

SEP 2024 BOTANY CURRICULUM
I SEMESTER

PAPER – I: MICROBIAL DIVERSITY, PHYCOLOGY AND MYCOLOGY

Programme name	B. Sc. BOTANY	SEMESTER	I
Course Title	PAPER – I: MICROBIAL DIVERSITY, PHYCOLOGY AND MYCOLOGY		
Course Code	BOT-S-101	No. of Credits	03
Contact Hours	60 Hours	Duration of Exam	03 Hours
Formative Assessment Marks	20	Summative Assessment Marks	80
<p>Course objectives:</p> <ul style="list-style-type: none"> <input type="checkbox"/> To understand the microbial diversity through isolation techniques from various environments, mastering methods of sterilization and learning microbial culture and preservation techniques. <input type="checkbox"/> Students will explore the structure, classification and multiplication of viruses like TMV and Bacteriophage T4, along with the economic importance of viruses and vaccination strategies. <input type="checkbox"/> Students will explore the structure, reproduction of Fungi, economic importance and disease caused by Fungi. <input type="checkbox"/> The course also covers bacterial characteristics, reproduction, plasmid biology and bacterial diseases such as Citrus canker and Phytoplasma – related diseases. <input type="checkbox"/> Additionally, students will study Cyanobacteria, algae, fungi and their economic roles and the environmental applications of algae in industries and agriculture. 			
<p>Course outcomes:</p> <p>CO1. Remember the fascinating diversity, general features of Cyanobacteria, algae and fungi.</p> <p>CO2. Understand the systematic position and structure of Cyanobacteria, algae and fungi.</p> <p>CO3. Analyse the prevention, disease cycle and control measures of plant diseases and its effect on economy of crops.</p> <p>CO4. Knowledge on the physiology and life cycles of Cyanobacteria, algae, fungi and their impact on humans and environment.</p> <p>CO5. Apply laboratory skills such as instrumentation, microbial cultures, staining, identification, preservation of microbes for their applications in research and industry, and their economic importance. Gain entrepreneurial skill w.r.t Mushroom cultivation.</p>			

I SEMESTER

PAPER – I: MICROBIAL DIVERSITY, MYCOLOGY AND PHYCOLOGY

60 Hrs.

UNIT I	Microbiology - Introduction and Scope of Microbiology. Branches of microbiology Contributions of scientists to the field of Microbiology -Anton von Leeuwenhoek, Louis Pasteur, Robert Koch and Iwanowsky. Microbial culture techniques -Culture media, serial dilution and pour plate method. Microbial cultures and preservation- Preservation methods-overlaying cultures with mineral oils, lyophilization. Microbial culture collections and their importance. A brief account on ITCC, MTCC and ATCC. Viruses – General structure and classification of Viruses. Structure and multiplication of TMV, SARS-COV-2 and Bacteriophage (T2). Cultivation of viruses. A brief account on Vaccines. Tomato leaf curl disease. Brief account of Prions and Viroids.	15 Hrs.
UNIT II	Bacteriology - Introduction, classification of Bacteria based on shape and flagella. Ultra structure of bacterial cell with special reference to Gram positive and Gram-negative cell wall composition. Endospore – a brief account. Bacterial nutrition. Reproduction – Binary fission and genetic recombination (Transformation, Transduction and Conjugation). A brief account of plasmids – definition and properties. Structure and importance of Ti plasmid. Citrus canker disease. Economic importance – Role of bacteria in Agriculture, Medicine and Industry. General account of Phytoplasma and Sandal spike disease. Study of <i>Rhizobium</i> and its applications. A brief account of Actinomycetes.	15 Hrs.
UNIT III	Cyanobacteria and Phycology Cyanobacteria: Introduction, general characteristics, reproduction, and economic importance. Type study: <i>Anabaena</i> and <i>Scytonema</i> . Algae - General characters, occurrence, structure, reproduction and life cycle of the following: Structure of <i>Volvox</i> , <i>Cladophora</i> and <i>Chara</i> ; Structure, Reproduction & Life cycle of <i>Oedogonium</i> , <i>Sargassum</i> and <i>Polysiphonia</i> . Economic importance of Algae in Agriculture, Medicine and Industry. Production of SCP, Biofertilisers and its significance. Brief account on Diatomaceous earth.	15 Hrs.

UNIT IV	Mycology - General characters and reproduction in fungi. Structure, reproduction and life cycle of <i>Albugo</i> , <i>Peziza</i> and <i>Puccinia</i> . Economic importance - Role of fungi in Medicine, Agriculture and Industry. Plant Pathology -Tikka disease of Groundnut, Red rot of Sugarcane, Grain smut of Sorghum and Koleroga of Arecanut. Lichens - General account, reproduction and ecological importance. A brief account of Mycorrhiza, Biopesticides, Mycotoxins and Mushroom cultivation. Model organism- <i>Saccharomyces cerevisiae</i> .	15 Hrs.
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Assessment:	Marks:
Attendance	05 Marks
Assignment	05 Marks
Test	10 Marks
Total	20 Marks

PRACTICAL PAPER – I

PAPER – I: MICROBIAL DIVERSITY, PHYCOLOGY AND MYCOLOGY

No of Credits: 02

45 Hrs.

	BOTP – 102: MICROBIAL DIVERSITY, PHYCOLOGY AND MYCOLOGY	15 Units
1	Study of instruments: Autoclave, Inoculation chamber, LAF, Hot air oven, Incubator and Inoculation loop.	1 Unit
2	Sterilization of glassware, media preparation - nutrient media (Nutrient Agar), Isolation of Bacteria from soil by pour plate method. Colony characteristics of Bacteria to identify colonies.	1 Unit
3	Plant Pathology: Citrus Canker, Sandal spike, Tomato leaf curl, Tikka disease of Groundnut, Red rot of Sugarcane, Grain smut of Sorghum and Koleroga of Arecanut.	2 Units
4	Gram staining: <i>Rhizobium</i> from root nodules and <i>Lactobacillus</i> from curd.	1 Unit
5	Measurement of cell concentration – yeast cells / fungal spores using Haemocytometer.	1 Unit
6	Type study of Cyanobacteria: <i>Anabaena</i> and <i>Scytonema</i> .	1 Unit
7	Type study of Algae: <i>Chlamydomonas</i> , <i>Volvox</i> , <i>Cladophora</i> , <i>Chara</i> , <i>Diatoms</i> , <i>Oedogonium</i> , <i>Sargassum</i> and <i>Polysiphonia</i> .	4 Units
8	Type study of fungi: <i>Albugo</i> , <i>Peziza</i> and <i>Puccinia</i> .	2 Units
9	<i>Lichens</i> and <i>Mycorrhiza</i> .	1 Unit
10	Visit to Mushroom cultivation unit/ Pharmaceutical industry/ Algae cultivation unit.	1 Unit

Assessment:	Marks:
Continuous assessment/Attendance	05 Marks
Test	05 Marks
Total	10 Marks

PRACTICAL QUESTION PAPER

BOTP 102: Paper– I: MICROBIAL DIVERSITY, PHYCOLOGY AND MYCOLOGY

Time 3 Hours

Max Mars - 40

1.	Identify & classify the specimens A, B, & C with labelled diagrams and reasons.	3 x 3 = 9 Marks
2.	Identify and Comment on the instrument D .	1 x 2 = 2 Marks
3.	Prepare a temporary slide of E . Sketch, label and identify with reasons. Leave the preparation for evaluation.	1 x 5 = 5 Marks
4.	Stain the given material F by Gram staining. Write the procedure and identify with reasons. Leave the preparation for evaluation. OR Calculate the population of fungal spores /yeast cells in F using Haemocytometer.	1 x 5 = 5 Marks
5.	Identify the Slides G, H and I with labelled diagrams with reasons.	3 x 3 = 9 Marks
6.	Record, Submission Algae Material/ Pathology Herbarium and Report.	5 + 3 + 2 = 10 Marks

SCHEME OF EVALUATION

1	Three specimens A, B and C , - one from A - Algae, B – Fungi, (Identification – 1 mark, classification – 1 mark, reasons 1 mark) C - Pathology/Lichens (Identification 1 mark, Comment and Labelled diagram 2 marks).
2	Instrument of D – 2 marks, (Identification ½ mark, working principle 1 Mark, Labelled diagram ½ mark).
3	Specimen E from algae – (Mounting – 2 marks. Identification – 1 mark, Sketch with reasons 2 marks).
4	Specimen F – Gram staining (Staining – 3 marks, Procedure and result –2 marks). OR Calculation of fungal spores/yeast cells using haemocytometer (Procedure and observation – 3 marks, calculation – 2 marks).
5	Three permanent slides G, H & I - from G - Cyanobacteria / algae, H - Fungi and I - Pathology/ Lichens (Identification – 1 mark, sketch with reasons- 2 marks).
6	a) Record –5 marks b) Submission of 3 specimens –3 marks (Algae & Pathology specimen) c) Report on Institute/ Industrial visit- 2 Marks.

REFERENCES

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16. Sharma, P. D. 2012, Microbiology and Plant Pathology, Rastogi Publication Pvt Ltd., Meerut, India.
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22. Alexopoulos, C. J and Mims, C. W. 1990. Introductory Mycology, 5 edn. Wiley Estern Ltd., New Delhi.
23. Pandey, B. P. 2001. College Botany Vol. I: Algae, Fungi, Lichens, Bacteria, Viruses, Plant Pathology, Industrial Microbiology and Bryophyta. S. Chand and Company Pvt. Ltd., New Delhi
24. Sambamurthy, A. V. S. S. 2006. A text book of Plant Pathology, I. K. International Pvt. Ltd., New Delhi.
25. Singh, R. S 1978. Plant Diseases 4 edn. Oxford and IBH, New Delhi.
26. Thakur, A. K. and S. K. Bassi, 2008. A Textbook of Botany: Diversity of Microbes and Cryptogams. S Chand and Company Ltd., New Delhi
27. Vashishta, B. R 1990. Botany for degree students: Fungi. S Chand and Company Ltd., New Delhi.

**SEP 2024 BOTANY CURRICULUM
 SEMESTER II**

**PAPER – II: BRYOPHYTES, PTERIDOPHYTES, PLANT ANATOMY
 AND PALEOBOTANY**

Programme name	B. Sc. BOTANY	SEMESTER	II
Course Title	PAPER – II: BRYOPHYTES, PTERIDOPHYTES, PLANT ANATOMY AND PALEOBOTANY		
Course Code	BOTT - 201	No. of Credits	03
Contact Hours	60 Hours	Duration of Exam	03 Hours
Formative Assessment Marks	20	Summative Assessment Marks	80

Course objectives

- Understand the basics of Bryophytes, Pteridophytes and Plant Anatomy covering the characteristics, occurrence, organization, and classification of Bryophytes and Pteridophytes.
- Explore the economic and ecological roles of Bryophytes and Pteridophytes in the field of medicine, agriculture and industry.
- Investigate the structure, reproduction and life cycles of Bryophytes and Pteridophytes.
- To understand the mode of evolution of plants through paleobotanical studies, formation of fossils and type study.
- Explore meristematic tissues, root and shoot apical meristems, their organization, types of vascular bundles and anomalous secondary growth in plants.

Course outcomes:

CO1. Understand the diversity and affinities among Bryophytes and Pteridophytes.

CO2. Understand the morphology, anatomy, reproduction and life cycle across Bryophytes and Pteridophytes.

CO3. Knowledge on economic, ecological and evolutionary significance of Bryophytes and Pteridophytes.

CO4. Understand the anatomy, reproduction and life cycle across Bryophytes and Pteridophytes.

CO5. Skill development for the proper description of internal structure of plant parts using botanical terms, their identification and further classification. Obtain laboratory skills/explore wood anatomical aspects for their commercial applications.

Course Outcomes (COs)

After completing this course, students will be able to:

CO1: Describe the characteristic features, classification, morphology, and reproduction of Bryophytes and Pteridophytes.

CO2: Compare evolutionary trends and life-cycle patterns among selected genera of Bryophytes and Pteridophytes.

CO3: Explain the structure, development, and functions of plant tissues, tissue systems, and various internal plant organs.

CO4: Interpret anatomical adaptations of plants in response to environmental conditions (xeric, hydric, mesic habitats).

CO5: Discuss the geological time scale, fossil types, methods of fossilization, and significance of paleobotanical studies.

CO6: Analyze fossil forms and relate paleobotanical evidence to the evolution of land plants, especially Bryophytes and Pteridophytes.

CO7: Prepare temporary/transverse sections, identify plant tissues and fossil specimens through laboratory work, and document observations scientifically.

II SEMESTER

PAPER – II: BRYOPHYTES, PTERIDOPHYTES, PALEOBOTANY AND PLANT ANATOMY

60 Hrs.

Unit I	BRYOPHYTES General characters, classification, distribution, structure, reproduction and alternation of generations in <i>Marchantia</i> , <i>Anthoceros</i> and <i>Funaria</i> . Ecological and economic importance of Bryophytes.	15 Hrs.
Unit II	PTERIDOPHYTES Introduction and general characters of Pteridophytes. Study of diversity in morphology, anatomy, reproduction and life cycle of the following groups in representative forms: 1. Psilotopsida – Ex. <i>Psilotum</i> . 2. Lycopsida – Ex. <i>Lycopodium</i> and <i>Selaginella</i> . 3. Filicopsida - Ex. <i>Marsilea</i> . (Developmental stages not required) Brief account of stelar evolution, heterospory and seed habit. Economic importance of Pteridophytes.	15 Hrs.

Unit III	PLANT ANATOMY Meristematic Tissues - Structure, function and classification. Organisation of Apical Meristems: Apical cell theory, Tunica-carpus theory and Histogen theory. Developmental pattern at flowering apex: ABC model specification of Floral organs. Simple and complex tissues- Structure, Components and functions. Vascular bundles and its types. Secretory tissues- Structure, Classification and significance. Primary structure of Monocot and Dicot Root and Stem. Secondary growth in Dicot stem Ex. – <i>Tridax</i> . Anomalous Secondary growth: <i>Boerhaavia</i> and <i>Dracaena</i> .	15 Hrs.
Unit IV	WOOD ANATOMY & PALEOBOTANY Wood Anatomy: Definition, types of wood, properties of wood, wood seasoning, Commercial uses of wood and timber identification, Dendrochronology. Brief account on Important Indian woods (any five) and Plywoods. Paleobotany: Introduction, Objectives and Significance of Paleobotanical study. Contributions of paleobotanist – Birbal Sahni. Outline of geological time scale with special emphasis on Paleozoic and Mesozoic Era. Process of fossilization – Compression, Impression, Petrification, Compaction, Casts and Moulds, Coal balls. Type study – <i>Rhynia</i> and <i>Calamites</i> .	15 Hrs.

Assessment:	Marks:
Attendance	05 Marks
Assignment	05Marks
Test	10 Marks
Total	20 Marks

II SEMESTER

PAPER – II: BRYOPHYTES, PTERIDOPHYTES, PALEOBOTANY AND PLANT ANATOMY

No. of credits: 02

45 Hrs.

	BOTP – 202: BRYOPHYTES, PTERIDOPHYTES, PALEOBOTANY AND PLANT ANATOMY	15 Units
1.	Study of Bryophytes (Forms studied in theory).	3 Units
2	Study of Pteridophytes (Forms studied in theory).	4 Units
3	Paleobotany – Type study (Fossil material/slide/photos).	2 Units
4	Histology – Permanent tissues.	2 Units
5	Study of T. S of Dicot stem and sectioning: <i>Tridax</i> .	1 Unit
6	Study of T. S of <i>Boerhaavia</i> stem and sectioning.	1 Unit
7	Study of T. S of <i>Dracaena</i> stem and sectioning.	1 Unit

8	Visit to Institute of Wood Science.	1 Unit
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Assessment:	Marks:
Continuous assessment/Attendance	05 Marks
Test	05 Marks
Total	10 Marks

PRACTICAL QUESTION PAPER
BOTP 202: PAPER – II: BRYOPHYTES, PTERIDOPHYTES, PALEOBOTANY AND
PLANT ANATOMY

Time: 3Hrs

Marks: 40

1.	Identify and classify the specimens A, B, C and D giving reasons.	4 x 3 = 12 Marks
2.	Comment on Slide E .	1 x 3 = 3 Marks
3.	Identify the slides F, G and H with reasons and diagrams.	3 x 3 = 9 Marks
4.	Prepare a temporary stained T. S of the material I . Sketch, label and identify with reasons. Leave the preparation for evaluation.	1 x 6 = 6 Marks
5.	Record, Slide Submission and report of visit to Wood Science Institute.	5 + 2 + 3 = 10 Marks

SCHEME OF EVALUATION

1	A & B Bryophytes and C & D Pteridophytes: (Identification and Classification- 1 mark, Reasons- 2 marks)
2	Slide E . (Paleobotany) (Identification – 1 mark, Reasons- 1 mark and Diagram – 1 mark)
3	Slides F (Bryophytes), G (Pteridophytes) and H Anatomy (Identification – 1 mark, Reasons- 1 mark and Diagram – 1 mark) for each slide.
4	I (Plant Anatomy)– (Staining and mounting – 2 marks, Sketch and labelling – 2 marks, Identification – 1 mark and reasons – 1 mark).
5	a) Record– 5marks. b) <i>Tridax & Boerhaavia</i> permanent slide submission- 2 marks and c) visit to Wood Science Institute – 3 marks.

REFERENCES

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**Question Paper Format for Discipline Specific (Elective) Subjects
BOTANY THEORY EXAMINATION
MAHARANI LAKSHMI AMMANI COLLEGE FOR WOMEN, AUTONOMOUS**

**I/II/III/IV/V/VI SEM END EXAMINATION
SEP-2024 ONWARDS**

YEAR:

PROGRAM – B.COM/B.Sc./BA/BBA/BCA/MA/MSc./M.Com

COURSE CODE: BOTT: 101- PAPER-I

COURSE TITLE: Microbial Diversity, Phycology and Mycology

:

TIME: 3 Hours

TOTAL MARKS:80

GENERAL INSTRUCTIONS:

1. Draw diagram where ever necessary
2. Utilize left side of the sheet as workspace
3. Write the answers in blue/black pen only
4. Question numbers should be mentioned correctly

5. Avoid over writing/ scratching

Q.No	Answer all the questions	CO's	CL's	MARKS: 1Mx10=10M
1		CO1		
2		CO1		
3		CO1		
4		CO1		
5		CO1		
6		CO2		
7		CO2		
8		CO2		
9		CO2		
10		CO2		
SECTION B				
	Answer any FIVE of the following			3MX5=15 M
11.		CO1		
12.		CO1		
13.		CO1		
14.		CO1		
15.		CO2		
16.		CO2		
17.		CO2		
SECTION C				
	III. Answer any FIVE of the following			5Mx5=25M
18.		CO2		
19.		CO2		

20.		CO2		
21.		CO3		
22.		CO3		
23.		CO3		
24.		CO3		
SECTION D				
	IV. Answer any THREE of the following			10Mx3=30M
25.		CO3		
26.		CO3		
27.		CO4		
28.		CO4/CO5		

QUESTIONS SECTION WISE MARKS DISTRIBUTION

SEC/MAINS	Total No. of Questions	Questions to be answered	Marks/question	Marks for written questions (excluding Choice)	Total Marks (including Choice)
A	10	10	1	10	10
B	7	5	3	15	21
C	7	5	5	25	35
D	4	3	10	30	40
TOTAL	28	23		80	106

BLUE PRINT FOR QUESTION PAPER

I. DISTRIBUTION OF CO'S FOR DSC QUESTION PAPER FOR END SEMESTER EXAMINATION

Section	Total No. of CO's	Question Numbers
	ESE	
Section A	5CO1's	1 TO 5
	5CO2's	6 TO 10
Section B	4 CO1's	11 TO 14
	3 CO2's	15 TO 17
Section C	3 CO2's	18 to 20
	4 CO3's	21 TO 24
Section D	2 CO3's	25 & 26
	2 CO4's / (1 CO4 & 1 CO5)	27 & 28 Note: If CO5 is given only question no. 28 can be given

II. WEIGHTAGE FOR CO'S IN END SEMESTER EXAMINATIONS

CO'S	Total No. of CO's	Total Marks	% of LOT/HOT
CO1	09 (LOT)	17	17%
CO2	11 (LOT)	29	29%
CO3	06 (HOT)	40	40%
CO4/CO5	02 CO4/ 1 CO4 & 1 CO5 (HOT)	20/ 10 + 10	
	TOTAL MARKS	106	

LOT-Lower order thinking

HOT- Higher order thinking