

SYLLABUS

B.Sc. Part-I (Sem. I & II) Subject Botany

(Session 2023-24 and 2024-25)

MEDB3PUP

Semester-I

THEORY			
	Credits per week	External Marks	Internal Assessment
BOTB1101T: Diversity of Microbes	2	35	15 (Attendance: 3 + Assignment: 6 + House Test 6)
BOTB1102T: Diversity of Cryptogams	2	35	15 (Attendance: 3 + Assignment: 6 + House Test 6)
PRACTICAL (BOTB1101L)			
Pertaining to Theory Paper- BOTB1101T:	2	50	
Pertaining to Theory Paper- BOTB1102T:			
Theory			70 Marks
Practical			50 Marks
Internal Assessment Pertaining to Theory Paper BOTB1101T & BOTB1102T			30 Marks
Total		:	150 Marks

Semester-II

THEORY			
	Credits per week	External Marks	Internal Assessment
BOTB1203T: Cell Biology	2	35	15 (Attendance: 3 + Assignment: 6 + House Test 6)
BOTB1204T: Genetics and Evolution	2	35	15 (Attendance: 3 + Assignment: 6 + House Test 6)
PRACTICAL (BOTB1202L)			
Pertaining to Theory Paper BOTB1203T:	2	50	
Pertaining to Theory Paper BOTB1204T:			
Theory			70 Marks
Practical			50 Marks
Internal Assessment Pertaining to Theory Paper BOTB1203T & BOTB1204T			30 Marks
Total		:	150 Marks

Note:

- 1) The number of teaching hours per week will be three for each theory paper and three for each practical per semester. In total there will be 12 teaching hours per week for both theory and practical (Six teaching hours for theory and six teaching hours for practical per week).
- 2) Practical paper in each semester will be of 3 hours. The timing of practical examination will be 9.00 am to 12.00 noon.

5/10/24
AV

Dr. Anshu Kaur
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M. R. Singh

B.Sc. PART-I (SEMESTER-I) SUBJECT: Botany
BOTB1101T: DIVERSITY OF MICROBES

Max. Marks: 50 marks
Pass Marks: 35% in Theory and Practical Separately
Theory Paper: 35 marks
Internal Assessment: 15 marks

Total Teaching hours: 45
Time Allowed: 3 Hours

INSTRUCTIONS FOR THE PAPER SETTER

The question paper will consist of three sections A, B and C. Section A and B will have four questions from the respective section of syllabus and will carry 6 marks each. Section C will consist of 11 short-answer type questions (4-5 lines) of 1 mark each which will cover the entire syllabus uniformly and will carry 11 marks in all.

INSTRUCTIONS FOR CANDIDATES

Candidates are required to attempt two questions from each section A and B and the entire section C, which is compulsory.

Section-A

1. Viruses: General characters, structure, classification and replication of viruses; importance of viruses, a brief account of Mycoplasma.
2. Bacteria- A general account with particular reference to ultra structure, classification, mode of reproduction. A brief account of Archaeobacteria.
3. Nutritional types in bacteria, economic importance of bacteria.
4. General account of Cyanobacteria: thallus organization, photosynthetic pigments, reserve food material & multiplication with emphasis on *Oscillatoria*.

Section-B

5. Fungi and Fungi like organisms: General characters. Classification and economic importance. Important features and life history of members of Kingdom Chromista: *Phytophthora* and Protozoa: *Physarum*; *Dictiostelium*.
6. Important features and life history of members of Kingdom Fungi: Chytridiomycota- *Physotherma*; Zygomycota-*Mucor*; Ascomycota-*Saccharomyces*, *Penicillium* and *Peziza*.
7. Important features and life history of Basidiomycota and Mitosporic Fungi: *Puccinia*, *Ustilago*, *Agaricus*; *Alternaria*, *Colletotrichum*.
8. Lichens: Structure, morphology, reproduction and economic importance.

RECOMMENDED REDINGS

1. Alexopolus, C.J., Mims, C.W. and Blackwell, M. 1996. *Introductory Mycology*. John Willey & Sons. Inc., Singapore.
2. Black, J.G. 1999. *Microbiology – Principles and Explorations*. John Wiley & Sons. Inc. Singapore.
3. Clifton, A. 1958. *Introduction to Bacteria*. McGraw Hills & Co., New York.
4. Sumbali, G. 2010. *The Fungi* (Second Edition). Narosa Publishing House, New Delhi.
5. Dube, H.C. 1990. *An Introduction to Fungi*. Vikas Publishing House Pvt. Ltd., New Delhi.
6. Sharma, P.D. 2001. *The Fungi*. Rastogi Co., Meerut.
7. Stainer, R.Y., Ingraham, J.L., Wheelis, M.L. and Painter, P.R. 1989. *General Microbiology*. Macmillan.



B.Sc. PART-I (SEMESTER-I) SUBJECT: Botany
BOTB1102T: DIVERSITY OF CRYPTOGAMS

Max. Marks: 50 marks
Pass Marks: 35% in Theory and Practical Separately
Theory Paper: 35 marks
Internal Assessment: 15 marks

Total Teaching hours: 45
Time Allowed: 3 Hours

INSTRUCTIONS FOR THE PAPER SETTER

The question paper will consist of three sections A, B and C. Section A and B will have four questions from the respective section of syllabus and will carry 6 marks each. Section C will consist of 11 short-answer type questions (4-5 lines) of 1 mark each which will cover the entire syllabus uniformly and will carry 11 marks in all.

INSTRUCTIONS FOR CANDIDATES

Candidates are required to attempt two questions from each section A and B and the entire section C, which is compulsory.

Section-A

1. Basic characteristics of Algae; habitat, algal cell structure, photosynthetic pigments, reserves food material, classification and economic importance of algae.
2. Important features and life history of Chlorophyceae with emphasis on *Volvox* and *Oedogonium*.
3. Important features and life history of Xanthophyceae and Phaeophyceae with emphasis on *Vaucheria*, *Ectocarpus* and *Sargassum*.
4. Important features and life history of Rhodophyceae with emphasis on *Batrachospermum*. Cell structure and reproduction in Diatoms.

Section-B

5. Bryophyta: General characters, classification, amphibians of Plant Kingdom displaying alternation of generations and ecological and economic importance.
6. Structure, reproduction and affinities of *Marchantia* (Hepaticopsida); *Anthoceros* (Anthocerotopsida); *Funaria* (Bryopsida) - developmental stages are excluded. Evolution of sporophytes in Bryophytes.
7. Pteridophyta: General characters, classification and economic importance of Pteridophytes. Evolution of stellar system in Pteridophytes. Important features and life history of Psilopsida (*Rhynia*) - developmental stages are excluded.
8. Important features and life history of Lycopsida (*Selaginella*); Sphenopsida (*Equisetum*) and Pteropsida (*Pteris* and *Marsilea*) - developmental stages are excluded.

RECOMMENDED REDINGS

1. Kumar, H.D. 1999. *Introductory Phycology (Second Edition)*. Affiliated East West Press Ltd., New Delhi.
2. Parihar, N.S. 1996. *Biology and Morphology of Pteridophytes*. Central Book Depot., Allahabad.
3. Rashid, A. 1998. *An Introduction to Bryophyta*. Vikas Pub. House Pvt. Ltd., New Delhi.
4. Rashid, A. 1999. *An Introduction to Pteridophyta*. Vikas Publ. House, Pvt.Ltd., New Delhi.
5. Sharma, O.P. 2001. *Text Book of Pteridophytes*. MacMillan India Ltd.
9. Sporne, K.R.1991. *The Morphology of Pteridophytes*. B. I. Publishing Pvt. Ltd., Bombay.

MEDB3PUP

10. Vasishta, P.C. 1996. *Bryophyta*. S. Chand & Co. Ltd., New Delhi.
11. Vasishta, P.C. 2000. *Pteridophyta*. S. Chand & Co. Ltd., New Delhi.
12. Singh, S.K. 2008. *Bryophyta*, Compus Book, International, New Delhi.
13. Lec., R.E. 2008. *Phycology*. Combridge University, Press, U.K.
14. Sharma, O.P. (2011). *Diversity of Microbes and Cryptogams-Algae*. Tata McGraw Hill, New Delhi.
15. Vashishta, B.R., Sinha, A.K. and Singh, V.P. (2011). *Botany for Degree Students-Algae*. S. Chand Publisher, New Delhi

SUGGESTED LABORATORY EXCERCISES

Teachers may select plants/material available in their locality/institution.

1. Study of the genera included under algae and fungi indicating their systematic position.
2. Study of morphology, reproductive structures and anatomy of the examples cited in theory under Bryophyta and Pteridophyta indicating their systematic position.
3. Observation of disease symptoms in hosts infected by bacteria – (Citrus canker), fungi – (Late blight of potato, loose smut of wheat, brown rust of wheat, yellow stripe rust of wheat, tikka disease of groundnut, red rot of sugarcane), viruses – (Yellow vein mosaic of bhindi) and mycoplasma – (little leaf disease of brinjal). Examination of diseased material and identification of pathogens.
4. Gram staining of bacteria.
5. Study of crustose, foliose and fruticose lichen thalli.

SUGGESTED READING (FOR LABORATORY EXCERCISES)

Books:

1. Bendre, A. and Kumar, A. 1990-91, *Practical Botany*, Rastogi Publications, Meerut.
2. Kashyap, S.R. 1972. *Liverworts of the Western Himalayas*. New Delhi.
3. Singh, R.S. 1998. *Plant Diseases*. Oxford IBH Publishing Co. Pvt. Ltd., New Delhi.

INSTRUCTIONS FOR PAPER SETTER

Practical BOTB1101L (Pertaining to Theory Paper- BOTB1101T & BOTB1102T)

	Marks
1. Section cutting and preparation of permanent slide of materia pertaining to Bryothytes/Pteridophytes.	10
2. Identification, classification and morphological note on specimens from Algae, Fungi, Lichen Bryophyta and Pteridophyta.	5 x 5 = 25
3. Study of diseased plant material	5
4. Practical note book.	5
5. Viva-voce.	5
	<u>50</u>



B.Sc. PART-I (SEMESTER-II) SUBJECT: Botany
BOTB1203T : CELL BIOLOGY

Max. Marks: 50 marks
Pass Marks: 35% in Theory and Practical Separately
Theory Paper: 35 marks
Internal Assessment: 15 marks

Total Teaching hours: 45
Time Allowed: 3 Hours

INSTRUCTIONS FOR THE PAPER SETTER

The question paper will consist of three sections A, B and C. Section A and B will have four questions from the respective section of syllabus and will carry 6 marks each. Section C will consist of 11 short-answer type questions (4-5 lines) of 1 mark each which will cover the entire syllabus uniformly and will carry 11 marks in all.

INSTRUCTIONS FOR CANDIDATES

Candidates are required to attempt two questions from each section A and B and the entire section C, which is compulsory.

Section-A

1. Structural organisation of cell: Prokaryotic and Eukaryotic cells; Plant and Animal cells.
2. The cell envelopes: Structure, composition and functions of cell wall in Bacteria, fungi and plants.
3. Plasma membrane: Structure and function; various models proposed, fluid mosaic model; transport across membrane.
4. Structure and function of cell organelles: Endoplasmic reticulum, Ribosomes, Golgi Bodies, Lysosomes, Vacuoles and Peroxisomes.

Section-B

5. Structure and function of nucleus; organisation of nuclear membrane, nucleolus and chromosomes.
6. Structure and function of Mitochondria and Plastids, semiautonomous nature.
7. Genetic material: Structure of DNA and RNA, elucidation of DNA and RNA as genetic materials.
8. Organisation of DNA into chromosomes, nucleosome structure. Organisation of genetic material in eukaryotes, prokaryotes and viruses.

RECOMMENDED READINGS

1. Alberts, B., Bray, D., Lewis, J., Raf. T.M., Roberts, K. and Watson, I.D.1999. *Molecular Biology of Cell*. Garland Publishing Co., Inc., New York, USA.
2. Bhatia, K.N. and Neelam, Dhand. *Cell Biology & Genetics*. Atruman's Pub., Jalandhar.
3. Gupta, P.K. 1999. *A text Book of Cell and Molecular Biology*. Rastogi Publicatons, Meerut, India.
4. Kleinsmith, L.J. and Kish, V.M. 1995. *Principles of Cell and Molecular Biology* (2nd Edition) Harper Colins College Publishers, New York, USA.
5. Lodish, H., Berk, A., Zipursky, S.L., Matsudaira, P., Bltimore, D. and Darnell, J. 2000. *Molecular Cell Biology*. W.H. Freeman & Co., New York, USA.
6. De Roberts, E.D.P. and De Robertis, Jr. E.M.F. 2006, *Cell and Molecular Biology*, Lippincott Williams & Wilkins, USA.

B.Sc. PART-I (SEMESTER-II) SUBJECT: Botany

BOTB1204T: GENETICS AND EVOLUTION

Max. Marks: 50 marks

Total Teaching hours: 45

Pass Marks: 35% in Theory and Practical Separately

Time Allowed: 3 Hours

Theory Paper: 35 marks

Internal Assessment: 15 marks

INSTRUCTIONS FOR THE PAPER SETTER

The question paper will consist of three sections A, B and C. Section A and B will have four questions from the respective section of syllabus and will carry 6 marks each. Section C will consist of 11 short-answer type questions (4-5 lines) of 1 mark each which will cover the entire syllabus uniformly and will carry 11 marks in all.

INSTRUCTIONS FOR CANDIDATES

Candidates are required to attempt two questions from each section A and B and the entire section C, which is compulsory.

Section-A

1. Replication of DNA in prokaryotes and eukaryotes, Mitosis and Meiosis
2. Transcription and Translation in eukaryotes and prokaryotes, genetic code.
3. Mutations – spontaneous and induced; transposable genetic elements.
4. Chromosome alterations – deletions, duplications, translocations, inversions. Variations in chromosome number – aneuploidy, polyploidy.

Section-B

5. Genetic inheritance: Mendelism; laws of segregation and independent assortment; linkage analysis; allelic and non-allelic interactions.
6. A brief account of origin of earth. Origin of life: History, Theories; abiogenesis, panspermia, chemical evolution, Oparin's hypothesis, Miller's experiments. Evolution of prokaryote. Protein evolution.
7. Theory of Organic Evolution. A detailed account on Lamarckism, Darwinism, Modern synthetic theory, germplasm theory and mutation theory.
8. Evidences of evolution: Direct and Indirect evidences, Fossils; Fossilization, types and significance. Geological time scale, determination of age of rocks and fossils.

RECOMMENDED READINGS

1. Bhatia, K.N. and Neelam, Dhand. *Cell Biology & Genetics*. Atruman's Pub., Jalandhar.
2. Gupta, P.K. *Cytology, Genetics & Evolution*. Rastogi Publications, Meerut.
3. Gupta, P.K. 1999. *A text Book of Cell and Molecular Biology*. Rastogi Publications, Meerut, India.
4. Kleinsmith, L.J. and Kish, V.M. 1995. *Principles of Cell and Molecular Biology* (2nd Edition) Harper Colins College Publishers, New York, USA.
5. Lodish, H., Berk, A., Zipursky, S.L., Matsudaira, P., Baltimore, D. and Darnell, J. 2000. *Molecular Cell Biology*. W.H. Freeman & Co., New York, USA.
6. Snustud, D.P. and Simmons, M.J. 2000. *Principles of Genetics*. John Wiley & Sons. Inc., USA.
7. Karp, G. 1999, *Cells and Molecular Biology: Concepts and Experiments*, John Wiley & Sons Inc. USA.
8. De Roberts, E.D.P. and De Robertis, Jr. E.M.F. 2006, *Cell and Molecular Biology*, Lippincott Williams & Wilkins, USA.

 Several handwritten signatures and initials in blue ink are present at the bottom of the page. On the left, there is a signature that appears to be 'S. Singh'. In the center, there are two more signatures, one of which is 'J.S.'. On the right, there is a circled signature that appears to be 'M.R.'.

SUGGESTED LABORATORY EXERCISES

Teachers may select plants/material available in their locality/institution.

1. To study cell structure from onion leaf peels.
2. Examination of electron micrographs of eukaryotic cells with special reference to organelles.
3. Examination of various stages of mitosis and meiosis using appropriate plant material (e.g. onion root tips, onion flower buds).
4. Preparation of karyotypes from dividing root tip cells of *Allium*.
5. Study of pollen mitosis of *Impatiens balsamina*.
6. Study of special types of chromosomes from slides/photographs.
7. Working out the laws of inheritance using seed mixture data provided using Chi-square methods.

SUGGESTED READINGS (FOR LABORATORY EXERCISES)

1. Fukui, K. and Nakayama, S. 1996. *Plant Chromosomes Laboratory Methods*. CRC Press, Boca Raton, Florida.
2. Gunning, B.E.S. and Steer, M.W. 1996. *Plant Cell Biology: Structure and Function*. Jones and Barlett Publishers, Boston, Massachusetts.
3. Harris, N. and Oparka, K.J. 1994. *Plant Cell Biology: A Practical Approach*. IRL Press at Oxford University Press, Oxford, UK.
4. Sharma, A.K. and Sharma, A. 1999. *Plant Chromosomes: Analysis Manipulation and Engineering*. Harwood Academic Publishers, Australia.

INSTRUCTIONS TO PAPER SETTER

Practical BOTB1202L (Pertaining to Theory Paper- BOTB1203T & BOTB1204T)

	Marks
1. Preparations of squash mount to show a cell division stage from onion root tip/flower.	10
2. Experiment on laws of inheritance using seed mixtures.	10
3. Preparation of temporary slide of onion peels to study cell structure.	6
4. Identification of three slides/Electron microphotographs.	10
5. Practical Note Book.	7
6. Viva-voce.	7
	50

