

JSS COLLEGE OF  **ARTS,**
COMMERCE AND SCIENCE

(Autonomous)

B N ROAD, MYSURU- 570 025

DEPARTMENT OF ZOOLOGY

Syllabus

CHOICE BASED CREDIT SYSTEM

For B.Sc programmes

Chemistry, Botany, Zoology

Chemistry, Zoology, Biotechnology

2019-20

Scheme of study for B.Sc. Zoology under CBCS scheme 2019-20
B.Sc. Degree syllabus – Programme- CZBt

Year	Sem	Course	Title of the Paper	Paper code	Credits	Maximum Marks						Exam Duration		
						L:T:P	Th	Pr	THEORY		PRACTICAL		Th	Pr
									C1	C2	C1	C2		
I BSc	I	DSC	Theory-Animal Diversity	DMA30005	4:0:0	70	-	15	15					
			Practical- Animal Diversity	DMA30105	0:0:2	-	35	-	-	7.5	7.5	3H	3H	
	II	DSC	Theory -Comparative Anatomy and Developmental Biology of Vertebrates	DMB30005	4:0:2	70	-	15	15	-	-	3H	3H	
			Practical- Comparative Anatomy and Developmental Biology of Vertebrates	DMB30105	0:0:2	-	35			7.5	7.5			
II BSc	III	DSC	Theory-Physiology and Biochemistry	DMC30005	4:0:0	70	-	15	15	-	-			
			Practical- Physiology and Biochemistry	DMC30105	0:0:2	-	35			7.5	7.5	3H	3H	
	IV	DSC	Theory-Genetics and Evolutionary Biology	DMD30005	4:0:0	70	-	15	15	-	-			
			Practical- Genetics and Evolutionary Biology	DMD30105	0:0:2	-	35			7.5	7.5	3H	3H	
III BSc	V	DSE (ELECTIVE 1)	Theory-Applied Zoology	DME30005	4:0:0	70	-	15	15	-	-			
			Practical- Applied Zoology	DME30105	0:0:2	-	35			7.5	7.5	3H	3H	
		DSE (ELECTIVE 2)	Theory-Insect, Vector and Diseases	DME30205	4:0:1	70	-	15	15	-	-			
			Practical- Insect, Vector and Diseases	DME30305	0:0:2	-	35			7.5	7.5	3H	3H	
	VI	DSE (ELECTIVE 1)	Theory-Aquatic Biology	DMF30005	4:0:0	70	-	15	15	-	-			
			Practical- Aquatic Biology	DMF30105	0:0:2	-	35			7.5	7.5	3H	3H	
		DSE (ELECTIVE 2)	Theory-Immunology	DMF30205	4:0:1	70	-	15	15	-	-			
			Practical- Immunology	DMF30305	0:0:2	-	35			7.5	7.5	3H	3H	
VI	SEC-1	Theory-Medical Diagnostics	DMF30405	2:0:0	35	-	15	15	-	-	2H	-		
	SEC-2	Theory-Aquarium Fish keeping	DMF30605	2:0:0	35	-	15	15	-	-				

Scheme of study for B.Sc. Zoology under CBCS scheme 2019-20

B.Sc. Degree syllabus – Programme- CBZ

Year	Sem	Course	Title of the Paper	Paper code	Credits	Maximum Marks						Exam Duration		
						L:T:P	Th	Pr	THEORY		PRACTICAL		Th	Pr
									C1	C2	C1	C2		
I BSc	I	DSC	Theory-Animal Diversity	DMA30008	4:0:0	70	-	15	15					
			Practical- Animal Diversity	DMA30108	0:0:2	-	35	-	-	7.5	7.5	3H	3H	
	II	DSC	Theory -Comparative Anatomy and Developmental Biology of Vertebrates	DMB30008	4:0:2	70	-	15	15	-	-	3H	3H	
			Practical- Comparative Anatomy and Developmental Biology of Vertebrates	DMB30108	0:0:2	-	35			7.5	7.5			
II BSc	III	DSC	Theory-Physiology and Biochemistry	DMC30008	4:0:0	70	-	15	15	-	-			
			Practical- Physiology and Biochemistry	DMC30108	0:0:2	-	35			7.5	7.5	3H	3H	
	IV	DSC	Theory-Genetics and Evolutionary Biology	DMD30008	4:0:0	70	-	15	15	-	-			
			Practical- Genetics and Evolutionary Biology	DMD30108	0:0:2	-	35			7.5	7.5	3H	3H	
III BSc	V	DSE (ELECTIVE 1)	Theory-Applied Zoology	DME30008	4:0:0	70	-	15	15	-	-			
			Practical- Applied Zoology	DME30108	0:0:2	-	35			7.5	7.5	3H	3H	
		DSE (ELECTIVE 2)	Theory-Insect, Vector and Diseases	DME30208	4:0:1	70	-	15	15	-	-			
			Practical- Insect, Vector and Diseases	DME30308	0:0:2	-	35			7.5	7.5	3H	3H	
	VI	DSE (ELECTIVE 1)	Theory-Aquatic Biology	DMF30008	4:0:0	70	-	15	15	-	-			
			Practical- Aquatic Biology	DMF30108	0:0:2	-	35			7.5	7.5	3H	3H	
		DSE (ELECTIVE 2)	Theory-Immunology	DMF30208	4:0:1	70	-	15	15	-	-			
			Practical- Immunology	DMF30308	0:0:2	-	35			7.5	7.5	3H	3H	
	VI	SEC-1	Theory-Medical Diagnostics	DMF30408	2:0:0		35	-	15	15	-	-	2H	-
		SEC-2	Theory-Aquarium Fish keeping	DMF30608	2:0:0		35	-	15	15	-	-		

B.Sc., UG SYLLABUS- PROGRAMME - CZBT

Scheme of study for B.Sc. Zoology under CBCS scheme from 2019-20

YEAR	SEMESTER	COURSE CODE	Title of the paper & Credits	NO. OF CREDITS		LECTURE/PRACTICAL/HOUR/WEEK		TOTAL TEACHING HOURS	
				TH	P	TH	P	TH	P
I	I	DMA30005	Animal Diversity	4	2	4	4	60	60
	II	DMA30105	Comparative Anatomy and Developmental Biology of Vertebrates	4	2	4	4	60	60
II	III	DMB30005	Physiology and Biochemistry	4	2	4	4	60	60
	IV	DMB30105	Genetics and Evolutionary Biology	4	2	4	4	60	60
III	V	DMC30005	Applied Zoology	4	2	4	4	60	60
		DMC30105	Insect, Vector and Diseases	4	2	4	4	60	60
	VI	DMD30005	Aquatic Biology	4	2	4	4	60	60
		DMD30105	Immunology	4	2	4	4	60	60
III	VI SEC	DME30005	Medical Diagnostics	2	-	2	-	30	-
		DME30105	Aquarium Fish keeping	2	-	2	-	30	-

B.Sc., UG SYLLABUS- PROGRAMME - CBZ

Scheme of study for B.Sc. Zoology under CBCS scheme from 2019-20

YEAR	SEMESTER	COURSE CODE	Title of the paper & Credits	NO. OF CREDITS		LECTURE/PRACTICAL/HOUR/WEEK		TOTAL TEACHING HOURS	
				TH	P	TH	P	TH	P
I	I	DMA30008	Animal Diversity	4	2	4	4	60	60
	II	DMA30108	Comparative Anatomy and Developmental Biology of Vertebrates	4	2	4	4	60	60
II	III	DMB30008	Physiology and Biochemistry	4	2	4	4	60	60
	IV	DMB30108	Genetics and Evolutionary Biology	4	2	4	4	60	60
III	V	DMC30008	Applied Zoology	4	2	4	4	60	60
		DMC30108	Insect, Vector and Diseases	4	2	4	4	60	60
	VI	DMD30008	Aquatic Biology	4	2	4	4	60	60
		DMD30108	Immunology	4	2	4	4	60	60
III	VI SEC	DME30008	Medical Diagnostics	2	-	2	-	30	-
		DME30108	Aquarium Fish keeping	2	-	2	-	30	-

Programme Outcome for Bachelor of Science in Chemistry, Zoology and Biotechnology:

After completing the graduation in the Bachelor of Science the students are able to:

- PO1.** Demonstrate the ability to justify, explain, and/or approach the concept both in written and oral forms
- PO2.** Demonstrate the ability to present clear, logical and succinct arguments
- PO3.** Develop state-of-the-art laboratory skills and professional communication skills.
- PO4.** Apply the scientific method to design, execute, and analyze an experiment.
- PO5.** Appreciate the central role of chemistry in the society and use this as a basis for ethical behaviour in issues facing chemists/drugs.
- PO6.** Understand Chemistry as an integral part for addressing social, economic, and environmental problems.
- PO7.** Identify the major groups of organisms with an emphasis on animals and plants.
- PO8.** Compare and contrast the characteristics of animals that differentiate themselves from other living and non-living creatures.
- PO9.** Give specific examples of physiological adaptations.
- PO10.** Design and develop solution to Biotechnology problems keeping in mind the safety measures for environment and society.
- PO11.** Support Biotechnology research activity with strong technical background knowledge.

Programme Specific Outcome

After completing the graduation in Chemistry, Zoology and Biotechnology the students are able to:

PSO1. Find jobs at all level of chemical, pharmaceutical, food products and life oriented material Industries

PSO2. Apply appropriate techniques for the qualitative and quantitative analysis of chemicals in laboratories and in industries.

PSO3. Recognize the relationship between different structures and functions at different levels.

PSO4. Characterize the biological, chemical and physical features of environments that Animals inhabit.

PSO5. Demonstrate effectively the applications of biochemical and biological sciences.

PSO6. Know and apply appropriate tools and techniques in biotechnological manipulation

PSO7. Understand his or her responsibilities in biotechnological practices.

Programme Outcome for Bachelor of Science in Chemistry, Botany, Zoology:

After completing the graduation in the Bachelor of Science the students are able to:

- PO1.** Demonstrate the ability to justify, explain, and/or approach the concept
- PO2.** Demonstrate the ability to present clear, logical and succinct arguments
- PO3.** Develop state-of-the-art laboratory skills and professional communication skills.
- PO4.** Apply the scientific method to design, execute, and analyze an experiment.
- PO5.** Appreciate the role and use of chemistry for ethical issues facing chemists/drugs.
- PO6.** Identify the taxonomic position of plants using required principles and methods.
- PO7.** Understand the impact of the plant diversity in societal and environmental context.
- PO8.** Use interdisciplinary approaches with quantitative skills to work on biological problems.
- PO9.** Understand Chemistry as an integral part for addressing social, economic, and environmental problems.
- PO10.** Identify the major groups of organisms with an emphasis on animals and plants.

Programme Specific Outcome

Bachelor of Science in Chemistry, Botany and Zoology

After completing the graduation in the Bachelor of Science the students are able to:

PSO1. Find jobs at all level of chemical, pharmaceutical, food products, life oriented material industries

PSO2. Apply appropriate techniques for the qualitative and quantitative analysis of chemicals in laboratories and in industries.

PSO3. Explicate ecological interconnectedness of life

PSO4. Analyze the avenues and remedies for burning environmental issues

PSO5. Recognize the relationship between different structures and functions at different levels.

PSO6. Characterize the biological, chemical and physical features of environment of Animals inhabits.

**I SEMESTER
CORE COURSE I
ANIMAL DIVERSITY**

Theory

Credits -4(60hrs)

Course outcome

After completion of the course the student is able to:

- CO1.** Identify in depth non chordata
- CO2.** Write down the characteristics of non chordata
- CO3.** Identify in details with examples non chordata
- CO5.** Learn the classification and characteristics of non chordata
- CO6.** Write down the details of non chordate

Unit I

15 hrs

INTRODUCTION TO BIODIVERSITY AND NON CHORDATA

Subdivisions of Zoology, Biodiversity and its importance. Principles of animal classification. Binomial and Trinomial nomenclature. Animal kingdom classification based on symmetry, coelom and metamerism. Definition of species.

Protozoa

General characters and classification up to classes with examples

Locomotory organelles in Protozoa: Pseudopodia, Flagella, cilia and myonemes

Locomotion in Protozoa: Amoeboid Movement and Sol- Gel Theory, Euglenoid movement and Flagellar movement, Ciliary movement and Paddle- Stroke Theory Brief account of locomotion and nutrition in protozoa.

Porifera

General characters and classification upto classes with examples. Canal systems in porifera (Ascon, Sycon, Leucon and Rhagon types), Larval forms of sponges. Economic importance of Porifera.

UnitII

15 hrs

Cnidaria

General characters and classification upto classes with examples. Structure and life cycle of *Obelia* / Metagenesis. Polymorphism in *Physalia*. Structure of a corallite. Types of coral reefs. Importance of corals.

Platyhelminthes

General Character and classification upto classes with examples. External features, Parasitic adaptations, pathogenicity and preventive measures of *Taenia solium* & *Schistoma hematobium*

Aschelminthes

General characters and classification upto classes; Structure,transmission, pathogenicity and preventive measures of *Ascaris* and *Wuchereria*.

UnitIII

15hrs

Annelida

General characters and classification upto classes with examples.

Leech: External morphology, parasitic adaptations, digestive system and reproductive system. Metamerism in annelids. Differentiate between Neries and Heteroneries.

Arthropoda

General characters and classification upto classes with examples

Metamorphosis in insects – (Ametabola, Hemimetabola, Paurometabola, Hypermetabola, Holometabola), hormonal control of metamorphosis. Social life in bees and termites.

Economic importance of insects.

UnitIV

15hrs

Mollusca

General characters and classification upto classes with examples; Torsion in gastropods, Foot in Mollusca- Amphineura, Scaphopoda, Pelicypoda, Gastropoda, Cephalopoda.

Fresh water mussel: External morphology, Digestive system.

Economic importance of Mollusca

Echinodermata

General characters and classification upto classes with examples.

Starfish: External features, Digestive system & water vascular system in starfish.

Pedicellaria and Aristotle`s Lantern of Sea urchin

Larval forms and phylogenetic significance.

Reference:

1. Barnes, R.D. 1974, Invertebrate Zoology – III edition by W.B. Saunders Co., Philadelphia.
2. Barrington, E.J.W., 1976, Invertebrate structure and function by Thomas Delson & Sons Ltd., London.
3. Chandler A.C. An Introduction to Parasitology, John Willy & Co.,
4. Earthworm Cinderella of Organic Farming-Radha D. Kale
5. Economic Zoology. - Shukla and Upadhya.
6. Ekambarnatha Ayyar – Invertebrate – Volumes
7. Hyman, L.H. 1940. The Invertebrates Vol. 1, 2.
8. Jordan and Verma P.S. Invertebrate Zoology
9. Kotpal R.L. Invertebrates.
10. Parker. J.J. Haswell, W.A. 1961 Text Book of Zoology vol. 1, 2nd edition. By Macmillan Co., London.
11. [Sandhu](#) G.S, [Harshvardhan Bhaskar](#), Text book on Invertebrate Zoology, Campus Books International, 2002, 2005 – [Vol](#) 1 and 2
12. Simpson G.C. Principles of Taxonomy

PRACTICAL –I
ANIMAL DIVERSITY

1. A-Study of Microscope.

B-PROTOZOA-Amoeba, Entamoeba, Polystomella, Euglena, Paramecium, Balantidium, Vorticella.

2. PORIFERA-Sycon, Hyalonema, Gemmule, Monaxon spicules.

3. COELETERATA-Obelia, Physalia, Aurelia, Ephyra larva, Metridium.

4. HELMINTHES-Taenia solium, Planaria, Fasciola, Ascaris male and female.

5. ANNELIDA- Pheretima , Nereis, Leech.

Onychophora- Peripatus

6. ARTHROPODA- Palaemon, Palamnaeus, Scolopendra, Spirostreptus.

7. MOLLUSCA- Chiton, Unio, Sepia, Octopus.

8. ECHINODERMATA- Asteropecten, Ophiothrix, Holothuria, Antedon, Pedicellariae of Seaurchin.

9. Study of mouth parts of insects: Cockroach, Mosquito, House fly, and Honey bee (permanent slides)

10. Preparation of protozoan culture by students and observation of protozoan culture

11. Mounting of setae OR foraminiferans

12. Preparation of animal album containing photographs, cut outs, with appropriate write up the above mentioned taxa. Different taxa/topics may be given to different sets of students.(Invertebrates-05)

13. Study of animal dissection through digi frog software.

14. Repetition

Note:

Charts, Photographs and models can be shown.

SCHEME OF EXAMINATION

Duration: 3 hrs.

Max. Marks: 35 Marks

- | | |
|--|----------|
| 1. Identify and comment on A to C (3 X 3) | 09 MARKS |
| 2. Identify and comment on D to F (3 X 3) | 09 MARKS |
| 3. Mounting | 03 MARKS |
| 4. Identify and write neat labeled diagram the given mouth parts | 04 MARKS |
| 5. Submission of Animal album | 05 MARKS |
| 6. Class Records | 05 MARKS |

SCHEME OF VALUATION

1. Identification & Classification-01,Diagram-01,Salient features-01
2. Identification & Classification-01,Diagram- 01,Salient features -01
3. Procedure-01, Slide preparation – 02
4. Identification-01, labeled Diagram – 03

DMB30005/ DMB30008

**II SEMESTER
CORE COURSE II
COMPARATIVE ANATOMY AND DEVELOPMENTAL BIOLOGY OF
VERTEBRATES**

Theory

Credits -4(60 hrs)

Course outcome

After completion of the course the student is able to:

- CO1.** Write down the characteristics of chordata
- CO2.** Identify in details with examples chordata
- CO3.** Deliberate the details of comparative anatomy
- CO4.** Identify in details with application of developmental biology
- CO5.** Learn in depth developmental biology
- CO6.** Deliberate in details with examples developmental biology

Unit I

15 hrs

CHORDATA

Protochordates

General features and Phylogeny of Protochordata.

Agnatha

General features of Agnatha and classification of cyclostomes upto classes.

Pisces

General features and Classification upto orders with examples; Migration of fishes- Anadromous and Catadromous. Osmoregulation in Fishes, Differentiation of osteichthyes and chondrichthyes.

Amphibia

General features and Classification upto orders with examples
Parental care in Amphibia- Ichthyophis, Alytes, Pipa and Gastrotheca.

Reptiles

General features and Classification upto orders with examples.
Poisonous and non-poisonous snakes, biting mechanism in snakes, Types and importance of snake venom, first aid for snake bite.

Unit II

15 hrs

Aves

General features and Classification upto orders with examples. Flightless birds and their distribution, major types of beaks. Kinds of migration in birds

Mammals

General features Classification up to orders with examples. Origin of mammals, Distribution of prototheria and metatheria with example
Dentition in mammals. Structure of teeth and their types. Adaptive radiation in mammals.

Comparative anatomy: Derivatives of integuments w.r.t glands and digital tips, brief account of Gills, lungs, air sacs and swim bladder. Types of receptors.

Circulatory system: Comparative account of Heart (Shark, Frog, Lizard, Pigeon and Man) and aortic arches (General plan of Shark, Frog, Lizard, Pigeon and Man)

Nervous system: Brain of Shark, Frog, Lizard, Pigeon and Man.

Evolution of Kidneys in vertebrates: Pronephros, mesonephros and metanephros.

Unit III

15 hrs

Early Embryonic Development

Gametogenesis: Spermatogenesis and oogenesis w.r.t. mammals, vitellogenesis in birds, Fertilization: external (amphibians), internal (mammals)

monospermy and polyspermy, types of egg and egg membrane

Cleavage: Planes of cleavage: meridional, vertical, equatorial and latitudinal cleavages. Types of cleavages: holoblastic, radial, spiral, meroblastic and superficial cleavage with examples.

Early development of frog ; structure of mature egg, cleavage, blastula, fate map, gastrula and Neurulation in frog embryo.

Unit IV

15 hrs

Late Embryonic Development

Structure of mature spermatozoon, Graafian follicle, Human menstrual cycle, Ovulation, fertilization, morula, blastocyst, implantation and placentation.

Placenta: Histological and morphological classification of mammalian placenta with examples.

Foetal membranes: Development, structure and functions of amnion, chorion, yolk sac and allantoises.

Modern trends in human reproduction : Invitro fertilization, cloning, sperm and egg banks, sexually transmitted diseases(AIDS, syphilis and gonorrhoea).

Reference:

1. Balinsky, B.I. (2008). An introduction to Embryology, International Thomson Computer
2. Carlson, Bruce M (1996). Patten's Foundations of Embryology, McGraw Hill, Inc
3. Gilbert, S. F. (2006). Developmental Biology, VIII Edition, Sinauer Associates, Inc.,
4. Hildebrand, M and Gaslow G.E. Analysis of Vertebrate Structure, John Wiley and Sons
5. Kent, G.C. and Carr R.K. (2000). Comparative Anatomy of the Vertebrates. IX Edition. The McGraw-Hill Companies.
6. Kardong, K.V. (2005) Vertebrates' Comparative Anatomy, Function and
7. Evolution. IV Edition. McGraw-Hill Higher Education
8. Walter, H.E. and Sayles, L.P; Biology of Vertebrates, Khosla Publishing House. Publishers, Sunderland, Massachusetts, USA. Press.
9. Young J.Z. 1950 - Life of Vertebrates – Oxford University Press, London

PRACTICAL –II
COMPARATIVE ANATOMY AND DEVELOPMENTAL BIOLOGY OF
VERTEBRATES

1. **PROTOCHORDATA**- Balanoglossus, Herdmania, Myxine, Ammocoetes larva.
2. **PISCES**- Pristis, Torpedo, Labeo, Exocoetus.
3. **AMPHIBIA**- Salamandra, Bufo, Hyla.
4. **REPTILES**- Chamaeleon, Draco, Vipera, Naja, Chelone, Bungarus, Enhydrina.
5. **AVES AND MAMMALS**- Koel, Kite, Duck, Bat, Loris, Guinea pig.
6. Skull of Frog, Pigeon, Rabbit.
7. Vertebrae of Frog (Atlas, Pro, Amphi and Acoelous), Pigeon (Heterocoelous Vertebra, Synsacrum) Rabbit (Atlas, Axis, Thoracic vertebrae).
8. Pectoral and Pelvic girdles of Frog, Pigeon and Rabbit. Fore and hind limb skeletons of Frog, pigeon and Rabbit.

9. Frog - cleavage stages, Blastula, gastrula, neurula stage (whole mount)
10. Chick embryo stages-18hrs, 24hrs, 36 hrs, 48hrs (whole mount and sections)
11. Study of the different types of placenta- Sheep, placenta.
Study of development of hen's egg – Window technique.
12. Identification of various family planning devices.
13. Study of skeletal system through software,
14. Preparation of animal album containing photographs, cut outs, with appropriate write up the above mentioned taxa. Different taxa/topics may be given to different sets of students.
(**Vertebrates-05**)
15. Repetition,

SCHEME OF EXAMINATION

Duration: 3 hrs.

Max. Marks: 35 Marks

- | | |
|--|----------|
| 1. Identify and comment on A to C (3 X 3) | 09 MARKS |
| 2. Identify and comment on D to F (3 X 3) | 09 MARKS |
| 3. Window technique | 03 MARKS |
| 4. Identify and comment on the given specimen/device | 04 MARKS |
| 5. Submission of Animal album | 05 MARKS |
| 6. Class Records | 05 MARKS |

SCHEME OF VALUATION

1. Identification & Classification-01, Diagram – 01, Salient features – 01
2. Identification & Classification-01, Diagram – 01, Salient features -01
3. Procedure-01, Diagram-01, significance – 01
4. Identification-01, Diagram – 01, Comment-02

**III SEMESTER
CORE COURSE III
PHYSIOLOGY AND BIOCHEMISTRY**

Theory

Credits -4(60 hrs)

Course outcome

After completion of the course the student is able to:

- CO1.** Specify in depth physiology
- CO2.** Learn in details with examples physiology
- CO3.** Learn the classification and characteristics of biochemistry
- CO4.** Learn the characteristics of biochemistry

Unit I

15 hrs

Nerve and muscle: Structure of a neuron, types of neuron, axonic conduction and synaptic transmission of nerve impulse, neurotransmitters. Ultra-structure of skeletal muscle, sliding filament theory. Chemical composition of muscle.

Digestion: Physiology of digestion in the alimentary canal; Absorption of carbohydrates, proteins, lipids, mechanical process in digestion

Unit II

15 hrs

Respiration : Pulmonary ventilation, respiratory volumes and capacities, Transport of Oxygen and carbon dioxide in blood: Respiratory pigments (Haemoglobin, Haemocyanin, Haemoerythrin and chlorocruorin)

Excretion: Ammonotelism, Ureotelism, Uricotelism with examples .Structure of nephron, Mechanism and physiology of Urine formation, Counter-current Mechanism

Cardiovascular system: Composition of blood, Structure of Human Heart, Origin and conduction of the cardiac impulse, Cardiac cycle

Unit III

15 hrs

Reproduction and Endocrine Glands: Physiology of male reproduction: hormonal control of spermatogenesis; Physiology of female reproduction: hormonal control of menstrual cycle
Gross morphology and function of pituitary, thyroid, pancreas, adrenal, testis and ovary.

Carbohydrate Metabolism : Glycolysis, Krebs Cycle ,Gluconeogenesis; Path way, regulation and significance Glycogen metabolism: Glycogenolysis, glycogenesis, Regulation of blood sugar level (Homeostasis), Diabetes mellitus

Unit IV

15hrs

Protein metabolism: Transamination, Deamination and Urea Cycle.

Lipid Metabolism: Biosynthesis and β oxidation of palmitic acid.

Vitamins: Definition and classification, (fat soluble and water soluble vitamins) physiological role and disorders.

Enzymes: Introduction, Mechanism of action- lock and key hypothesis, induced fit hypothesis
Enzyme kinetics- Effect on enzyme concentration, substrate concentration

Reference:

1. Berg, J.M., Tymoczko, J.L. and Stryer, L. (2006) Biochemistry. VI Edition. W.H freeman and CO.
2. Guyton, A.C. and Hall, J.E (2011) Text book of medical physiology. XII Edition, Harcourt Asia Pvt. Ltd/W.B. Saunders Company.
3. Harper's illustrated Biochemistry. XXVIII Edition. Lange Medical Book/McGraw Hill.
4. Jayaraman J. 1981. Laboratory Manual in Biochemistry Wiley Eastern Ltd.
5. Lehninger A.L.: Nelson D. Land Co., M.M. 2nd edition 1993. Principles of Biochemistry, CBS Publishers, New Delhi.
6. Murray, R.K., Granner, D.K., Mayes, P.A and Rodwell, V.W. (2009).
7. Tortora, G.J. and Derrickson, B.H. (2009). Principles of Anatomy and Physiology, XII Edition, John Wiley & Sons, Inc.
8. Nelson, D.L. Cox, m.m. Lehninger, A.L (2009). Principles of Biochemistry. IV Edition. W.H Freeman and Co.
9. Widmaier, E.P., Raff H. and Strang, K.T. (2008) Vander's Human physiology XI Edition. McGraw Hill/

PRACTICAL –III
PHYSIOLOGY AND BIOCHEMISTRY

PRACTICAL

(CREDITS 2)

1. Qualitative test for carbohydrate -Molisch's test, Iodine test, Fehling's test and Picric acid test.
2. Qualitative test for proteins- Biuret test, Ninhydrin test, Millon's test and Xanthoproteic test.
3. Qualitative test for lipids-Acrolein Test, Leiberman-Burchard test, Salkowasky test.
4. Identification of vitamins presents in the food materials with their physiological role and their disorders.
5. Salivary amylase activity on starch.
6. Dehydrogenase activity in milk.
7. Preparation of hematin crystals.
8. Blood typing –ABO type and Rh factors.
9. Detection of nitrogenous wastes – Ammonia (Nessler's test), Urea (Urease test), Uric acid (Folin's U test).
10. Study of permanent mammalian histological sections of pituitary, thyroid, parathyroid.
11. Study of permanent mammalian histological sections of Pancreas, adrenal gland, testis and ovary.
12. Study of permanent mammalian slides of liver, lung and kidney.
13. Study of permanent slides of spinal cord, bone marrow and T.S of cartilage.
14. **Field Study:** Visit to a Pathology lab / Hospital to know about different techniques of biochemical analysis and submission of the report.
15. Repetition.

SCHEME OF PRACTICAL EXAMINATION

Duration: 3 hrs.

Max Marks: 35

- | | |
|---|---------|
| 1. Biochemistry experiments by lots (1 to 3) | 09Marks |
| 2. Physiology experiments by lots (5 to 9) | 09Marks |
| 3. Identify and comment the slide A (10 to 13) | 03Marks |
| 4. Identify the vitamin present in the food material and comment on their physiological role and disorders. | 04Marks |
| 5. Report | 05Marks |
| 6. Practical records | 05Marks |

SCHEME OF VALUATION

1. Procedure - 03, Experiment- 04, Result - 02
2. Procedure - 03, Experiment- 04, Result - 02,
3. Identification -01, Diagram –01, Comment– 01
4. Identification -01, Sources-01, Physiological role –01, Deficiency disease – 02

= **034.** Identification - 01 mark, Comment -
02 marks,

=

03

DMD30005/ DMD30008

**IV SEMESTER
CORE COURSE IV
GENETICS AND EVOLUTIONARY BIOLOGY**

Theory

Credits -4(60 hrs)

After completion of the course the student is able to:

CO1. Learn in depth genetics

CO2. Identify the detail of evolution

CO3. Understand in depth evolution

CO4. Identify in details with application, if applicable, genetics

Unit I

15 hrs

Introduction to Genetics: History of genetics mono and dihybrid crosses, Mendel's law.

Mendelian Genetics and its Extension: Principles of Inheritance, Chromosome theory of inheritance, Incomplete dominance and codominance.

Multiple alleles, lethal alleles, Supplementary gene, Complementary gene, Epistasis, Pleiotropy. Extra-chromosomal inheritance-Maternal inheritance-shell coiling in *Limnaea*. Cytoplasmic inheritance-Kappa partical in *Paramecium*.

Sex Determination: Chromosomal basis of sex determination in animals. Non-disjunction (primary and secondary). Genic balance theory in *Drosophila*. Klinefelter's and Turners syndromes. Environmental and hormonal effects on determination of sex (*Bonellia* and free martin).

Unit II

15 hrs

Linkage, Crossing Over and Chromosomal Mapping

Linkage and crossing over: Linkage in *Drosophila*, linkage in man; Significance of crossing over. Genetic maps of chromosomes. Construction of chromosome map.

Inborn errors of metabolism: phenylketonuria, alkaptonuria and albinism.

Sex linked inheritance: *Drosophila*- Red and white color inheritance

Man- Haemophilia and colour blindness, Y-linked genes.

Mutations: Chromosomal Mutations: Deletion, Duplication, Inversion, Translocation,

Aneuploidy and Polyploidy; Gene mutations: Induced mutations, Spontaneous mutations, Reverse mutations, Suppressor mutations.

Disorders due to mutant gene in man: sickle cell anaemia, thalassemia, brachydactyly.

Unit III

15 hrs

Introduction to Evolutionary Theories

Concept of organic evolution. Lamarckism, Darwinism, Neo-Darwinism-Industrial melanism (Natural selection).

Evidences of Evolution:

Indirect evidences: comparative morphology & anatomy, connecting links. Analogy, Homology, vestigial organs, Physiology and biochemistry – enzyme, hormones, serology, and amino acid sequence analysis, excretory product analysis, cytology, genetics and embryology.

Direct evidences from palaeontology: Nature, types of fossils. Geological time scale mentioning dominant groups in each period.

Unit IV

15 hrs

ADAPTATIONS

Adaptive radiation : examples, micro and macro evolution – examples.

Adaptations: Aquatic adaptations: Primary (Shark) and secondary (Turtle).

Volant adaptations: Active (Insect, Bird and Bat) and passive flights (Exocoetes, Rhacophorus and Draco).

Arboreal adaptations: Chameleon, Loris.

Desert adaptations: Phrynosoma, Camel. Coloration and mimicry.

Trends in Human evolution: Australopithecus, Paranthropus, Kenyanthropus and *Homo erectus*, *Homo sapiens*.

Ethology: Definition, innate – taxes, reflexes, instincts and motivation, learned behaviour – habituation, imprinting, conditioned reflexes and insight.

Reference:

1. Barton, N.H., Briggs, D.E.G., Eisen, J.A., Goldstein, D.B. and N.H. (2007).
2. Campbell, N.A. and Reece J.B. (2011) Biology. IX Edition, Pearson, Benjamin, Cumming.
3. Douglas, J. Futuyma (1997) Evolutionary Biology. Sinauer Associates Evolution. Cold Spring, Harbour Laboratory Press.
4. Gardner, E.J., Simmons, M.J., Snustad, D.P. (2008). Principles of Genetics.
5. Hall, B.K. and Hallgrímsson, B. (2008) Evolution. IV Edition, Jones and Bartlett
6. Klug, W.S., Cummings, M.R., Spencer, C.A. (2012). Concepts of Genetics Organic Evolution by Veer Bala Rastogi
7. Principles of Genetics by Robert.H. Tamarin, Tata McGraw-Hill pub. Publishers
8. Ridley, M. (2004) Evolution. III Edition. Blackwell Publishing
9. Russell, P.J. (2009) Genetics-A Molecular Approach. III Edition. Benjamin
10. Snustad, D.P., Simmons, M.J. (2009). Principles of Genetics Edition.

Stebbins G.L. (1970) The process of organic evolution, Prentice Hall Publ.

11. Strickberger, M.W, (1995) Genetics, Mac Millan Co.VIII Edition. Wiley India X Edition. Benjamin Cummings.

DMD30105/ DMD30108

PRACTICAL –IV

GENETICS AND EVOLUTIONARY BIOLOGY

PRACTICAL

(CREDITS 2)

1. Genetic problems- Monohybrid and Dihybrid cross.
2. Complementary genes: Flower color in sweet pea.
Supplementary genes: Comb patterns in Fowls.
3. Epistatic genes: Plumage colors in Fowls
Multiple genes: Skin color in man.
4. Multiple alleles: ABO blood group in human.
Sex linked inheritance: *Drosophila* (red and white eye colour) and human (Haemophilia and Colourblindness).
5. Study of *Drosophila* and Grasshopper Karyotypes.
6. General morphology of *Drosophila melanogaster* (male and female).
7. Mounting of sex comb and wing of *Drosophila*.
8. Identification of mutants of white eye, bar eye, sepia eye, vestigial wing and ebony body of *Drosophila*.
9. Preparation of media and maintenance and breeding of *Drosophila* (Demonstration).
10. Study of homology – vertebrate forelimbs and analogy-wing of bird & butterfly, serial homology in crustacia from suitable specimens/ pictures.
11. Study of aquatic adaptations: Shark & Turtle.
Study of arboreal adaptations: Chamaeleon, Loris.
12. Study of Volant adaptations : Exocoetus Fish, Bat, Pigeon, Draco.

13. Submission of report on-
 - a. Evolution of Horse
 - b. Evolution of Camel
 - c. Evolution of Elephant
 - d. Evolution of Man
14. Experiment on genetic drift-Sampling error and population size.
15. Repetition.

SCHEME OF PRACTICAL EXAMINATION

DURATION: 3 HOURS

MAX.MARKS:35

- | | |
|--|----------|
| 1. Genetics problem any 2 | 10marks |
| 2. Identify with reasons A (Wild male & Female <i>Drosophila melanogaster</i>)
B (Drosophila mutant) | 04 marks |
| 3. Construct, Identify and comment on given Karyotypes | 05 marks |
| 4. Mounting of wing/ sex comb of Drosophila. | 03marks |
| 5. Identify and comment on given specimen | 03 marks |
| 6. Submission of report. | 05 marks |
| 7. Class record. | 05 marks |

SCHEME OF VALUATION

1. Genetic Problems
- 2 .Identification-01, Reasons- 01
3. Identification -01, Construct -02, Comment-02
4. Procedure-01, Mounting-02
5. Identification -01, Comment-02

DME30005/ DME30008

**V SEMESTER
DISCIPLINE SPECIFIC ELECTIVE COURSE
APPLIED ZOOLOGY**

Theory

Credits -4(60 hrs)

Course outcome

After completion of the course the student is able to:

- CO1.** Understand the detail of communicable diseases
- CO2.** Understand the classification and characteristics of medical zoology
- CO3.** Learn the characteristics of applied zoology
- CO4.** Understand in detail with examples applied zoology
- CO5.** Know about the importance of insects in forensic science and medicine.

Unit I

15 hrs

Introduction to Host-parasite Relationship: Host, Definitive host, Intermediate host, Parasitism, Symbiosis, Commensalism, Reservoir, Zoonosis

Epidemiology of Diseases: Transmission, Prevention and control of diseases: Tuberculosis, typhoid

Rickettsiae and Spirochaetes: Brief account of *Rickettsia prowazekii*, *Borrelia recurrentis* and *Treponema pallidum*

Insect Vector Biology: Introduction to vector biology, economic importance and control of fleas, lice, bugs, mosquitoes, flies and parasitoids. Vector-parasite interaction; host-pathogen interaction

Unit II

15 hrs

Parasitic Protozoa: Structure, Life history, pathogenicity and preventive measures of *Entamoeba histolytica*, *Plasmodium vivax*, *Trypanosoma gambiense* and *Leishmania donovani*

Parasitic Helminthes: Structure, Life history and pathogenicity of *Ancylostoma duodenale*, *Tape worm* and *Liver fluke*

Medical Zoology: Infectious/ communicable diseases: small pox, hepatitis, AIDS, influenza, SARS, Ebola, tuberculosis, plague, cholera, amoebiasis, malaria, dengue, chikungunya,

trypanosomiasis, and elephantiasis. (Pathogen, Vector, transmission, symptoms and prevention).

Unit III

15 hrs

Insects of Economic Importance: Biology, Control and damage caused by *Helicoverpa armigera* (cottonbal worm), *Pyrilla perpusilla* (sugar cane leaf hopper), *Papilio demoleus* (lime butterfly) *Callosobruchus chinensis*(beetle), and *Tribolium castaneum*(red flour beetle) Lac insect.

Sericulture: Morphology and life cycle of *Bombyx mori*, Types of silks and distribution.

Apiculture: Types of honey bees, products, byproducts and their usage. Pollination and insects with examples.

Unit IV

15 hrs

Animal Husbandry: Preservation and artificial insemination in cattle; Induction of early puberty and synchronization of estrus in cattle.

Poultry Farming: Principles of poultry breeding, Management of breeding stock and broilers, processing and preservation of eggs.

Fish Technology: Genetic improvements in aquaculture industry; Induced breeding and transportation of fish seed.

Reference:

1. Arora, D. R and Arora, B. (2001). Medical Parasitology. II Edition. CBS Publications
2. Atwal, A.S. (1986). Agricultural Pests of India and South East Asia, Kalyani CBCS Undergraduate Program in Zoology
4. Dennis, H. (2009). Agricultural Entomology. Timber Press (OR).
5. Dunham R.A. (2004). Aquaculture and Fisheries Biotechnology Genetic Approaches. CABI publications, U.K.
6. Hafez, E. S. E. (1962). Reproduction in Farm Animals. Lea & Fabiger Publisher
7. Kumar and Corton. Pathological Basis of Diseases.
8. Park, K. (2007). Preventive and Social Medicine. XVI Edition. B.B Publishers.
9. Pedigo, L.P. (2002). Entomology and Pest Management, Prentice Hall. Publishers.

DME30105/ DME30108

**PRACTICAL –V
APPLIED ZOOLOGY**

PRACTICAL

(CREDITS 2)

1. Study of *Plasmodium vivax*, *Entamoeba histolytica*, *Trypanosoma gambiense*, and *Wuchereria bancrofti* and their life stages through permanent slides/photomicrographs or specimens.
2. Study of arthropod vectors associated with human diseases: *Pediculus*, *Culex*, *Anopheles*, *Aedes* and *Xenopsylla*.
3. Study of insect damage to different plant parts/stored grains through damaged products/photographs.
4. Identifying feature and economic importance of *Helicoverpa (Heliothis) armigera*, *Papilio demoleus*
5. Demonstration of Plastination techniques by using some dead insects.
6. Maintenance of freshwater aquarium.
7. Collection and mounting of Ants.
8. Animal associations: - Mutualism – Termites and *Trichonympha*.
9. Commensalism – Echenies and shark.
Protocooperation – Hermit crab and Sea anemone.
10. Predation – Snake and Frog. Parasitism – Head louse, Bed bug, Mosquito, Ticks, Mites.
11. Identification of mulberry and non mulberry silkworms. Identification of different larvae of silk worm- Using specimens / pictures
12. Identification of food fishes of Karnataka (*Tilapia*, *Notopterus*, *Catla catla*, *Clarius*).
13. Field visits to a Vermiculture / Sericulture / fisheries / apiculture / poultry / dairy farm-
submission of any 1 Report.
14. Repetition.

SCHEME OF PRACTICAL EXAMINATION

Duration 3 Hours

Max Marks: 35

- | | |
|--|----------|
| 1. Identify and comment on A to C (From 1,2,3 & 4) | 09 Marks |
| 2. Identify and comment upon animal association D &E | 06 Marks |
| 3. Identify mulberry or non mulberry silkworms | 03Marks |
| 4. Identify food fishes of Karnataka | 04 Marks |
| 5. Identify different larvae of silk worm- | 03 Marks |
| 6. Report submission | 05 Marks |
| 7. Class record. | 05 Marks |

SCHEME OF VALUATION

1. Identification & Classification-01,Diagram – 01,Comment & role–01
2. Identification – 01,Diagram – 01, Comment-01
3. Identification –01, Diagram – 01, Comment- 01
4. Identification – 01, Diagram – 01, Comment- 01
5. Identification – 01, Diagram – 01, Comment- 02

DME30205/ DME30208

**V SEMESTER ZOOLOGY
DISCIPLINE SPECIFIC ELECTIVE COURSE
INSECT, VECTORS AND DISEASES**

Theory

Credits -4(60 hrs)

Course outcome

After completion of the course the student is able to:

- CO1.** Learn in detail of insect, vector diseases
- CO2.** Identify in detail with examples insect, vector diseases
- CO3.** Deliberate the detail of insect ,vector diseases
- CO4.** Learn in depth Insect, vectors and diseases

Unit I

15 hrs

Introduction to Insects

General Features of Insects, Morphological features, Head – Eyes, Types of antennae, Mouth parts w.r.t. feeding habits

Concept of Vectors : Brief introduction of Carrier and Vectors (mechanical and biological vector), Reservoirs, Host-vector relationship, Vectorial capacity, Adaptations as vectors, Host Specificity

Insects as Vectors: Classification of insects up to orders, detailed features of orders with insects as vectors – Diptera, Siphonaptera, Siphunculata, Hemiptera

Unit II

15 hrs

Dipteran as Disease Vectors

Dipterans as important insect vectors – Mosquitoes, Sand fly, Houseflies;

Study of mosquito-borne diseases – Malaria, Dengue, Chikungunya, Viral encephalitis, Filariasis; Control of mosquitoes

Study of sand fly-borne diseases – Visceral Leishmaniasis, Cutaneous

Leishmaniasis, Phlebotomus fever; Control of Sand fly

Study of house fly as important mechanical vector, Myiasis, Control of house fly

Unit III

15 hrs

Siphonaptera as Disease Vectors

Fleas as important insect vectors; Host-specificity, Study of Flea-borne diseases –Plague, Typhus fever; Control of fleas

Siphunculata as Disease Vectors

Human louse (Head, Body and Pubic louse) as important insect vectors; Study of louse-borne diseases –Typhus fever, Relapsing fever, Trench fever, Vagabond's disease, Phthiriasis; Control of human louse

Unit VI

15 hrs

Hemiptera as Disease Vectors

Bugs as insect vectors; Blood-sucking bugs; Chagas disease, Bed bugs as mechanical vectors, Control and prevention measures

Reference:

1. Imms, A.D. (1977). *A General Text Book of Entomology*. Chapman & Hall, UK
2. Chapman, R.F. (1998). *The Insects: Structure and Function*. IV Edition, Cambridge University Press, UK
3. Pedigo L.P. (2002). *Entomology and Pest Management*. Prentice Hall Publication
4. Mathews, G. (2011). *Integrated Vector Management: Controlling Vectors of Malaria and Other Insect Vector Borne Diseases*. Wiley-Blackwell

DME30305/ DME30308

V SEMESTER ZOOLOGY

PRACTICAL –V

INSECT VECTORS AND DISEASES

PRACTICAL

(CREDITS 2)

1. Study of different kinds of mouth parts of insects
2. Study of following insect vectors through permanent slides/ photographs:*Pediculus humanus capitis*
3. Study of following insect vectors through permanent slides/ photographs:
4. *Aedes, Culex, Anopheles*
5. Study of following insect vectors through permanent slides/ photographs:*Pediculus humanus*
6. Study of following insect vectors through permanent slides/ photographs:*corporis, Phthirus pubis, Xenopsylla cheopis*
7. Study of following insect vectors through permanent slides/ photographs: *Cimex lectularius,*
8. Study of following insect vectors through permanent slides/ photographs:*Phlebotomus argentipes, Musca domestica,*
9. Study of different diseases transmitted by above insect vectors
10. Study of different diseases transmitted by above insect vectors
11. Repetation.
- 12. Submission of a project report on any one of the insect vectors and disease transmitted**

DMF30005/ DMF30008

**VI SEMESTER ZOOLOGY
DISCIPLINE SPECIFIC ELECTIVE COURSE
AQUATIC BIOLOGY**

Theory

Credits -4(60 hrs)

Course outcome

After completion of the course the student is able to:

- CO1.** Learn in detail with examples aquatic biology
- CO2.** Write down in detail with examples aquatic biology
- CO3.** Identify the classification and characteristics of aquatic biology
- CO4.** Identify in depth aquatic biology

UNIT I

15 hrs

Aquatic Biomes

Ecosystems: Concept, types and structure of ecosystem

Hydrosphere: (Water) Physical and chemical properties.

Brief introduction of the aquatic biomes: Freshwater ecosystem (lakes, wetlands, Streams and rivers), estuaries, intertidal zones, oceanic pelagic zone, marine Benthic zone and coral reefs

UNIT II

15 hrs

Fresh water biology

Physico-chemical Characteristics: Light, Temperature, Thermal stratification, Dissolved Solids, Carbonate, Bicarbonates, Phosphates and Nitrates, Turbidity; dissolved gases (Oxygen, Carbon dioxide).

Pond: The pond as an ecosystem – Origin and classification, flora and fauna of pond ecosystem. Freshwater adaptations.

Lakes: Origin and classification, Lake as an Ecosystem

UNIT III

15 hrs

Marine Biology

Salinity and density of Sea water, Continental shelf, Adaptations of deep sea organisms, Coral reefs, Sea weeds.

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

Pearl culture: Types of pearls, composition, Biology of pearl oyster, pearl formation, culture of pearls .

UNIT IV

15hrs

Management of Aquatic Resources

Water pollution: Definition, sources Types and classification of pollutants. Effects of Water Pollution, Oxygen sag curves and Eutrophication of drinking water: Collection, purification and distribution. Waste water treatment: Primary, secondary and tertiary treatment

Causes of pollution: Agricultural, Industrial, Sewage, Thermal and Oil spills, Management and conservation (legislations), Sewage treatment, Water quality assessment- BOD and COD.

Reference:

1. B. Das, (2012). Parasitology, Books & Allied Pvt. Ltd-II
- 2.S. Bhattacharya (2011). Environmental toxicology, Books & Allied Pvt. Ltd
- 3.S. Bhattacharya (2011). Environmental toxicology, Books & Allied Pvt. Ltd
4. T. K. Saha. (2012). Ecology and Environmental Biology. Books & Allied Pvt.

DMF30105/ DMF30108

**PRACTICAL VI
AQUATIC BIOLOGY**

PRACTICAL

(Credits 2)

- 1&2.** Study the important macrophytes, phytoplanktons and zooplanktons Present in a lake ecosystem/ photographs.
- 3** Estimation of dissolved oxygen in different water samples.
- 4** Estimation of dissolved carbon dioxide in different water samples.
- 5** Estimation of chlorides in different water samples.
- 6** Estimation of hardness in different water samples.
- 7** Measurement of pH, using pH-meter, pH paper.
- 8** Study of pond ecosystem.
- 9** Study of aquarium ecosystem.
- 10** Morphometric measurement of locally available freshwater fish and marine water fish.
- 11** Identification of fish(any six).
- 12&13.** Fish by products.
- 14** . Project Report on a visit to a Sewage treatment plant/Marine bioreserve/ Fisheries Institutes.
- 15.** Repetition.

SCHEME OF PRACTICAL EXAMINATION

Duration 3 Hours

Max Marks: 35 Marks

- | | |
|---|----------|
| 1. Estimation of any 2 parameters – by lots. | 10Marks |
| 2. Identify the given specimen (A&B.) | 06 Marks |
| 3. Identify and comment on phyto or zooplanktons. | 04Marks |
| 7. Fish by products. | 05 Marks |
| 8. Report. | 05 Marks |
| 9. Record. | 05 Marks |

SCHEME OF VALUATION

- 1.Procedure - 04, Experiment- 04, Result - 02
- 2.Identification -01, Diagram –01,Comment- 01
3. Identification -01,Diagram –01,Comment- 02
4. Identification -01,Comment- 04

DMF30205/ DMF30208

**VI SEMESTER ZOOLOGY
DISCIPLINE SPECIFIC ELECTIVE COURSE
IMMUNOLOGY**

Theory

Credits -4(60hrs)

Course outcome

After completion of the course the student is able to:

- CO1.** Deliberate in details with application, if applicable immunology.
- CO2.** Learn in details with examples immunology.
- CO3.** Identify in details with examples immunology.
- CO4.** Identify the characteristics of immunology.
- CO5.** Deliberate in depth immunology.

Unit I: Overview of the Immune System

15 Hrs

Introduction to basic concepts in immunology, components of immune system, principles of innate and adaptive immune system.

Cells and Organs of the Immune System

Haematopoiesis, Cells of immune system and organs (primary and secondary lymphoid organs) of the immune system.

Antigens: Basic properties of antigens, B and T cell epitopes, haptens and adjuvants.

Unit II: Antibodies

15 Hrs

Structure, classes and function of antibodies, monoclonal antibodies, antigen antibody interactions as tools for research and diagnosis

Vaccines: General introduction to vaccines, Various types of vaccines

CBCS Undergraduate Program in Zoology

Unit III: Working of the immune system

15 Hrs

Structure and functions of MHC, exogenous and endogenous pathways of antigen presentation and processing, Basic properties and functions of cytokines, Complement system: Components and pathways.

Unit IV: Immune system in health and disease

15 Hrs

Gell and Coombs' classification and brief description of various types of hypersensitivities, Introduction to concepts of autoimmunity and immunodeficiency

Reference:

1. Kindt, T. J., Goldsby, R.A., Osborne, B. A. and Kuby, J (2006). *Immunology*, VI Edition. W.H. Freeman and Company.
2. David, M., Jonathan, B., David, R. B. and Ivan R. (2006). *Immunology*, VII Edition, Mosby, Elsevier Publication.
3. Abbas, K. Abul and Lechtman H. Andrew (2003.) *Cellular and Molecular Immunology*. V Edition. Saunders Publication.

PRACTICAL VI

IMMUNOLOGY

PRACTICAL

(CREDITS 2)

1. Demonstration of lymphoid organs
2. Histological study of spleen, thymus and lymph nodes through slides/ photographs
3. Preparation of stained blood film to study various types of blood cells.
4. Ouchterlony's double immuno-diffusion method.
5. ABO blood group determination.
6. ABO blood group typing.

7. Cell counting and viability test from splenocytes of farm bred animals/cell lines.
8. Demonstration of ELISA.
9. Demonstration Immunoelectrophoresis.
10. Demonstration of Blotting technique.
11. Demonstration of PCR.
12. Repitation

DMF30405/DMF30408

SKILL ENHANCEMENT COURSE MEDICAL DIAGNOSTICS

Theory

Credits -2(30 hrs)

Course outcome

After completion of the course the student is able to:

CO1. Write down the characteristics of medical diagnostics

CO2. Write down in depth medical diagnostics

CO3. Specify the details of non infectious diseases

Unit I

10 hrs

Introduction to Medical Diagnostics and its Importance

Diagnostics Methods Used for Analysis of Blood

Blood composition, Preparation of blood smear and Differential Leucocyte Count (D.L.C) using Leishman's stain, Platelet count using haemocytometer, Erythrocyte Sedimentary Rate (E.S.R), Packed Cell Volume (P.C.V.).

Unit II

10 hrs

Non-infectious Diseases

Causes, types, symptoms, complications, diagnosis and prevention of Diabetes (Type I and Type II), Hypertension (Primary and secondary), Testing of blood glucose using Glucometer/Kit.

Infectious Diseases

Causes, types, symptoms, diagnosis and prevention of Tuberculosis and Hepatitis.

Unit III:

10 hrs

Diagnostic Methods Used for Urine Analysis

Urine Analysis: Physical characteristics; Abnormal constituents.

Tumours

Types (Benign/Malignant), Detection and metastasis; Medical imaging: X-Ray of Bone fracture, PET, MRI and CT Scan (using photographs).

Reference:

1. Asis. Das. (2012). Medical Physiology, Books & Allied Pvt. Ltd
2. Cheesbrough M., A Laboratory Manual for Rural Tropical Hospitals, A Basis for Training Courses.
3. Godkar P.B. and Godkar D.P. Textbook of Medical Laboratory Technology, II Edition, Bhalani Publishing House.
4. Guyton A.C. and Hall J.E. Textbook of Medical Physiology, Saunders
5. Park, K. (2007), and Social Medicine, B.B. Publishers.
6. Prakash, G. (2012), Lab Manual on Blood Analysis and Medical Diagnostics, S.Chand and Co.

DMF30605/DMF30608

SKILL ENHANCEMENT COURSE AQUARIUM FISH KEEPING

Theory

Credits -2(30 hrs)

Unit1: Introduction to Aquarium Fish Keeping

10 hrs

The potential scope of Aquarium Fish Industry as a Cottage Industry, Exotic and Endemic species of Aquarium Fishes

Unit 2: Biology of Aquarium Fishes

10 hrs

Common characters and sexual dimorphism of Fresh water and Marine Aquarium fishes such as Guppy, Molly, Sword tail, Gold fish, Angel fish, Blue morph, Anemone fish and Butterfly fish

Unit 3: Food and feeding of Aquarium fishes

10 hrs

Use of live fish feed organisms. Preparation and composition of formulated fish feeds

Fish Transportation

Live fish transport - Fish handling, packing and forwarding techniques.

Maintenance of Aquarium

General Aquarium maintenance – budget for setting up an Aquarium Fish Farm as a Cottage Industry

Reference:

1. E.P. Odum (Revised edition) Fundamental of Ecology, W. B. Saunders Co.,
2. P.D. Sharma (1991) Ecology and Environment – Rastogi Puplium
3. H.R. Singh (1989) An Introduction Animal Ecology and Envirmental Biology, Shobanlal Magin chand & Co.,

4. S.Anderson (1991) Managing on Wildlife, Resources, Prentive Hall, Englewood Chit, New Jermamy.
5. Nair, S.M. (1992) Endangered animals of India and their conservation M.B.J Delhi.
6. H.D. Kumar – Modern concepts of Ecology, Vikas Publishing House.
7. Elton, Plant ecology.
8. WWF manuals.
9. Prater S H, The book of Indian Animals. 1998.

**Pattern of Question Paper
Semester I to VI**

Time : 3 Hrs

Max Marks: 70

I. Answer all the questions

5 X 1 = 5

- 1 -----
- 2-----
- 3-----
- 4-----
- 5-----

II. Answer any five questions

5 X 3 = 15

- 6-----
- 7-----
- 8-----
- 9-----
- 10-----
- 11-----

III. Answer any four questions

4 X 5 = 20

- 12 -----
- 13-----
- 14-----
- 15-----
- 16-----

IV. Answer any three questions

3 X 10 = 30

- 17-----
18-----
19-----
20-----

(Note- 10 Marks may be divided in to 6+4 or 5+5)

B.Sc, Examinations (SEC)

Zoology Question Paper

Duration: 02 Hours

Maximum Marks: 35

I. Answer all questions

1X 3 = 03

- 1.
- 2.
- 3.

II. Write short note on any Four of the following

3X 4 = 12

- 4.
- 5.
- 6.
- 7.
- 8.

III. Answer any Two of the following

5X 2 = 10

- 9.
- 10.
- 11.

IV. Write an essay on any one of the following

10X1 = 10

- 12.
- 13.

