

JSS MAHAVIDYAPEETHA

JSS COLLEGE OF ARTS, COMMERCE AND SCIENCE

(Autonomous, 'A' Grade and 'College with Potential for Excellence')

Ooty road, Mysuru-570 025, Karnataka

Ph: 0821-2548236 & 2548380. FAX: 0821-2548238

E-mail: jssautonomous@gmail.com; Website: jsscacs.edu.in



DEPARTMENT OF BOTANY (UG)

FRAMING OF DURATION FOR DEGREE PROGRAMME AND REVISION OF SYLLABUS FOR UNDERGRADUATE COURSES & CONTINUOUS ASSESSMENT AND GRADING PATTERN (CGPA)

(Ref: Govt order No. ED 166 UNE 2023, Bengaluru, dated 05-05-2024)

B.Sc. BOTANY

Syllabus and Scheme of Examination

2024 – 2025

I & II Semesters Botany Syllabus for B.Sc.

ALLOCATION OF CREDITS

Sem	Course code	Practical/ Theory	TITLE OF THE COURSE DISCIPLINE CORE COURSE (COMPULSORY)	Hrs/ Week L:T:P	Credits	Max marks
I	GB0101	Theory	Diversity of Microbes, Algae, Fungi & Phytopathology	3 Hrs.	3	80+20
	GB0102	Practical		4 Hrs.	2	40+10
II	GB0201	Theory	Bryophytes, Pteridophytes, Gymnosperms, Palaeobotany & Morphology of Angiosperms	3 Hrs.	3	80+20
	GB0202	Practical		4 Hrs.	2	40+10

Botany – First semester

Diversity of Microbes, Algae, Fungi and Phytopathology

Code: 48 Hrs (3 Hrs of instruction/ week: 3 Credits)

Course outcome

1. Students will be in position to understand the general characters, classification and economic importance of Mollicutes, Viruses, Bacteria, Cyanobacteria, Algae, Fungi and Lichens
2. They know the structure and reproduction of various forms included in the syllabus
3. They will acquire the basic knowledge of various plant diseases mentioned in the syllabus and their management

Unit I: Microbial diversity

- 16 Hrs.

A brief account of microbes in soil, air, food and water.

Brief account of five kingdom (Whittaker) and three domain (Carl Woese) system of classification.

Virology: History, general characters, classification, ultrastructure and multiplication of TMV and Bacteriophage (T4); Transmission of Viruses.

Viroids: General characters and fine structure of PSTVd.

Prions: General characters and diseases [Creutzfeldt-Jakob disease (CJD), Bovine spongiform encephalopathy (BSE)].

Mycoplasma: History and general characters.

Phytoplasma: Introduction, classification and diseases (Sandal spike disease).

Bacteriology: Introduction, classification (based on nutrition); Ultrastructure and reproduction (Budding, fission and endospore formation); Genetic recombination (Conjugation, transduction and transformation) and economic importance.

Unit II: Algae and Lichens

- 16 Hrs.

Cyanobacteria: General characters and economic importance of Cyanobacteria.

Type study: *Nostoc*

General characters, classification and economic importance of algae.

Type study: *Chlorella*, *Oedogonium*, *Caulerpa*, *Diatom* (Pennales), *Sargassum* and *Polysiphonia*.

Lichens: General characters, classification (based on morphology and fungal component), structure, reproduction and Economic importance.

Unit III: Fungi and Phytopathology

- 16Hrs

Fungi: General characters, classification (Ainsworth's) and economic importance.

Type study: *Rhizopus*, *Albugo*, *Penicillium*, *Puccinia* and *Fusarium*.

Phytopathology: Introduction, classification (based on causal organism) and disease triangle.

Plant diseases: Host, causal organism, symptoms and management of Little leaf of brinjal, Tobacco mosaic disease, Citrus canker, Tikka disease of groundnut, Late blight of potato, Coffee rust and Algal rust; Biopesticides.

Suggested readings

1. Alexopolous, J. and Charles, W. M. 1988. Introduction to Mycology. Wiley Eastern, New Delhi.
2. Chopra, G. L. 1973. Text Book of Algae. S. Nagin and Co. Jalandhar.
3. Dube, H. C. 1983. An Introduction of Fungi. Vikas Publication House, New Delhi.
4. Dutta, A. C. 1998. Botany for Degree Students. Oxford University Press.
5. Ganguli, H. C., Das, K. S. and Datta C. 1935. College Botany. (Vol. II). New Central Book Agency (P) Ltd.
6. Mehrotra, R. S. and Aneja, K. R. 1990. An Introduction of Mycology. Wiley Eastern Ltd.
7. Pandey, B. P. 2001. College Botany Vol. I: Algae, Fungi, Lichens, Bacteria, Viruses, Plant Pathology, Industrial Microbiology and Bryophyta. S. Chand and Company Ltd, New Delhi.
8. Pandey, B. P. 2007. Botany for Degree students: Diversity of Microbes, Cryptograms, Cell Biology and Genetics. S. Chand and Company Ltd, New Delhi.
9. Pelczar, M. J. 2001. Microbiology. 5th edition, Tata Mc Graw-Hill Co, New Delhi.
10. Presscott, L., Harley, J. and Klein, D. 2005. Microbiology. 6th edition, Tata McGraw- Hill Co. New Delhi.
11. Sambamurthy, A. V. S. S. 2006. A text book of Plant Pathology. I. K. International Pvt. Ltd., New Delhi.
12. Sambamurthy, A.V.S. S. 2006. A Textbook of Algae. I.K. International Pvt. Ltd., New Delhi.
13. Sharma, O. P. 2006. A Text Book of Thallophyta. McGraw Hill Publishing. Co. New Delhi.
14. Singh, R. S. 1984. Introduction to Principles of Plant Pathology. Oxford and IBH Publication Co. Pvt. Ltd, New Delhi.
15. Singh, V., Pande, P. C. and Jain, D. K. 2006. A Textbook of Botany. Rastogi Publications, Meerut.
16. Smith G. M., 1955. Cryptogamic Botany- Algae, Fungi and Lichens. Vol. I. McGraw-Hill Book Co., New York.
17. Srivastava, H. N. 1998. Algae. Pradeep Publications, Jalandar.
18. Srivastava, H. N. 1993. Fungi. Pradeep Publications, Allahabad.
19. Sundarajan, S. 1998. College Microbiology. Vol 1. Vardhana Publications, Bangalore.
20. Sundarajan, S. 1993. College Botany. Vol I and II. Himalaya Publishing Company, Bangalore.
21. Vashishta, B. R., Sinha A. K. and Singh, V. P. 2008. Botany for Degree Students: Algae. S. Chand and Company Ltd, New Delhi.

**Scheme of question paper
(Theory)**

**B.Sc., Degree I Semester Examination
Diversity of Microbes, Algae, Fungi and Phytopathology**

Code:

Time: 3 Hrs

Max Marks: 80

I. Define/ Explain any EIGHT the following **8 X 1 = 08**

- 5 from Unit I
- 3 from Unit II
- 2 from Unit III

II. Write short notes on any FIVE of the following **5 X 3 = 15**

- 2 from Unit I
- 3 from Unit II
- 2 from Unit III

III. Answer any FIVE of the following **5 X 5 = 25**

- 2 from Unit I
- 2 from Unit II
- 3 from Unit III

IV. Describe any FOUR of the following in detail **4 X 8 = 32**

- 2 from Unit I
- 2 from Unit II
- 2 from Unit III

Unit	1 Mark	3 Marks	5 Marks	8 Marks	Total
I	1 X 5 = 5	3 X 2 = 6	5 X 2 = 10	8 X 2 = 16	37
II	1 X 3 = 3	3 X 3 = 9	5 X 2 = 10	8 X 2 = 16	38
III	1 X 2 = 2	3 X 2 = 6	5 X 3 = 15	8 X 2 = 16	39

Assessment method

Assessment		Marks
C ₁	Test	10
C ₂	Test	10
C ₃	Semester end exam	80

**Theory Model Question Paper
I Semester - Paper I (DSCB 1.1)**

Diversity of Microbes, Algae, Fungi and Phytopathology

Code:

Time: 3 Hrs

Max Marks: 80

Instruction: Draw neat labeled diagrams wherever necessary

I. Define/ Explain any EIGHT of the following

8 X 1 = 8

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.
- 7.
- 8.
- 9.
- 10.

II. Write short notes on any FIVE of the following

5 X 3 = 15

- 11.
- 12.
- 13.
- 14.
- 15.
- 16.
- 17.

III. Answer any FIVE of the following

5 X 5 = 25

- 18.
- 19.
- 20.
- 21.
- 22.
- 23.
- 24.

IV. Describe any FOUR of the following in detail

4 X 8 = 32

- 25.
- 26.
- 27.
- 28.
- 29.
- 30.

Practical Syllabus
I Semester - Paper I (DSCB 1.1)

Diversity of Microbes, Algae, Fungi and Phytopathology

Code: - 64 Hrs (1 Practical of 4 Hrs / week: 2 Credits)

1. Equipments used in Microbiology lab: Inoculation loop & needle, Hot air oven, Incubator, Pressure cooker.
2. Equipments used in Microbiology lab: Laminar air flow chamber, Hemocytometer, Colony counter
3. Photographs /Charts of Microbiologists and their contribution
4. Staining of bacteria: Simple (positive and negative) and Gram staining.
5. Structure and reproduction of *Nostoc* and *Chlorella*
6. Structure and reproduction of *Oedogonium*
7. Structure and reproduction of *Caulerpa*
8. Structure and reproduction of *Sargassum*
9. Structure and reproduction of *Polysiphonia* and Pennate Diatom
10. Structure and reproduction of *Rhizopus*, *Albugo*
11. Structure and reproduction of *Penicillium* and *Puccinia*,
12. Structure and reproduction of *Fusarium* and Lichens
13. Host, causal organism, symptoms and management of Sandal spike, TMV, Citrus canker, Algal rust (Avocado)
14. Host, causal organism, symptoms and management of Tikka disease of Groundnut, Late blight of Potato and Coffee rust
15. Biopesticides (Neem, *Trichoderma*, *Bacillus subtilis*, NPV)

Assessment method

Assessment		Marks
C ₁	Test	05
C ₂	Test	05
C ₃	Semester end exam	40

**Practical Question Paper Scheme
I Semester - Practical I (DSCB 1.1)**

Diversity of Microbes, Algae, Fungi, and Phytopathology

Code:

Time: 3 Hrs

Max. Marks: 40

- I. Perform the experiment A and leave for evaluation - 07
- II. Prepare a temporary stained slide of the materials B & C sketch, label and identify with reasons. Leave the preparation for evaluation - 10
- III. Write critical comment on the materials D, E & F - 12
- IV. Identify the slides G, H & I with reason -06
- V. Record - 05

**Practical Question Paper Scheme (SEB)
I Semester - Practical I (DSCB 1.1)**

Diversity of Microbes, Algae, Fungi, and Phytopathology

Code:

Time: 3 Hrs

Max. Marks: 40

- I. Perform the experiment A and leave for evaluation - 07**
[Simple staining (positive and negative) / differential staining]
(Principle- 1; Procedure- 2; Performance with result- 4)
- II. Prepare a temporary stained slide of the materials B & C sketch, label, and identify with reasons. Leave the preparation for evaluation - 10**
(1 from Cyanobacteria/ Algae, 1 from Fungi)
(Identification- 1; Preparation- 2; Reasons with labeled diagram- 2)
- III. Write critical comment on the materials D, E & F - 12**
(1 each from Fungi, Virus / Bacteria/ Mycoplasma disease and Algae/Lichen)
(Identification- 1, Causal organism- 1, Symptoms and Management- 2)
- IV. Identify the slides G, H & I with reason -06**
(1 each from Algae/ Cyanobacteria, Fungi/ Lichen and Bryophyte)
(Identification- 1; Reasons with labeled diagram- 3)
- V. Record - 05**

Note: Each student shall bring the practical record to the practical examination for evaluation without which he / she shall not be allowed to appear for the practical examination.

Theory Syllabus
II Semester - Paper II (DSCB 1.2)

**Bryophytes, Pteridophytes, Gymnosperms, Palaeobotany and
Morphology of Angiosperms**

Code: - 48 Hrs (3 Hrs of instruction/ week: 3 Credits)

Course outcome

1. Students will be able to understand the salient features, classification and economic importance of Bryophytes, Pteridophytes Gymnosperms and Angiosperms
2. They will know the Morphology, Anatomy and Reproduction of Bryophytes, Pteridophytes, Gymnosperms and fossil plants included in the syllabus
3. They will acquire the knowledge of geological time scale, fossils and fossilization
4. Students are able to understand various types of tissues and their functions
5. They will understand the Morphological structures of root, stem, leaf, flower, fruit and seed of Angiosperms.

Unit I **- 14 Hrs**

Bryophytes: General characters, classification and economic importance of Bryophytes
Type Study - *Riccia*, *Marchantia*, *Anthoceros* and *Polytrichum* (Developmental details not required).

Paleobotany: Geological time scale, fossils and fossilization; Types of fossils.
Type study: *Rhynia* and *Cycadeoidea*

Unit II **- 14 Hrs**

Pteridophytes: General characters classification and economic importance.
Stelar Evolution.

Type study: *Psilotum*, *Selaginella*, *Equisetum*, *Pteris* and *Marsilea* (Developmental details not required); Heterospory and seed habit (Brief account).

Unit III **10 Hrs**

Gymnosperms: General characters, classification and economic importance of Gymnosperms.
Type study: *Cycas*, *Pinus* and *Gnetum*.

Morphology of Angiosperms: **10 Hrs**

Parts of a flowering plant; monocot and dicot plant root systems; Root modifications- fusiform, napiform, conical fasciculated, tuberous, prop, stilt, climbing, respiratory, parasitic and epiphytic; shoot system; stem modifications-rhizome, tuber, corm, bulb, runner, stolon, offset, sucker, phylloclade (*Opuntia*, *Euphorbia*), cladode (*Ruscus*, *Asparagus*); Leaf- parts, phyllotaxy, simple and compound leaves, pinnate and palmate); Leaf modifications -tendrils, spine, phyllode, pitcher. Inflorescence- racemose, cymose and special types (cyathium, thyrus, verticillaster, hypanthodium). Flower: A brief account of floral morphology and floral diagram. Fruits- classification- simple (dry dehiscent, dry indehiscent, Schizocarpic and fleshy types); aggregate and composite; Structure of dicot seed and monocot seed.

Suggested readings

1. Andrews, H. N. 1961. *Studies in Paleobotany*. John Wiley, New York.
2. Bhatnagar, S. P. and Mitra, A. 1966 *Gymnosperms*. New age International (P) Ltd. Publishers.
3. Bierhorst, D. W. 1971. *Morphology of Vascular Plants*. The MacMillan Co., N.Y. and Collier-MacMillan Ltd., London.
4. Chamberlain, C. J. 1935. *Gymnosperms- Structure and Evolution*. Chicago Press.
5. Chestor, A. A. 1947. *Introduction to Palaeobotany*. McGraw Hill, London.
6. Coulter, J. M. and Chamberlain, C. J. 1964. *Morphology of Gymnosperms*. Central Book Depot, Allahabad.
7. Dutta, A. C. 1998. *Botany for Degree Students*. Oxford University Press.
8. Dutta, S. C. 1966. *An Introduction to Gymnosperms*. Asia Publications House, Mumbai.
9. Eames, A. J. 1936. *Morphology of Vascular Plants (Lower Groups)*. McGraw Hill, N.Y.
10. Frank, C. 1990. *The inter-relationships of the Bryophytes*. New Phytologist. Today and Tomorrow's Printers and Publishers.
11. Gangulee, H. C., Kar and Kumar, A. 1982. *College Botany- Vol. II*. Central Book Agency, Calcutta.
12. Pandey, S. N., Mishra, S. P. and Trivedi, P. S. 2007. *A Textbook of Botany- Vol. II*. Rastogi Publications, Meerut.
13. Rashid, A. 1999. *An Introduction to Pteridophyta*. MKM Publisher Pvt Ltd.
14. Shripad, N. A. 1995. *Paleobotany*. Oxford and I.B.H. New Delhi.
15. Singh, V., Pande, P. C. and Jain, D. K. 2005. *Diversity and Systematics of Seed plants*. Rastogi Publications, Meerut.
16. Singh, V., Pande, P. C. and Jain, D. K. 2006. *A Textbook of Botany*. Rastogi Publications, Meerut.
17. Singh G. 2012. *Plant systematics: Theory and Practice*. Oxford and IBH, Pvt. Ltd., New Delhi.
18. Singh V. & Jain - *Taxonomy of Angiosperms* - Rastogi Publications, Meerut
19. Sporne, K. R. 1971. *The Morphology of Gymnosperms: The Structure and Evolution of Primitive seed Plants*. Hutchinson University Library, London.
20. Sporne, K. R. 1974. *Morphology of Pteridophytes*. Hutchinson and Co., London.
21. Vashishta, P. C. 1982. *Peridophyta*. S. Chand and Co. Ltd., New Delhi.

**Theory Question Paper Scheme
II Semester - Paper II (DSCB 1.2)**

**Bryophytes, Pteridophytes, Gymnosperms, Palaeobotany and
Morphology of Angiosperms**

Code:

Time: 3 Hrs

Max Marks: 80

Instruction: Draw neat labeled diagrams wherever necessary

Code:

Time: 3 Hrs

Max Marks: 80

I. Define/ Explain any EIGHT of the following

8 X 1 = 08

2 from Unit I

3 from Unit II

2 from Unit III

3 from Anatomy

II. Write short notes on any FIVE of the following

5 X 3 = 15

2 from Unit I

2 from Unit II

2 from Unit III

1 from Anatomy

III. Answer any FIVE of the following

5 X 5 = 25

2 from Unit I

2 from Unit II

2 from Unit III

1 from Anatomy

IV. Describe any FOUR of the following in detail

4 X 8 = 32

2 from Unit I

2 from Unit II

2 from Unit III

Unit	1 Mark	3 Marks	5 Marks	8 Marks	Total
I	1 X 4 = 4	3 X 2 = 6	5 X 2 = 10	8 X 2 = 16	36
II	1 X 2 = 2	3 X 2 = 6	5 X 2 = 10	8 X 2 = 16	34
III	1 X 4 = 4	3 X 3 = 9	5 X 3 = 15	8 X 2 = 16	44

Assessment method

Assessment		Marks
C ₁	Test	10
C ₂	Test	10
C ₃	Semester end exam	80

Theory Model Question Paper
II Semester - Paper I (DSCB 1.2)

**Bryophytes, Pteridophytes, Gymnosperms, Palaeobotany and
Morphology of Angiosperms**

Code:

Time: 3 Hrs

Max Marks: 80

Instruction: Draw neat labeled diagrams wherever necessary

I. Define/ Explain any EIGHT of the following

8 X 1 = 8

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.
- 7.
- 8.
- 9.
- 10.

II. Write short notes on any FIVE of the following

5 X 3 = 15

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- 12.
- 13.
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III. Answer any FIVE of the following

5 X 5 = 25

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- 20.
- 21.
- 22.
- 23.
- 24.

IV. Describe any FOUR of the following in detail

4 X 8 = 32

- 25.
- 26.
- 27.
- 28.
- 29.
- 30.

Practical Syllabus
II Semester - Practical II (DSCB 1.2)

**Bryophytes, Pteridophytes, Gymnosperms, Paleobotany and
Morphology of Angiosperms**

Code: - 64 Hrs. (1 practical of 4 Hrs / week: 2 Credits)

1. Morphology, anatomy and reproduction of *Riccia* and *Marchantia*
2. Morphology, anatomy and reproduction of *Anthoceros* and *Polytrichum*
3. Morphology, anatomy and reproduction of *Psilotum* and *Rhynia*
4. Morphology, anatomy and reproduction of *Selaginella* and *Equisetum*
5. Morphology, anatomy and reproduction of *Pteris* and *Marsilea*
6. Morphology, anatomy and reproduction of *Cycas* and *Cycadioidea*
7. Morphology, anatomy and reproduction of *Pinus*
8. Morphology, anatomy and reproduction of *Gnetum*
9. Modifications of root.
10. Modifications of stem.
11. Modifications of leaf
12. Study of Inflorescences: Racemose, Cymose and Special types.
13. Study of Fruits-simple, aggregate and composite type
14. Visit to Geology Museum / Fernarium

Assesment method

Assesment		Marks
C ₁	Test	05
C ₂	Test	05
C ₃	Semester end exam	40

Practical Question Paper
II Semester - Practical II (DSCB 1.2)

**Bryophytes, Pteridophytes, Gymnosperms, Paleobotany and
Morphology of Angiosperms**

Code:

Time: 3 Hrs

Max. Marks: 40

- | | |
|--|------|
| I. Identify the specimens A, B and C with reasons | -09 |
| II. . Identify the specimen D & E | - 05 |
| III. Comment on the materials F, G and H | -09 |
| IV. Identify the slides / Chart I, J, K and L with reasons | - 12 |
| VI. Record | - 05 |

Practical Question Paper Scheme
II Semester - Practical II (DSCB 1.2)

**Bryophytes, Pteridophytes, Gymnosperms, Palaeobotany and
Morphology of Angiosperms**

Code:

Time: 3 Hrs

Max. Marks: 40

- | | |
|--|-------------|
| I. Identify the specimens A, B and C with reasons | - 09 |
| (1 each from Bryophytes, Pteridophytes and Gymnosperms)
(Identification -1; Reasons with labeled diagram- 2) | |
| II. . Identify the specimen D and E. | - 05 |
| (from Morphology of angiosperms)
(Identification- 1; Reasons-1 labeled diagram- 0.5) | |
| III. Comment on the materials F, G and H | - 09 |
| (1 each from Bryophytes, Pteridophytes and Gymnosperms/Paleobotany)
(Identification- 1; Reasons with labeled diagram- 2) | |
| IV. Identify the slides / Chart I, J, K and L with reasons | - 12 |
| (1 each from Bryophytes, Pteridophytes, Gymnosperms and Morphology of Angiosperms)
(Identification- 1; Reasons with labeled diagram- 2) | |
| VI. Record | - 05 |

Note: Each student shall bring the practical record to the practical examination without which he / she shall not be allowed to appear for the practical examination.