomla or WordPress.

ECE23 01

V SEMESTER

DSE 2A: Elective: ASP.Net

Credit (L: T: P = 4: 0: 0)

Course Outcome:

After successful completion of the course, the student is able to
CO 1. Learn the details of ASP.NET Framework
CO 2. Learn the details of ASP.NET working Environment
CO 3. Deliberate in details with examples Standard Control of ASP.NET
CO 4. Understand the details of Developing Simple Websites Using ASP.NET Controls
CO 5. Deliberate in depth Developing Simple Web Application Using ASP.NET Controls
CO 6. Learn the details of Database Access Controls
CO 7. Identify in details with examples Database Access Controls

Unit - 1 15 Hours

Overview of the ASP.NET: Introduction of different Web Technology, What is Asp.Net, How Asp.Net Works, Use of visual studio, Different Languages used in ASP.Net. Summary.
Framework: Common Language Runtime (CLR), .NET Framework Class Library, Summary

Unit - 2 15 Hours

Setting up and Installing ASP.NET: Installing Internet Information Server, Installation of Asp.Net, virtual directory, Application Setting in IIS, Summary.

Unit - 3 15 Hours

Asp.Net Standard Controls, Displaying information, Label Controls, Literal Controls, Bulleted List, Accepting User Input, Textbox controls, Radio Button and Radio Button List Controls, Checkbox and Checkbox List Controls, Button controls, Link Button Control, Image Button Control, Using Hyperlink Control, Dropdown List, List Box, Displaying Images, Image Control, Image Map Control, Using Panel Control, Using Hyperlink Control, Asp.Net, Page & State Management, Overview of events in page, Summary.

Unit - 4 15 Hours

Designing Websites with master pages, creating master pages, Creating default contents, nesting master pages, registering master pages in web configuration, Summary.
ASP.Net Theme: ASP.NET Website Theme, Named Skin and Default Skin in ASP.NET Theme, Style Sheet Theme and Theme Attributes of a Page Directive
Using the Rich Controls: Accepting File Uploads, Saving files to file system, Calendar Control, Displaying advertisements, Displaying Different Page view, Displaying a Tabbed Page View, Wizard Control, Summary.

Reference Books:

1. Mathew Mac Donald, ASP. Net The Complete Reference, McGraw –Hill, 2002.

ECE2401

V SEMESTER
DSE 2A: Elective: ASP.Net Lab
Credit (L: T: P = 0: 0: 2)

LAB MANUAL:

1. Write a Program to generate the factorial operation.
2. Write a Program to perform Money Conversion.
3. Write a Program to generate the Quadratic Equation.
4. Write a Program to generate the Login control.
5. Write a Program to perform Asp.Net state.
6. Write a Program to perform validation operation.
7. Write a Program to perform Tree view operation.
8. Write a Program to display the phone no of an author using database.
9. Write a Program to insert the data in to database using Execute-Non Query.
10. Write a Program to bind data using template in data list.
11. Write a Program to bind data using Hyperlink column in data grid.

ECE22201

V SEMESTER
DSE 2B: Elective: Visual Programming
Credit (L: T: P = 4: 0:0)

{Note: Use any open source alternative such as Tkinter with Python /SharpDevelop/GAMBAS/OPENXAVA with JAVA}

Course Outcome:

After successful completion of the course, the student is able to
CO 1. Learn in details with examples Basic concept Of GUI Environment
CO 2. Deliberate the details of GUI Controls
CO 3. Learn in details with examples Data types and Operations in Visual Programming
CO 4. Learn in details with examples Control statements in Visual Programming
CO 5. Write down in details with examples Modular Programming
CO 6. Learn the details of Forms Handling in Visual Programming
CO 7. Understand in depth Database Connectivity in Visual Programming

Unit - 1 15 Hours

GUI Environment: Introduction to graphical user interface (GUI), programming language (procedural, object oriented, event driven), the GUI environment, compiling, debugging, and running the programs.

Controls: Introduction to controls textboxes, frames, check boxes, option buttons, images, setting borders and styles, the shape control, the line control, working with multiple controls and their properties, designing the user interface, keyboard access, tab controls, default & cancel property, coding for controls.

Operations: Data types, constants, named & intrinsic, declaring variables, scope of variables, val function, arithmetic operations, formatting data.

Unit - 2 15 Hours

Decision Making: If statement, comparing strings, compound conditions (and, or, not), nested if statements, case structure, using if statements with option buttons & check boxes, displaying message in message box, testing whether input is valid or not.

Modular programming: Menus, sub-procedures and sub-functions defining / creating and modifying a menu, using common dialog box, creating a new sub-procedure, passing variables to procedures, passing argument by value or by reference, writing a function/ procedure.

Unit - 3 15 Hours

Forms Handling: Multiple forms creating, adding, removing forms in project, hide, show method, load, unload statement, me keyword, referring to objects on a different forms

Iteration Handling: Do/loops, for/next loops, using msg box function, using string function

Arrays and Grouped Data Control: Arrays - 1-dimension arrays, initializing an array using for each, user-defined data types, accessing information with user-defined data types, using list boxes with array, two dimensional arrays.

Unit - 4 15 Hours

lists, loops and printing list boxes & combo boxes, filling the list using property window / add item method, clear method, list box properties, removing an item from a list, list box/ combo box operations.

Database Connectivity: Database connectivity of forms with back end tool like mysql, populating the data in text boxes, list boxes etc. searching of data in database using forms. Updating/ editing of data based on a criterion.

Reference Books:

1. Reference: Programming in Visual Basic 6.0 by Julia Case Bradley, Anita C. Millispangh (Tata Mcgraw Hill Edition 2000 (Fourteenth Reprint 2004))

ECE22301

V SEMESTER
DSE 2B: Elective: Visual Programming Lab
Credit (L: T: P = 0: 0: 2)

1. Print a table of numbers from 5 to 15 and their squares and Cubes.
2. Print the largest of three numbers.
3. Find the factional of a number n.
4. Enter a list of positive numbers terminated by zero. Find the sum and average of these numbers.
5. A person deposits Rs. 1000 in a fixed account yielding 5% interest. Complete the amount in the account at the end of each year for n years.
6. Read n numbers. Count the number of negative numbers, positive numbers and zeros in the list.
7. Read n numbers. Count the number of negative numbers, positive numbers and zeroes in the list. Use of arrays.
8. Read a single dimension array. Find the sum and average of these numbers.
9. Read a two dimension array. Find the sum of two 2D Array.
10. Create a database Employee and Make a form to allow data entry to Employee Form with the following command buttons:

ECE22401

V SEMESTER

DSE2C: PHP Programming with MySQL
Credit (L: T: P = 4: 0: 0)

Course Outcome:

After successful completion of the course, the student is able to
CO1. Learn in depth Elements of PHP
CO2. Learn in depth Interaction Methods Between HTML and PHP
CO3. Understand in depth PHP function
CO4. Understand in depth String Manipulation
CO5. Learn the characteristics of Regular Expression
CO6. Learn the details of Developing PHP Web Application

Unit - 1 15 Hours

Introduction Basic PHP Development Control Structure: Introduction to www, History, Understanding client/server roles Apache, PHP, MySQL, XAMPP Installation PHP Basic syntax, PHP data Types, PHP Variables PHP Constants, PHP Expressions, PHP Operators Control Structures & Loop

Unit - 2 15 Hours

Working With the File System Working With Regular Expressions, Opening a File, Reading from a File, Writing to a File, File Locking, Uploading Files via an HTML Form, Getting File Information, Directory Functions, Getting a Directory Listing, The basic regular expressions, Matching patterns, Finding matches, Replace patterns

WORKING WITH FORMS: PHP Form handling, PHP GET/POST, PHP Form Validation, Accessing user input, Combine HTML and PHP code using hidden fields, Redirecting the user, File upload

Unit - 3 15 Hours

CLASSES AND OBJECTS: Object oriented concepts, Define a class, attributes, Object, Object properties, methods, constructors and destructors, Class constants, Static method, Class inheritance, Abstract classes, Final keyword, Implementing Interface, Object serialization

Using Cookies: What are Cookies? – Setting Cookies – Using Cookie variables – Session Basics: What's a session? – Understanding Session variables – Managing User preferences with Sessions – Graphics: Drawing functions.

Unit - 4 15 Hours

INTRODUCTION TO DATABASE: What is RDBMS technology?, Introduction to SQL, Connecting to the MYSQL, Selecting a database, Adding data to a table, Displaying returned data on Web pages ,Finding the number of row, Inserting, Deleting , Entering and updating data, Executing multiple queries, Understanding Primary and Foreign Key, Understanding Database Normalization, Dealing with Dates and Times

Reference Books:

1. Complete Beginner's Guide to PHP: Programming & Web Development by Cedric Palmer (22 February 2014)
2. PHP and MySQL Web Development by Laura Thomson and Luke Welling
3. PHP Reference: Beginner to Intermediate PHP5 by Mario Lurig
4. PHP 4: A Beginner's Guide by William Mccarty
5. Julie Meloni and Matt Telles, PHP 6, Course Technology, CENGAGE Learning, India Edition, 2008.
6. Kevin Tatroe, Peter MacIntyre and RasmusLerdorf, Programming PHP, O'REILLY media, 3rd edition, 2013.

ECE22501

V SEMESTER

DSE2C: PHP Programming with MySQL Lab
Credit (L: T: P = 0: 0: 2)

1. Write a PHP program to find the factorial of a number.
2. Write a PHP program using Conditional Statements.
3. Write a PHP program to find the maximum value in a given multi-dimensional array.
4. Write a PHP program to find the GCD of two numbers using user-defined functions.
5. Design a simple web page to generate multiplication table for a given number using PHP.
6. Design a web page that should compute one's age on a given date using PHP.
7. Write a PHP program to download a file from the server.
8. Write a PHP program to store the current date and time in a COOKIE and display the 'Last Visited' date and time on the web page.
9. Write a PHP program to store page views count in SESSION, to increment the count on each refresh and to show the count on web page.
10. Write a PHP program to draw the human face.
11. Write a PHP program to design a simple calculator.
12. Design an authentication web page in PHP with MySQL to check username and password.

ECE23001

V SEMESTER

DSE 3A: Elective: Analysis and Design of Algorithms

(Credit L: T: P = 4: 0: 0)

Course Outcome:

After successful completion of the course, the student is able to
CO1. Learn the details of Types of notion of Algorithm
CO2. Learn in details with examples Algorithm Design Techniques
CO3. Deliberate in depth Sorting Techniques
CO4. Deliberate in depth of Searching Techniques
CO5. Identify in details with examples Analysis of Graph Algorithms
CO6. Learn the details of Dynamic Programming Methods

Unit - 1 15 Hours

Introduction: Notion of Algorithm, Review of Asymptotic Notations, Mathematical Analysis of Non-Recursive and Recursive Algorithms Correctness of Algorithm
Algorithm Design Techniques: Iterative techniques Divide and conquer greedy algorithms.
Sorting Techniques: Selection sort, bubble sort, insertion sort, more sorting techniques-quick sort, merge sort. Radix sort,

Unit - 2 15 Hours

The Greedy Method: General Method - Container Loading - Knapsack Problem - Tree
Searching Techniques: Linear and Binary search, Complexity Analysis.
Graphs: Analysis of Graph algorithms -Depth-First Search Breadth-First Search and its applications, minimum Spanning Trees and Shortest Paths -PRIM 'S, KRUSKAL, Dijkstra's algorithm. Branching-Hamiltonian Circuit problem.

Unit - 3 15 Hours

Dynamic Programming: The General Method, Warshall's Algorithm, Floyd's Algorithm for the All-Pairs Shortest Paths, Single-Source Shortest Paths: The Travelling Salesperson problem.

Unit - 4 15 Hours

Vertex Splitting – Job Sequencing With Deadlines - Minimum Cost Spanning Trees - Optimal
Storage on Tapes – Optimal Merge Patterns - #Single Source Shortest Paths#.
Backtracking: The General Method – The 8-Queens Problem – Sum of Subsets – Graph Coloring – Hamiltonian Cycles – Knapsack Problem Branch and Bound: The Method - 0/1 Knapsack Problem.

Reference Books:

1. Analysis & design of Algorithm-Padma Reddy
2. A.V. Levitin, Introduction to the Design and Analysis of Algorithms, Pearson Education, 2006.
3. J. Kleinberg and E. Tardos, Algorithms Design, Pearson Education, 2006.
4. Ellis Horowitz, SatrajSahni and SanguthevarRajasekaran, Fundamentals of Computer Algorithms,Universities Press, Second Edition, Reprint 2009.
5. A.A.Puntambekar, Analysis and Design Of Algorithms, Technical Publications, 2008

ECE23101

V SEMESTER

DSE 3A: Elective: Analysis and Design of Algorithms Lab

(Credit L: T: P = 0: 0: 2)

1. Implement Insertion Sort.
2. Implement Merge Sort.
3. Implement recursive algorithm
4. Implement Randomized Quick sort.
5. Implement Radix Sort.
6. Implement Searching Techniques (linear & Binary)
7. Implement selection sort
8. Implement Bubble sort
9. Implement Prim's Algorithm
10. Implement Dijkstra's Algorithm
11. Implement Krushkal's Algorithm
12. Implement Travelling Salesperson problem
13. Implement Floyd's Algorithm
14. Implement Depth First Search
15. Implement Binary Search tree.

ECE23201

V SEMESTER

DSE 3B: Elective: Mobile Applications

Credit (L: T: P = 4: 0: 0)

Course Outcome:

After successful completion of the course, the student is able to

CO1. Deliberate the details of Concepts of Event Driven Programming
CO2. Learn in details with examples issues of Mobile applications
CO3. Specify the details of Mobile applications Development tools and Frameworks
CO4. Deliberate in details with examples common Mobile device UI's
CO5. Write down in depth Data persistence Remote data storage and communication
CO6. Learn in details with examples Code signing

Unit - 1 15 Hours

Event Driven Programming: UI event loop, Threading for background tasks, Outlets / actions, delegation, notification, Model View Controller (MVC) design pattern.
Mobile application issues: limited resources (memory, display, network, file system), input / output (multi-touch and gestures), sensors (camera, compass, accelerometer, GPS)

Unit - 2 15 Hours

Development tools: Apple iOS toolchain: Objective-C, Xcode IDE, Interface Builder, Device simulator.
Frameworks: Objective-C and Foundation Frameworks, Cocoa Touch, UI Kit, Others: Core Graphics, Core Animation, Core Location and Maps, Basic Interaction.

Unit - 3 15 Hours

Common UI's for mobile devices: Navigation Controllers, Tab Bars, Table Views, Modal views, UI Layout.
Data Persistence: Maintaining state between application invocations, File system, Property Lists, SQLite, Core Data.

Unit - 4 15 Hours

Remote Data-Storage and Communication: "Back End" / server side of application, RESTful programming, HTTP get, post, put, delete, database design, server side JavaScript / JSON.
Code signing: security, Keychain, Developers and App Store License Agreement

Reference:

1. Rajiv Ramnath, Roger Crawfis, and Paolo Sivilotti, Android SDK 3 for Dummies, Wiley, 2011.
2. Valentino Lee, Heather Schneider, and Robbie Schell, Mobile Applications: Architecture, Design, and Development, Prentice Hall, 2004.
3. Brian Fling, Mobile Design and Development, O'Reilly Media, 2009. Maximiliano
4. Firtman, Programming the Mobile Web, O'Reilly Media, 2010.
5. Christian Crumlish and Erin Malone, Designing Social Interfaces, O'Reilly Media, 2009.
6. James E Smith, Ravi Nair, "Virtual Machines", Morgan Kaufmann Publishers, 2006.

ECE23301

V SEMESTER

DSE 3B: Elective: Mobile Applications Lab

Credit (L: T: P = 0: 0: 2)

Software Lab based on Mobile Applications:

1. Installing Android Environment
2. Create Hello World Application
3. Sample Application about Android Resources
4. Sample Application about Layouts
5. Sample Application about Intents
6. Sample Application I about user interfaces
7. Sample Application about Animations
8. Make a Project based on above labs
9. Sample Application about Android Data
10. Sample Application about SQLite I
11. Sample Application about SQLite II
12. Project Presentation

ECE33 01

V SEMESTER

DSE 3C: Elective: Machine Learning

Credit (L: T: P = 4: 0: 0)

Course Outcome:

After successful completion of the course, the student is able to

CO1. Deliberate the details of Concepts of Machine Learning
CO2. Learn in details with examples for Machine Learning Software
CO3. Specify the details of Linear Algebra
CO4. Deliberate in details with examples Linear & Logistic Regression
CO5. Write down in depth Regularization and its utility
CO6. Learn in details with methods of Neural Networks

Unit - 1 15 Hours

Introduction: Concept of Machine Learning, Applications of Machine Learning, Key elements of Machine Learning, Supervised vs. Unsupervised Learning, Statistical Learning: Bayesian Method, The Naive Bayes Classifier

Unit - 2 15 Hours

Softwares for Machine Learning and Linear Algebra Overview: Plotting of Data, Vectorization, Matrices and Vectors: Addition, Multiplication, Transpose and Inverse using available tool such as MATLAB.

Unit - 3 15 Hours

Linear Regression: Prediction using Linear Regression, Gradient Descent, Linear Regression with one variable, Linear Regression with multiple variables, Polynomial Regression, Feature Scaling/Selection.

Logistic Regression: Classification using Logistic Regression, Logistic Regression vs. Linear Regression, Logistic Regression with one variable and with multiple variables.

Unit - 4 15 Hours

Regularization: Regularization and its utility: The problem of Overfitting, Application of Regularization in Linear and Logistic Regression, Regularization and Bias/Variance.

Neural Networks: Introduction, Model Representation, Gradient Descent vs. Perceptron Training, Stochastic Gradient Descent, Multilayer Perceptrons, Multiclass Representation, Backpropagation Algorithm.

Readings

1. Ethem Alpaydin, "Introduction to Machine Learning" 2nd Edition, The MIT Press, 2009.
2. Tom M. Mitchell, "Machine Learning", First Edition by Tata McGraw-Hill Education, 2013.
3. Christopher M. Bishop, "Pattern Recognition and Machine Learning" by Springer, 2007.
4. Mevin P. Murphy, "Machine Learning: A Probabilistic Perspective" by The MIT Press, 2012.

ECE34**01**

V SEMESTER

DSE 3C: Elective: Machine Learning Lab

Credit (L: T: P = 0: 0: 2)

For practical Labs for Machine Learning, students may use software like MABLAB/Octave or Python. For later exercises, students can create/use their own datasets or utilize datasets from online repositories like UCI Machine Learning Repository (http://archive.ics.uci.edu/ml/).

1. Perform elementary mathematical operations in Octave/MATLAB like addition, multiplication, division and exponentiation.
2. Perform elementary logical operations in Octave/MATLAB (like OR, AND, Checking for Equality, NOT, XOR).
3. Create, initialize and display simple variables and simple strings and use simple formatting for variable.
4. Create/Define single dimension / multi-dimension arrays, and arrays with specific values like array of all ones, all zeros, array with random values within a range, or a diagonal matrix.
5. Use command to compute the size of a matrix, size/length of a particular row/column, load data from a text file, store matrix data to a text file, finding out variables and their features in the current scope.
6. Perform basic operations on matrices (like addition, subtraction, multiplication) and display specific rows or columns of the matrix.
7. Perform other matrix operations like converting matrix data to absolute values, taking the negative of matrix values, additing/removing rows/columns from a matrix, finding the maximum or minimum values in a matrix or in a row/column, and finding the sum of some/all elements in a matrix.
8. Create various type of plots/charts like histograms, plot based on sine/cosine function based on data from a matrix. Further label different axes in a plot and data in a plot.
9. Generate different subplots from a given plot and color plot data.
10. Use conditional statements and different type of loops based on simple example/s.
11. Perform vectorized implementation of simple matrix operation like finding the transpose of a matrix, adding, subtracting or multiplying two matrices.
12. Implement Linear Regression problem. For example, based on a dataset comprising of existing set of prices and area/size of the houses, predict the estimated price of a given house.
13. Based on multiple features/variables perform Linear Regression. For example, based on a number of additional features like number of bedrooms, servant room, number of balconies, number of houses of years a house has been built – predict the price of a house.
14. Implement a classification/ logistic regression problem. For example based on different features of students' data, classify, whether a student is suitable for a particular activity. Based on the available dataset, a student can also implement another classification problem like checking whether an email is spam or not.
15. Use some function for regularization of dataset based on problem 14.
16. Use some function for neural networks, like Stochastic Gradient Descent or backpropagation - algorithm to predict the value of a variable based on the dataset of problem 14.

ECE24101

V SEMESTER

SEC 2A: Elective: Object Oriented Modelling& Design with UML
Credit (L: T: P = 0: 0: 2)

Course Outcome:

After successful completion of the course, the student is able to
CO1. Deliberate in details with examples Object Oriented Development
CO2. Write down the details of OO Modeling Concepts
CO3. Learn the details of OO process Overview
CO4. Identify in depth Design of System Using OO Model
CO5. Specify the details of Steps for Implementation of OO Modeling
CO6. Learn the details of Design a System Using UML Tool

Object Oriented Modeling& Design with UML Lab

Term Work / Assignment

Each candidate will submit an approximately10-page written report on a case study or mini project. Students have todo OO analysis & design for the project problem, and develop use case model, analysis model and design model for it, using UML.

Practical assignment

Nine assignments, one on each of the diagrams learnt in UML.

Reference Books:

1. Object –oriented modeling and design- Michael R Blaha and James R Rumbaugh
2. Object Technology- David A.Taylor
3. Designing Flexible Object Oriented systems with UML – Charles Ritcher
4. Object Oriented Analysis & Design, Sat/.inger. Jackson, BurdThomson
5. Object Oriented Modeling and Design - James Rumbaugh
6. Teach Yourself UML in 24 Hours - Joseph Schmuilers

ECE24301

V SEMESTER

SEC 2B: Elective: JQuery
Credit (L: T: P = 0: 0: 2)

Course Outcome:

After successful completion of the course, the student is able to
CO1. Deliberate in details with examples JQuery
CO2. Learn the details of JQuery Overview
CO3. Specify the details of Steps for Implementation of JQuery
CO4. Learn the details of Design and use of JQuery

JQuery Lab

1. Test if jQuery is loaded.
2. Scroll to the top of the page with jQuery.
3. Disable right click menu in html page using jquery.
4. Blink text using jQuery.
5. Create a Zebra Stripes table effect.
6. Print a page using jQuery.
7. Limit character input in the text area including count.
8. Create a div using jQuery with style tag.
9. Move one DIV element inside another using jQuery.
10. Add a list element within an unordered list element.
11. Remove all the options of a select box and then add one option and select it.
12. How to get the value of a textbox using jQuery?
13. Remove style added with .css() function using jQuery.
14. Distinguish between left and right mouse click with jQuery.
15. Check if an object is a jQuery object.
16. How to detect whether the user has pressed 'Enter Key' using jQuery.
17. How to get textarea text using jQuery.
18. Access form input fields using jQuery.
19. Convert a jQuery object into a string.
20. How to detect a textbox's content has changed using jQuery?
21. Remove a specific value from an array using jQuery.
22. Add options to a drop-down list using jQuery.
23. Delete all table rows except first one using jQuery.
24. Count Child elements using jQuery.
25. Restrict "number"-only input for textboxes including decimal points.
26. Set value in input text using jQuery.
27. Set a value in a span using jQuery.
28. Find the class of the clicked element.
29. Set href attribute at runtime using jquery.
30. Find the total width of an element (including width, padding, and border) in jQuery.
31. Change options of select using jQuery.
32. Access HTML form data using jQuery.

ECE24501

V SEMESTER

SEC 2B: Elective: MongoDB
Credit (L: T: P = 0: 0: 2)

Course Outcome:

After successful completion of the course, the student is able to

CO1. Deliberate in details with examples MongoDB

CO2. Learn the details of MongoDB Overview

CO3. Specify the details of Steps for Implementation of MongoDB

CO4. Learn the details of Design and use of MongoDB

MongoDB Lab

1. Write a MongoDB query to display all the documents in the collection restaurants.
2. Write a MongoDB query to display the fields restaurant_id, name, borough and cuisine for all the documents in the collection restaurant.
3. Write a MongoDB query to display the fields restaurant_id, name, borough and cuisine, but exclude the field _id for all the documents in the collection restaurant.
4. Write a MongoDB query to display the fields restaurant_id, name, borough and zip code, but exclude the field _id for all the documents in the collection restaurant.
5. Write a MongoDB query to display all the restaurant which is in the borough Bronx.
6. Write a MongoDB query to display the first 5 restaurant which is in the borough Bronx.
7. Write a MongoDB query to display the next 5 restaurants after skipping first 5 which are in the borough Bronx.
8. Write a MongoDB query to find the restaurants who achieved a score more than 90.
9. Write a MongoDB query to find the restaurants that achieved a score, more than 80 but less than 100.
10. Write a MongoDB query to find the restaurants which locate in latitude value less than -95.754168.
11. Write a MongoDB query to find the restaurants that do not prepare any cuisine of 'American' and their grade score more than 70 and latitude less than -65.754168.
12. Write a MongoDB query to find the restaurants which do not prepare any cuisine of 'American' and achieved a score more than 70 and located in the longitude less than -65.754168.
    Note : Do this query without using $ and operator.
13. Write a MongoDB query to find the restaurants which do not prepare any cuisine of 'American ' and achieved a grade point 'A' not belongs to the borough Brooklyn. The document must be displayed according to the cuisine in descending order.
14. Write a MongoDB query to find the restaurant Id, name, borough and cuisine for those restaurants which contain 'Wil' as first three letters for its name.
15. Write a MongoDB query to find the restaurant Id, name, borough and cuisine for those restaurants which contain 'ces' as last three letters for its name.

16. Write a MongoDB query to find the restaurant Id, name, borough and cuisine for those restaurants which contain 'Reg' as three letters somewhere in its name.
17. Write a MongoDB query to find the restaurants which belong to the borough Bronx and prepared either American or Chinese dish.
18. Write a MongoDB query to find the restaurant Id, name, borough and cuisine for those restaurants which belong to the borough Staten Island or Queens or Bronxor Brooklyn.
19. Write a MongoDB query to find the restaurant Id, name, borough and cuisine for those restaurants which are not belonging to the borough Staten Island or Queens or Bronxor Brooklyn.
20. Write a MongoDB query to find the restaurant Id, name, borough and cuisine for those restaurants which achieved a score which is not more than 10.
21. Write a MongoDB query to find the restaurant Id, name, borough and cuisine for those restaurants which prepared dish except 'American' and 'Chinees' or restaurant's name begins with letter 'Wil'.
22. Write a MongoDB query to find the restaurant Id, name, and grades for those restaurants which achieved a grade of "A" and scored 11 on an ISODate "2014-08-11T00:00:00Z" among many of survey dates..
23. Write a MongoDB query to find the restaurant Id, name and grades for those restaurants where the 2nd element of grades array contains a grade of "A" and score 9 on an ISODate "2014-08-11T00:00:00Z".
24. Write a MongoDB query to find the restaurant Id, name, address and geographical location for those restaurants where 2nd element of coord array contains a value which is more than 42 and upto 52..
25. Write a MongoDB query to arrange the name of the restaurants in ascending order along with all the columns.
26. Write a MongoDB query to arrange the name of the restaurants in descending along with all the columns.
27. Write a MongoDB query to arrange the name of the cuisine in ascending order and for that same cuisine borough should be in descending order.
28. Write a MongoDB query to know whether all the addresses contains the street or not.
29. Write a MongoDB query which will select all documents in the restaurants collection where the coord field value is Double
30. Write a MongoDB query which will select the restaurant Id, name and grades for those restaurants which returns 0 as a remainder after dividing the score by 7
31. Write a MongoDB query to find the restaurant name, borough, longitude and attitude and cuisine for those restaurants which contains 'mon' as three letters somewhere in its name.
32. Write a MongoDB query to find the restaurant name, borough, longitude and latitude and cuisine for those restaurants which contain 'Mad' as first three letters of its name.

ECF3901

VI SEMESTER

DSE 4A: Elective: Operation Research
Credit (L: T: P = 4: 0: 0)

Course Outcome

After successful completion of the course, the student is able to
CO1. Write down the details of Origin and Development of Operation Research
CO2. Understand the characteristics of Linear Programming Problems and Methods
CO3. Deliberate in depth Transportation Problems
CO4. Deliberate in depth Assignment Problem
CO5. Identify in details with examples Network Analysis
CO6. Learn in depth Application of Operation Research

Unit - 1 15 Hours

Linear Programming Problems: Origin and development of operations research, formulation of Linear Programming problem, Graphical solution.

Theory of simplex method, Use of artificial variables and their solution.

Unit - 2 15 Hours

Transportation Problem: Mathematical formulation of transportation problem, Initial basic Feasible solution, North West corner rule, Matrix minima method, Vogel's approximation method, MODI method to find optimal solution.

Unit - 3 15 Hours

Assignment Problem: Mathematical formulation of an Assignment problem, Assignment algorithm, Hungarian Method to solve Assignment Problem.

Unit - 4 15 Hours

Network Analysis: Basic components of Network, Rules for drawing Network diagram Time calculation in Networks. Critical Path Method and PROJECT Evaluation and Review Techniques. Algorithm and flow chart for CPM and PERT.

Reference Books:

1. Taha, "Operations Research", 7th edition, Pearson Education, 2007.
2. Billey E. Gillett, "Introduction to Operations Research", Himalaya Publishing House, Delhi,1979.
3. HamadyA.Taha "Operations Research" , Collin Mac Millan, 1982

ECF21101

VI SEMESTER

DSE 4A: Elective: Operation Research Lab
Credit (L: T: P = 0: 0:2)

Lab based on Operation Research

1. LPP
2. Simplex
3. Dual Simplex
4. Big – M
5. Vogel's
6. Maxima and Minima
7. North West corner
8. Sequencing Problems
9. Modi Method
10. Hugarian Method
11. Assignment Problem

ECE4101

VI SEMESTER
DSE 4B: Elective: Enterprise Resource Planning
Credit (L: T: P = 4: 0: 0)

Course Outcome:

After successful completion of the course, the student is able to

CO1. Deliberate the details of ERP

CO2. Learn in depth Models of ERP

CO3. Write down in depth Business Process Mapping for ERP

CO4. Understand in details with applications of ERP and Related Technologies

CO5. Deliberate the details of ERP Modules

CO6. Specify in details with examples SAP

Unit - 1 15 Hours

Introduction to ERP, Evolution of ERP, What is ERP? Reasons for the growth of ERP, Scenario and Justification of ERP in India, Evaluation of ERP, Various Modules of ERP, Advantage of ERP and Disadvantage of ERP.

Unit - 2 15 Hours

An overview of Enterprise, Integrated Management Information, Business Modeling, ERP for Small Business, ERP for make to order companies, Business Process Mapping for ERP Module Design, Hardware Environment and its Selection for ERP Implementation.

Unit - 3 15 Hours

ERP and Related Technologies, Business Process Reengineering (BPR), Management Information System (MIS), Executive Information System (EIS), Decision support System (DSS), Supply Chain Management (SCM) (With Example)

Unit - 4 15 Hours

ERP Modules, Introduction to Finance, Plant Maintenance, Quality Management, Materials Management, ERP Market, Introduction, SAP AG, Baan Company, Oracle Corporation, People Soft, JD Edwards World Solutions Company, System Software Associates.

Reference Books:

1. C.S. V Murthy Enterprise Resource Planning
2. R.G. Saha – Enterprise Resource Planning - HPH
3. Alexis Leon, Leon Publishers: Enterprise Resource Planning
4. Ravi Anupindi, Sunil Chopra, Pearson Education". "Managing Business Process Flows
5. Altekar, PHI. Enterprise Resource Planning
6. Srivatsava, I.K. International Publishers, Enterprise Resource Planning
7. P. DiwanVinod Kumar Garg and N.K. Venkitakrishnan, PHI. Enterprise Resource Planning
8. Introduction to SAP, an Overview of SD: MM, PP, FI/CO Modules of SAP. 10. ZaveriJyotindra Enterprise Resource Planning

ECE21301

VI SEMESTER
DSE 4B: Elective: Enterprise Resource Planning Lab
Credit (L: T: P = 0: 0: 2)

Students should be Prepare ERP Solution Report for his / her Case Study under the supervision of Teacher/ Lecturer

ECF21401

VI SEMESTER

DSE 4C: Elective: E-Commerce Technologies

Credit (L: T: P = 4: 0: 0)

Course Outcome:

After successful completion of the course, the student is able to
CO1. Understand the details of E-Commerce
CO2. Learn the details of Basic Concepts Of Internet and WWW
CO3. Identify in depth Internet Security Methods
CO4. Learn in details with examples Concepts of Electronic Data Exchange and applications
CO5. Learn in details with examples Planning For E-Commerce
CO6. Understand in depth Features of Internet Marketing

Unit - 1 15 Hours

An introduction to Electronic commerce: What is E-Commerce (Introduction And Definition), Main activities E-Commerce, Goals of E-Commerce, Technical Components of E-Commerce, Functions of E-Commerce, Advantages and disadvantages of E-Commerce, Scope of E-Commerce, Electronic Commerce Applications, 9 Electronic Commerce and Electronic Business(C2C)(C2G,G2G, B2G, B2P, B2A, P2P, B2A, C2A, B2B, B2C)

The Internet and WWW: Evolution of Internet, Domain Names and Internet Organization (.edu, .com, .mil, .gov, .net etc.) , Types of Network, Internet Service Provider, World Wide Web, Internet & Extranet, Role of Internet in B2B Application, building own website, Cost, Time, Reach, Registering a Domain Name, Web promotion, Target email, Banner, Exchange, Shopping Bots.

Unit - 2 15 Hours

Internet Security: Internet Security Issues Overview –Computer Security Classifications- Intellectual Property threats- Threats to the security of client computers-Threats to the security of communication channels- Threats to the security of Server computers- digital Certificates

Secure Transaction, Computer Monitoring, Privacy on Internet, Corporate Email privacy, Computer Crime(Laws , Types of Crimes), Threats, Attack on Computer System, Software Packages for privacy, Hacking, Computer Virus(How it spreads, Virus problem, virus protection, Encryption and Decryption, Secret key Cryptography, DES, Public Key Encryption, RSA, Authorization and Authentication, Firewall, Digital Signature(How it Works)

Unit - 3 15 Hours

Electronic Data Exchange: Introduction, Concepts of EDI and Limitation, Applications of EDI, Disadvantages of EDI, EDI model, Electronic Payment System: Introduction, Types of Electronic Payment System, Payment Types, Value Exchange System, Credit Card System, Electronic Fund Transfer, Paperless bill, Modern Payment Cash, Electronic Cash.

Online payment basics- Payment cards-E-cash-Holding Electronic cash: online and offline

Cash-Advantages and disadvantages of electronic cash system-electronic wallets-Microsoft.NET passport-yahoo Wallet-EGML standard-stored value cards-magnetic strip Cards-smart cards.

Unit - 4 15 Hours

Planning for Electronic Commerce: Planning Electronic Commerce initiates, linking objectives to business strategies, measuring cost objectives, Comparing benefits to Costs, Strategies for developing electronic commerce web sites.

Internet Marketing: The PROS and CONS of online shopping, The cons of online shopping, Justify an Internet business, Internet marketing techniques, The E-cycle of Internet marketing, Personalization e-commerce.

Technologies for Electronic Commerce: Web Server Hardware and Software- Web server Basics- Types of web sites- web clients and web servers-Software for Web servers-website and utility programs-Web server hardware-Web Hosting Choices.

Reference Books:

1. G.S.V.Murthy, E-Commerce Concepts, Models, Strategies- :- Himalaya Publishing House, 2011.
2. Kamlesh K Bajaj and DebjaniNag , E- Commerce , 2005.
3. Gray P. Schneider , Electronic commerce, International Student Edition, 2011,
4. HENRY CHAN, RAYMOND LEE, THARAM DILLON, ELIZABETH CHANG E COMMERCE, FUNDAMENTALS AND APPLICATIONS, Wiely Student Edition, 2011

ECF21501

VI SEMESTER

DSE 4C: Elective: E-Commerce Technologies Lab

Credit (L: T: P = 0: 0: 2)

Software Lab based on E-Commerce Technologies

E-commerce concepts are to be implemented in developing a website using a combination of following technologies:

1. HyperText Markup Language (HTML)
2. Cascading Style Sheets (CSS)
3. JavaScript
4. ASP
5. PHP
6. XML
7. Joomla

ECF22001

VI SEMESTER

DSE 5A: Cloud Computing
Credit (L: T: P = 4: 0: 0)

Course Outcome

After successful completion of the course, the student is able to

CO1. Learn in depth Fundamentals of Cloud Computing
CO2. Understand the details of Cloud Services and File System
CO3. Learn in depth Concept of Collaborating with Cloud
CO4. Understand the details of Virtualization in cloud
CO5. Learn the classification and characteristics of Security challenges in Cloud Computing
CO6. Specify the classification and characteristics of Security challenges in Cloud Computing
CO7. Understand the details of Security challenges in Cloud Computing
CO8. Understand the Common standards of Cloud Computing
CO9. Deliberate in details with examples Various Application of Cloud Computing

Unit - 1 15 Hours

Cloud Introduction: Cloud Computing Fundamentals: Cloud Computing definition, Types of cloud, Cloud services: Benefits and challenges of cloud computing, Evolution of Cloud Computing , usage scenarios and Applications , Business models around Cloud– Major Players in Cloud Computing - Issues in Cloud - Eucalyptus - Nimbus - Open Nebula, CloudSim.

Cloud Services and File System: Types of Cloud services: Software as a Service - Platform as a Service – Infrastructure as a Service - Database as a Service - Monitoring as a Service – Communication as services.

Unit - 2 15 Hours

Service providers- Google App Engine, Amazon EC2, Microsoft Azure, Sales force.

Collaborating With Cloud: Collaborating on Calendars, Schedules and Task Management – Collaborating on Event Management, Contact Management, Project Management – Collaborating on Word Processing, Databases – Storing and Sharing Files- Collaborating via Web-Based Communication Tools – Evaluating Web Mail Services – Collaborating via Social Networks – Collaborating via Blogs and Wikis.

Unit - 3 15 Hours

Virtualization For Cloud: Need for Virtualization – Pros and cons of Virtualization – Types of Virtualization – System Vm, Process VM, Virtual Machine monitor – Virtual machine properties - Interpretation and binary translation, HLL VM - Hypervisors – Xen, KVM , VMWare, Virtual Box, Hyper-V.

Unit - 4 15 Hours

Security, Standards, And Applications: Security in Clouds: Cloud security challenges – Software as a Service Security, Common Standards: The Open Cloud Consortium –The Distributed management Task Force – Standards for application Developers – Standards for Messaging – Standards for Security, End user access to cloud computing, Mobile Internet devices and the cloud.

Reference Books:

1. Bloor R., Kanfman M., Halper F. Judith Hurwitz "Cloud Computing" Wiley India Edition,2010
2. John Rittinghouse& James Ransome, "Cloud Computing Implementation Management and Strategy", CRC Press, 2010
3. Antohy T Velte,Cloud Computing: "A Practical Approach", McGraw Hill,2009
4. Michael Miller, Cloud Computing: "Web-Based Applications That Change the Way You Work and Collaborate Online", Que Publishing, August 2008.
5. James E Smith, Ravi Nair, "Virtual Machines", Morgan Kaufmann Publishers, 2006.

Online Reading/Supporting Material

1. Haley Beard, "Cloud Computing Best Practices for Managing and Measuring Processes for On-demand Computing", Applications and Data Centers in the Cloud with SLAs, Emereo Pty Limited, July 2008
2. Webpages.iust.ac.ir/hsalimi/.../89.../Cloud%20Common%20standards.pptop ennebula.org,
3. www.cloudbus.org/cloudsim/, http://www.eucalyptus.com/
4. hadoop.apache.org
5. http://hadoop.apache.org/docs/stable/hdfs_design.html
6. http://static.googleusercontent.com/external_content/untrusted_dlcp/research.google.com /en//archive /mapreduce-osdi04.pdf

ECF22101

VI SEMESTER

DSE 5A: Cloud Computing Lab
Credit (L: T: P = 0: 0: 2)

Software Lab based on Cloud Computing:

1. Create virtual machines that access different programs on same platform.
2. Create virtual machines that access different programs on different platforms.
3. Exploring Google cloud for the following
   a) Storage
   b) Sharing of data
   c) Manage your calendar, to-do lists,
   d) A document editing tool
4. Exploring Open source cloud (Any two)

ECF22201

VI SEMESTER
DSE 5B: Elective: Data Mining and Data Warehousing
Credit (L: T: P = 4: 0: 0)

Course Outcome:

After successful completion of the course, the student is able to

CO1. Understand the characteristics of Data Warehousing

CO2. Understand the details of Data Warehousing Architecture

CO3. Deliberate in depth Data Mining

CO4. Learn in details with examples Association Rule Mining

CO5. Specify the details of Classification and Prediction Techniques

CO6. Learn in depth Clustering Methods

CO7. Write down in depth Application of Data Mining

Unit - 1 15 Hours

Data Warehousing: Introduction- Definition and description need for data ware housing need `for strategic information, failures of past decision support systems, OLTP v/s DWH-DWH requirements-trends in DWH-Application of DWH.

Data Warehousing Architecture: Reference architecture- Components of reference architecture - Data warehouse building blocks, implementation, physical design process and DWH deployment process.

Unit - 2 15 Hours

A Multidimensional Data, Model Data Warehouse Architecture.

Data Mining: Data mining tasks-Data mining vs KDD- Issues in data mining, Data Mining metrics, Data mining architecture - Data cleaning- Data transformation- Data reduction - Data mining primitives.

Unit - 3 15 Hours

Association Rule Mining: Introduction - Mining single dimensional Boolean association rules from transactional databases - Mining multi-dimensional association rules.

Classification and Prediction: Classification Techniques - Issues regarding classification and prediction - decision tree - Bayesian classification –Classifier accuracy.

Unit - 4 15 Hours

Clustering: Clustering Methods - Outlier analysis.

Applications and Other Data Mining Methods: Distributed and parallel Data Mining Algorithms, Text mining- Web mining.

Reference Books:

1. Jiawei Han and MichelineKamber," Data Mining Concepts and Techniques", Morgan Kaufmann Publishers, USA, 2006.
2. Berson,"DataWarehousing, Data Mining and OLAP", Tata McGraw Hill Ltd, New Delhi, 2004.
3. Pang-Ning Tan, Michael Steinbach, Vipin Kumar, Introduction to Data Mining, , Pearson Education.

4. Arun K Pujari,"Data mining techniques", Oxford University Press, London, 2003.
5. Dunham M H,"Data mining: Introductory and Advanced Topics". Pearson Education, New Delhi, 2003.
6. MehmedKantardzic," Data Mining Concepts, Methods and Algorithms", John Wiley and Sons, USA, 2003.
7. Soman K. P., DiwakarShyam, Ajay V., Insight into Data mining: Theory and Practice, PHI 2006

ECF22301

VI SEMESTER

DSE 5B: Elective: Data Mining and Data Warehousing Lab

Credit (L: T: P = 0: 0: 2)

Software Lab based on Data Mining:

Practical List: Practical are to be done using Weka, and a report prepared as per the format*. The operations are to be performed on built-in dummy data sets of weka and/or the downloadable datasets mentioned in references below. Also wherever applicable, the parameter values are to be varied (upto 3 distinct values). The 'Visualize' tab is to be explored with each operation.

1. Pre-processing: Apply the following filters –
   a. weka>filter>supervised>attributed> AddClassification, AttributeSelection, Discretize, NominalToBinary
   b. weka>filter>supervised>instance: StratifiedRemoveFolds, Resample
   c. weka>filter>unsupervised>attribute>Add, AddExpression, AddNoise ,Center , Discretize , MathExpression ,MergeTwoValues , NominalToBinary , NominalToString, NormalizeNumericToBinary ,NumericToNominal , NumericTransform , PrincipalComponent, RandomSubset , Remove , RemoveType , ReplaceMissingValues , Standardize
   d. weka>filter>unsupervised>instance>Normalize , Randomize , Standardize, RemoveFrequentValues, RemoveWithValues , Resample , SubsetByExpression
2. Explore the 'select attribute' as follows
   weka>attributeSelection> , FilteredSubsetEval , WrapperSubsetEval
3. Association mining
   weka>associations> , Apriori, FPGrowth
4. Classification**
   weka>classifiers>bayes> , NaïveBayes , weka>classifiers>lazy> : IB1, IBkweka>classifiers>trees , SimpleCart , RandomTree , ID3
5. Clustering**
   weka>clusters> , SimpleKMeans , FarthestFirst algorithm, DBSCAN, hierarchicalClusterer

ECF22401

VI SEMESTER
DSE 5C: Elective: Artificial Intelligence and Expert Systems
Credit (L: T: P = 4: 0: 0)

Course Outcome

After successful completion of the course, the student is able to

CO1. Deliberate in details with examples Artificial intelligence system
CO2. Learn the characteristics of Concepts of Representation of knowledge
CO3. Understand in details with examples Concepts of Representation of knowledge
CO4. Understand the details of knowledge inference methods
CO5. Understand in details with examples Concepts of Machine Learning Techniques
CO6. Learn the details of Expert System

Unit - 1 15 Hours

INTRODUCTION TO AI AND PRODUCTION SYSTEMS: Introduction to AI-Problem formulation, Problem Definition -Production systems, Control strategies, Search strategies. Problem characteristics, Production system characteristics -Specialized production system-Problem solving methods - Problem graphs, Matching, Indexing and Heuristic functions -Hill Climbing-Depth first and Breath first, Constraints satisfaction - Related algorithms, Measure of performance and analysis of search algorithms.

REPRESENTATION OF KNOWLEDGE: Game playing - Knowledge representation, Knowledge representation using Predicate logic

Unit - 2 15 Hours

Introduction to predicate calculus, Resolution, Use of predicate calculus, Knowledge representation using other logic-Structured representation of knowledge.

KNOWLEDGE INFERENCE: Knowledge representation -Production based system, Frame based system. Inference - Backward chaining, Forward chaining, Rule value approach, Fuzzy reasoning - Certainty factors, Bayesian Theory-Bayesian Network-Dempster -Shafer theory.

Unit - 3 15 Hours

PLANNING AND MACHINE LEARNING: Basic plan generation systems - Strips - Advanced plan generation systems - Kstrips -Strategic explanations -Why, Why not and how explanations. Learning- Machine learning, adaptive Learning.

Unit - 4 15 Hours

EXPERT SYSTEMS: Expert systems - Architecture of expert systems, Roles of expert systems -Knowledge Acquisition –Meta knowledge, Heuristics. Typical expert systems - MYCIN, DART, XOON, Expert systems shells.

Reference Books:

1. Kevin Night, Elaine Rich, Nair B., "Artificial Intelligence (SIE)",McGraw Hill- 2008. (Unit-1,2,4,5)
2. Dan W. Patterson, "Introduction to AI and ES", Pearson Education, 2007. (Unit-III)
3. Peter Jackson, "Introduction to Expert Systems", 3rd Edition, Pearson Education, 2007.
4. Stuart Russel, Peter Norvig "AI – A Modern Approach", 2nd Edition, Pearson Education 2007.

ECF22501

VI SEMESTER
DSE 5C: Elective: Artificial Intelligence and Expert Systems Lab
Credit (L: T: P = 0: 0: 2)

1. Implement Breadth First Search (for 8 puzzle problem or Water Jug problem or any AI search problem)
2. Implement Depth First Search (for 8 puzzle problem or Water Jug problem or any AI search problem)
3. Implement Best First Search (for 8 puzzle problem or Water Jug problem or any AI search problem)
4. Implement Single Player Game (Using Heuristic Function)
5. Implement Two Player Game (Using Heuristic Function)
6. Implement A* Algorithm
7. Implement Propositional calculus related problem
8. Implement First order propositional calculus related problem
9. Implement Certainty Factor problem
10. Implement Syntax Checking of English sentences-English Grammar
11. Develop an Expert system for Medical diagnosis.
12. Develop any Rule based system for an application of your choice.

ECF23001

VI SEMESTER

DSE 6: Elective: Dissertation / Project

Credit (L: T: P = 0: 0: 6) 12 Hours/Week

Course Outcome:

After successful completion of the course, the student is able to

CO1. Identify in details with examples Problem identification

CO2. Write down in depth System Analysis

CO3. Understand and Develop SRS for selected System Problem

CO4. Understand and Develop System Design for selected System Problem

CO5. Learn in details and Develop a Code and Test the System

CO6. Understand the details of Presentation and Demo of Project Work

- ✓ This option is to be offered only in 6th Semester.
- ✓ The students will be allowed to work on any project based on the concepts studied in
- ✓ Core/elective or skill based elective courses.
- ✓ The group size should be maximum of THREE (03) students.
- ✓ Each group will be assigned a teacher as a supervisor who will handle both their theory as Well as lab classes.
- ✓ A maximum of Four (04) projects would be assigned to one teacher.

ECF24101

VI SEMESTER

SEC 3A: Elective: AJAX
Credit (L: T: P = 0: 0: 2)

Course Outcome:

After successful completion of the course, the student is able to

CO1. Deliberate in details with examples AJAX

CO2. Learn the details of AJAX Overview

CO3. Specify the details of Steps for Implementation of AJAX

CO4. Learn the details of Design and use of AJAX

Term work: Design& Develop Small web application using AJAX

Reference Books:

1. Steven Holzner, "Ajax A Beginner's Guide", The McGraw-Hill Companies.

2. Edmond Woychowsky,"Ajax: Creating Web Pages with AsynchronousJavaScript and XML", Pearson Education, Inc.

3. Thomas A. Powell, "Ajax: The Complete Reference", McGraw-Hill Companies.

ECF24301

VI SEMESTER

SEC 3B: Elective: Angular JS
Credit (L: T: P = 0: 0: 2)

Course Outcome:

After successful completion of the course, the student is able to

CO5. Deliberate in details with examples Angular JS

CO6. Learn the details of Angular JS Overview

CO7. Specify the details of Steps for Implementation of Angular JS

CO8. Learn the details of Design and use of Angular JS

Term work: Design & Develop Small web application using AngularJS

Reference Books:

1. Valeri Karpov, Diego Netto, "Professional AngularJS", WROX
2. Sheppard, Miller, Liptak, "Sams Teach Yourself-AngularJS for .NET Developer in 24 Hours", Pearson Education India; First edition

ECF24501

VI SEMESTER

SEC 3C: Elective: Wordpress
Credit (L: T: P = 0: 0: 2)

Course Outcome:

After successful completion of the course, the student is able to

CO1. Deliberate in details with examples Word press

CO2. Learn the details of Word pressOverview

CO3. Specify the details of Steps for Implementation of Word press

CO4. Learn the details of Design and use of Word press

Term work: Design & Develop Small Web Site usingWord press

Reference Books:

1. Lisa Sabin-Wilson, Cory Miller, Kevin Palmer, Andrea Rennick, and Michael Torbert, " WordPress® All-in-One For Dummies®", Wiley Publishing, Inc.
2. Tris Hussey, "WordPress Absolute Beginner's Guide", Que Publishing

ECF25101

VI SEMESTER

SEC 4A: Elective: Python Programming
Credit (L: T: P = 0: 0: 2)

Course Outcome:

After successful completion of the course, the student is able to

CO1. Learn the details of Python Programming Structure
CO2. Deliberate the characteristics of Python Programming
CO3. Understand in details with examples - Python Programming Languages
CO4. Specify in depth OOPs, Event Driven and GUI features in Python

Software Lab using Python

Section: A (Simple programs)

1. Write a menu driven program to convert the given temperature from Fahrenheit to Celsius and vice versa depending upon user's choice.
2. WAP to calculate total marks, percentage and grade of a student. Marks obtained in each of the three subjects are to be input by the user. Assign grades according to the following criteria
   Grade A: Percentage >=80
   Grade B: Percentage>=70 and <80
   Grade C: Percentage>=60 and <70
   Grade D: Percentage>=40 and <60
   Grade E: Percentage<40
3. Write a menu-driven program, using user-defined functions to find the area of rectangle, square, circle and triangle by accepting suitable input parameters from user.
4. WAP to display the first n terms of Fibonacci series.
5. WAP to find factorial of the given number
6. WAP to find sum of the following series for n terms: 1 – 2/2! : 3/3!----------n/n!
7. WAP to calculate the sum and product of two compatible matrices.

Section: B (Visual Python)

All the programs should be written using user defined functions, wherever possible.

1. Write a menu-driven program to create mathematical 3D objects
   I. Curve
   II. Sphere
   III. Cone
   IV. Arrow
   V. Ring
   VI. Cylinder.
2. WAP to read n integers and display them as a histogram.
3. WAP to display sine, cosine, polynomial and exponential curves.

4. WAP to plot a graph of people with pulse rate p vs. height h. The values of p and h are to be entered by the user.
5. WAP to calculate the mass m in a chemical reaction. The mass m (in gms) disintegrates according to the formula m=60/(t:2), where t is the time in hours. Sketch a graph for t vs. m, where t>=0.
6. A population of 1000 bacteria is introduced into a nutrient medium. The population p grows as follows:

P(t) = (15000(1:t))/(15: e)

Where the time t is measured in hours. WAP to determine the size of the population at given time t and plot a graph for P vs t for the specified time interval.

7. Input initial velocity and acceleration, and plot the following graphs depicting equations of motion:

I. Velocity wrt time (v=u:at)
II. Distance wrt time (s=u*t:0.5*a*t*t)
III. Distance wrt velocity (s=(v*v-u*u)/2*a)

Reference Books:

1. P. K. Sinha&PritiSinha , "Computer Fundamentals", BPB Publications, 2007.
2. Dr. Anita Goel, Computer Fundamentals, Pearson Education, 2010.
3. T. Budd, Exploring Python, TMH, 1st Ed, 2011
4. Python Tutorial/Documentation www.python.or 2010
5. Allen Downey, Jeffrey Elkner, Chris Meyers , How to think like a computer scientist : learning with Python , Freely available online.2012

ECF25301

VI SEMESTER

SEC 4B: Elective: R Programming
Credit (L: T: P = 0: 0: 2)

Course Outcome:

After successful completion of the course, the student is able to

CO1. Learn the details of R Programming Structure
CO2. Deliberate the characteristics of R Programming
CO3. Understand in details with examples - R Programming Languages

Software Lab Based on R Programming

1. Write a program that prints 'Hello World' to the screen.
2. Write a program that asks the user for a number n and prints the sum of the numbers 1 to n
3. Write a program that prints a multiplication table for numbers up to 12.
4. Write a function that returns the largest element in a list.
5. Write a function that computes the running total of a list.
6. Write a function that tests whether a string is a palindrome.
7. Implement the following sorting algorithms: Selection sort, Insertion sort, Bubble Sort
8. Implement linear search.
9. Implement binary search.
10. Implement matrices addition, subtraction and Multiplication

Reference Books:

1. William N. Venables and David M. Smith, An Introduction to R. 2nd Edition. Network Theory Limited.2009
2. Norman Matloff, the Art of R Programming - A Tour of Statistical Software Design, No Starch Press.2011

ECF25501

VI SEMESTER

SEC 4C: Elective: CodeIgniter
Credit (L: T: P = 0: 0: 2)

Course Outcome:

After successful completion of the course, the student is able to

CO1. Learn the details of CodeIgniter - Application Development Framework
CO2. Deliberate the Features of CodeIgniter

Term work: Design & Develop Small web application using CodeIgniter framework

Reference Books:

https://www.guru99.com/codeigniter-tutorial.html
https://www.javatpoint.com/codeigniter-preventing-enabling-from-csrf

Question Paper Pattern
Theory (3 or 4 Credits)

Time: 3 Hours Max. Marks: 70

Part – A

I. Answer any Eleven Question out of given Twelve Questions.11 X 2 = 22

1.
2.
3.
4.
5.
6.
7.
8.
9.
10.
11.
12.

Note: Three Questions each from the Units 1, 2, 3, and 4

Part - B

II. Answer any Two Sub Questions from each main Question.

13. A) **2 X 6 = 12**
B)
C)

14. A) **2 X 6 = 12**
B)
C)

15. A) **2 X 6 = 12**
B)
C)

16. A) **2 X 6 = 12**
B)
C)

Note: Each Main questions contains 3 sub questions carries 06 Marks (may have internal Split-ups) and from Units 1, 2, 3 and 4 respectively

Question Paper Pattern

Theory (1 or 2 Credits)

Time: 2 Hours Max. Marks: 35

Part – A

I. Answer all Questions. 05 X 02 = 10

1.
2.
3.
4.
5.

Part - B

II. Answer any Four Questions out of given Five Questions. 5 X 5 = 25

6.
7.
8.
9.
10.

Note: Each Main questions contains 3 sub questions carries 06 Marks (may have internal Split-ups) and from Units 1 & 2 respectively

Question Paper Pattern

Practical / Project (1 or 2 Credits)

Time: 3 Hours Max. Marks: 35

Practicals

1. Two Experiments/ Programs 20 Marks Each 2 x 10 = 20 Marks

   a. Write-ups 5 X 2 = 10 Marks

   b. Conducting & Results 3 X 5 = 10 Marks (Any One for 2 Hours of Practical's)

2. Viva – Voice 10 Marks

3. Record 05 Marks

Project

1. Project Presentation 10% Marks
2. Project Demo 20% Marks
3. Viva – Voice 20% Marks
4. Record / Report 20% Marks
5. IA (C1 & C2) 30% Marks

Question Paper Pattern

Theory (SEC 1A/B: Mathematics / Business Mathematics)

Time: 2 Hours **Max. Marks: 35**

Part – A

1. Answer any five Questions. **5 X 2 = 10**

a.
b.
c.
d.
e.
f.

Part – B

2. Answer any two Questions. **2 X 5 = 10**

a.
b.
c.

3. Answer any two Questions. **2 X 5 = 10**

a.
b.
c.

4. Answer any one of the following. **1 X 5 = 5**

a.
b.

Question Paper Pattern

Project (6 Credits)

Time: 3 Hours Max. Marks: 70

IA (C1 & C2) = Max. Marks: 30

Practicals

Project

1.	Project Presentation	10 Marks
2.	Project Demo	30 Marks
3.	Viva – Voice	20 Marks
4.	Record / Report	10 Marks
5.	IA (C1 & C2)	(15 & 15) Marks

PRINCIPAL
JSS College of Arts, Commerce & Science
(Autonomous)
Ooty Road, MYSURU-25