

**NEW SYLLABUS**  
**B.Sc. Semester - I**

Scheme of examination

Continuous Assessment (CA)	=	15 Marks
Term Test	=	10 Marks
Home Assignment	=	05 Marks
Semester End Examination (SEE)	=	35 Marks
Total	=	50 Marks

**B.Sc. Semester I Botany Paper I P C 22-1001**

**Algae, Fungi and Lichens**

**Scheme of examination:**

**MM: 35**

1. In Semester End Examination the candidate has to answer five questions in all. Each question will be of 7 marks. Candidate has to answer all questions in the main answer book only.
2. Q. No. 1 will be compulsory having 07 short answer type questions (one mark each) covering entire syllabus.
3. Each paper is divided in four units. There will be two questions from each unit. Student has to answer one question from each unit.

**UNIT - I**

**General characters of algae, Classification** (F. E. Fritsch and Smith), Diverse habitat, Range of thallus structure, Photosynthetic pigments and food reserves. Reproduction (vegetative, asexual and sexual), Types of life cycles and evolution of sex in algae. Economic importance (algae as food and fodder, algae in agriculture, pharmaceuticals and industries). Isolation and culture of algae.

**UNIT - II**

**Habitat, structure, reproduction and life cycle of following forms:**

Chlorophyceae - Volvox, Coleochaete, Chara

Xanthophyceae - Vaucheria

Phaeophyceae - Ectocarpus

Rhodophyceae - Polysiphonia

**UNIT - III**

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**General characters of fungi:** Definition, occurrence, thallus organization, asexual and sexual reproduction, biological and economic importance of fungi. Classification of fungi. (Saccardo and Ainsworth's).

#### UNIT - IV

**Brief account, structure, importance and life history of the following:**

Yeast, Rhizopus, Aspergillus, Peziza, Agaricus.

**Lichens:** General characters, habitat, structure, reproduction and economic importance of lichens, importance of lichens as colonizers and indicators of environment.

**Suggested Readings:**

- Bold, H. C. and Wayne, M. J. 1996. Introduction to Algae. 2nd Edition. Prentice Hall, Inc. Englewood Cliffs, New Jersey.
- Gilbert, M. S. 1985. Cryptogamic Botany. Vol. I and II second edition. Tata McGra Hill Publishing Co. Ltd., New Delhi.
- Kumar, H. D. 1998. Introductory Phycology. Affiliated East-West Press Ltd., New York.
- Lee, R.E. 2008. Phycology. Fourth Edition, Cambridge University Press, USA.
- Singh, V. Pandey, P. C. and Jain, D. K. 2001. A Text book of Botany. Rastogi Publication, Meerut.
- Van den Hoek, C., Mann, D.J. and Jahns, H.M. 1995. Algae: An introduction to Phycology. Cambridge Univ. Press., England.
- Vashitha, B. R. 2002. Botany for degree students (Algae and Bryophytes). S. Chand and Co. Ltd., New Delhi.
- Alexopoulos, C.J. and Mims, C.V. 1988. Introductory Mycology. John Wiley and Sons, New York.
- Dubey, H.C. 1989. Fungi. Rastogi publication, Meerut.
- Sarabhai, R.C. and Saxena, R.C. 1990. A textbook of Botany. Rastogi publication, Meerut.
- Vashishta, B. R. 2001. Botany for degree student's Fungi. S. Chand and company, New Delhi.

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- Webster, J. and Weber, R. 2007. Introduction to Fungi. 3rd edition, Cambridge University Press, Cambridge.

## B.Sc. Semester I Botany Paper II P C 22-1002

### Microbiology and Plant Pathology

#### Scheme of examination:

MM: 35

1. In Semester End Examination the candidate has to answer five questions in all. Each question will be of 7 marks. Candidate has to answer all questions in the main answer book only.
2. Q. No. 1 will be compulsory having 07 short answer type questions (one mark each) covering entire syllabus.
3. Each paper is divided in four units. There will be two questions from each unit. Student has to answer one question from each unit.

#### UNIT - I

Meaning and scope of **microbiology**, Developments in the field of microbiology, spontaneous generation, discovery of bacteria, germ theory of diseases, Vaccination, Antibiotics.

**General account of Eubacteria:** occurrence, morphology (structure, shapes), flagella, capsule, nutritional types, endospore, reproduction (binary fission, transformation, conjugation, transduction), economic and biological importance.

#### UNIT - II

**Mycoplasma:** occurrence, morphology, reproduction and importance.

**Virus:** General characteristics and importance. Structure of TMV and Pox virus.

**Structure and multiplication of bacteriophage.**

**Cyanobacteria:** *Oscillatoria* and *Nostoc*, occurrence, morphology, reproduction and importance.

#### UNIT - III

What is plant disease? Animate and inanimate plant diseases. Important symptoms of plant diseases caused by fungi, bacteria, viruses, MLO's (blights, mildew - downy and powdery, rust, smut, mosaic, little leaf, galls etc.)

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Brief account, structure, importance and life history and/or disease cycle and control of the following:

**Albugo** and white rust. **Sclerospora** and downy mildew/ green ear of Bajra.

**Claviceps** and ergot.

#### UNIT – IV

Brief account, structure, importance and life history and/or disease cycle and control of the following:

**Puccinia** and rusts of wheat (Black, orange, yellow)

**Ustilago** and loose smut of wheat and covered smut of barley.

**Alternaria** and early blight of tomato/potato.

#### Suggested Readings:

- Agrawal, K. and Sharma, J. 2014. A Text book of Mycology, Microbiology and Plant Pathology. CBH publisher, Jaipur.
- Aneja, K. R. 2003. Experiment in Microbiology, Plant Pathology and Biotechnology. New age international (P) Ltd. Publishers, New Delhi.
- Biswas, S. B. and Biswas, A. 2000. An introduction of Viruses. Vikas publications, New Delhi.
- Dubey, R. C. and Maheshwari, D. K., 2002. A Text Book of Microbiology. S. Chand and Co., New Delhi. 8
- Kumar, H. D. and Kumar, S. 1998. Modern Concepts of Microbiology. Vikas publishing house Pvt. Ltd., New Delhi.
- Madahar, C. L. 2001. Introduction of Bacteria. Mc Graw Hill Edu. Pvt. Ltd., London.
- Mckane, L. and Judy, K. 1996. Microbiology: Essentials and Applications. McGraw Hill, New York.
- Pandey, S. N. and Trivedi, P. C. 2005. A text book of Fungi, Bacteria and Virus. Vikas Publishing House, New Delhi.
- Pelczar, M.J. Microbiology. 5 th edition, Tata Mc Graw-Hill Co., New Delhi.
- Presscott, L., Harley, J. and Klein, D. 2005. Microbiology. 6 th edition, Tata Mc Graw-Hill Co., New Delhi.



- Purohit, S. S. 2002. Microbiology. Agro. Bot. Publication, Jodhpur.
- Sharma, P. D. 2003. Microbiology and Pathology. Rastogi Publication, Meerut.
- Singh, V. and Srivastava, V. 1998. Introduction of Bacteria. Vikas Publication, New Delhi.
- Singh, R. P. 2010. Microbiology. Kalyani Publishers, New Delhi.

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**NEW SYLLABUS**  
**B.Sc. Semester - II**

Scheme of examination

Continuous Assessment (CA)	=	15 Marks
Term Test	=	10 Marks
Home Assignment	=	05 Marks
Semester End Examination (SEE)	=	35 Marks
Total	=	50 Marks

**B.Sc. Semester II Botany Paper I P C 22-2001**

**Bryophytes and Pteridophytes**

**Scheme of examination:**

**MM: 35**

1. In Semester End Examination the candidate has to answer five questions in all. Each question will be of 7 marks. Candidate has to answer all questions in the main answer book only.
2. Q. No. 1 will be compulsory having 07 short answer type questions (one mark each) covering entire syllabus.
3. Each paper is divided in four units. There will be two questions from each unit. Student has to answer one question from each unit.

**UNIT - I**

**Bryophyta:** General characters, Origin and evolution of Bryophyta. Classification (Eichler and Proskauer) Habitat, Range of thallus structure, Reproduction (Vegetative and Sexual) Alternation of generation, Evolution of sporophytes in Bryophytes, Economic importance of Bryophytes.

**UNIT II**

Habitat, structure, reproduction and alternation of generation in following forms:

Hepaticas - Riccia, Marchantia and Porella.

Anthocerotopsida - Anthoceros.

Bryopsida - Sphagnum, Funaria

**UNIT III**

**Pteridophyta:** General characters of pteridophytes, classification by Smith, Bold & Sporne.

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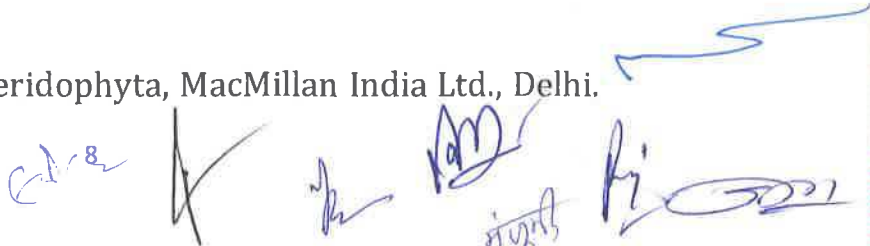
Important characteristics of Psilopsida, Lycopsidea, Sphenopsida and Pteropsida. Economic importance of Pteridophytes. Alternation of Generation. Stellar system in Pteridophytes. Heterospory and seed habit.

#### Unit – IV

Distribution, structure and life history of  
Psilotum, Selaginella, Equisetum, Pteridium and Marsilea.

#### Suggested readings

- Chopra, R.N. and Kumar, P.K. 1988. Biology of Bryophytes. Wiley Eastern Ltd. New Delhi.
- Pandey, S.N., Mishra, S.P. and Trivedi, P.S. 1981. A text book of Botany vol. II, Vikas publishing House Pvt. Ltd, New Delhi.
- Parihar, N.S. 1965. An Introduction to Bryophyta. Central Book Depot, Allhabad.
- Puri, P. 1985. Bryophytes. Atmaram and Sons, Delhi.
- Smith, G.M. 1938. Cryptogramic Botany Vol. II. Bryophytes and Pteridophytes. Mc Graw Hill Book Company, London.
- Sporne, K.R. 1967. The Morphology of Bryophytes. Hutchinson University Library, London.
- Tyagi, A. and Saxena, M. 2014. Algae, Lichens and Bryophyta, CBH, Jaipur
- Vashishta, B. R., Sinha, A. K. and Kumar, A. 2011. Botany for degree students, Bryophyta. S. Chand and Co. New Delhi.
- Watson E.V. 1971. The structure and life of Bryophytes. Hutchinson University Library, London
- Bierhorst, D.W. 1971. Morphology of Vascular Plants. MacMillan Co., N.Y. and CollierMacMillan Ltd., London.
- Parihar, N.S. 1996. The Biology and Morphology of Pteridophytes. Central Book Depot, Allahabad.
- Singh, V., Pandey, P. C. and Jain, D. K. 2013. A text book of Botany. IV edition, Rastogi publication, Meerut.
- Sharma, O. P. 1990. Textbook of Pteridophyta, MacMillan India Ltd., Delhi.



- Vashishta, P.C. 1997. Botany for Degree Students- Pteridophyta. S. Chand and Company, New Delhi.
- Wilson, N. S. and Rothewall, G. W. 1993. Paleobotany and Evolution of Plants. (2nd Edition), Cambridge University Press, U. K.

**B.Sc. Semester II Botany Paper II P C 22-2002**  
**Gymnosperms and Palaeobotany**

**Scheme of examination:**

**MM: 35**

1. In Semester End Examination the candidate has to answer five questions in all. Each question will be of 7 marks. Candidate has to answer all questions in the main answer book only.
2. Q. No. 1 will be compulsory having 07 short answer type questions (one mark each) covering entire syllabus.
3. Each paper is divided in four units. There will be two questions from each unit. Student has to answer one question from each unit.

**UNIT-I**

Resemblances and characteristics of seed plants. Differences between Gymnosperms and Angiosperms. General characters and classification of Gymnosperms (Andrews, Sporne & Bierhorst), Economic importance of Gymnosperms.

**UNIT-II**

Systematic position, distribution, Morphology of Vegetative and reproductive parts, anatomy, reproduction and life cycle of following genera:

*Cycas, Pinus and Ephedra*

**UNIT- III**

Formation of fossils, types of fossils, techniques of study of fossils. Geological time scale. Applied aspects of paleobotany - use in coal and petroleum exploration.

**UNIT -IV**

**Fossil Pteridophytes:** Rhynia, Lepidodendron, Calamites, Lepidocarpon.

**Fossil Gymnosperms:** Cycadeodea, Cordaites, Williamsonia.

**Suggested Readings:**

- Bhatnagar, S. P. and Moitra, A. 1997. Gymnosperms. New Age International (P) Ltd., Publisher, New Delhi.

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- Clark, D. L. 1976. Fossils, Palaeobotany and Evolution. W.M.C. Brown Company, New York.
- Meyen, S. V. 1978. Fundamentals of Palaeobotany. Chapman and Hall, London.
- Sharma, O. P. 1997. Gymnosperms. Pragati Prakashan, Meerut, India.
- Sporne, K. R. 2002. The Morphology of Gymnosperms. B. I. Pub. Pvt. Ltd. Mumbai, Kolkata, Delhi.
- Thomas, B. A. and Spice, R. A. 1986. The Evolution and Palaeobotany of land Plants. Publ. Crom. Helm London and Sydney.
- Vasishta P.C. 1980. Gymnosperms. S. Chand and Co. Ltd., New Delhi.

## B. Sc. BOTANY PRACTICAL EXAMINATION

SEMESTER I & II

SKELETON PAPER

MAX. MARKS: 100

TIME 4 HOURS

Q. No.	Practical	Marks
1.	Make suitable stained glycerine preparation of any one alga from the given mixture 'A' Draw its labelled diagram, assign it to its systematic position giving reasons.	08
2.	Make suitable preparation of the reproductive structure of material "B" Draw labelled diagrams, identify giving reasons.	10
3.	Make suitable stained preparation of material 'C' (Vegetative/ Reproductive) Draw a labelled diagram, identify giving reasons.	10
4.	Make suitable preparation of material 'D' (Vegetative/Reproductive) Draw a labelled sketch, identify giving reasons.	10
5.	Make a suitable preparation of material "E" (Vegetative/Reproductive) Draw a labelled sketch, identify giving reasons.	10
6.	One microbiology experiment for comments or Gram staining.	08
7.	Comment upon the spots (1-6), Identify giving reasons (3 Minutes for each Spot)	24
8.	Viva-Voce	10
9.	Practical Record	10
	<b>Total</b>	<b>100</b>

### Suggested Laboratory Exercises:

1. Microscopic preparations and study of the following algal material:  
*Nostoc, Oscillatoria, Volvox, Coleochaete, Vaucheria, Chara, Ectocarpus and Polysiphonia.*
2. Study of class work material by making suitable temporary slides and study of permanent slides of:  
Yeasts, *Aspergillus, Peziza, Agaricus.*
3. Study of Specimen, permanent slides and by making suitable temporary slides:  
*Albugo, Sclerospora, Claviceps, Ustilago, Puccinia Alternaria*
4. Study of External morphology and preparations of slides of vegetative and reproductive parts of following Bryophytes: *Riccia, Marchantia, Anthoceros, Sphagnum.*
5. Study of External morphology and preparations of stained slides of vegetative and reproductive parts of following Pteridophytes: *Selaginella, Equisetum and Marsilea.*

Microscopic examination of fossil slides, specimen/photograph-

*Rhynia, Lepidodendron, Calamites and Lepidocarpon.*

6. Study of External morphology and preparations of suitable section of vegetative/ reproductive parts of following Gymnosperms: *Cycas, Pinus and Ephedra*

#### Cycas

- i. Study through permanent slides - normal root (T.S.), stem (T.S.) (if sections are not available show photographs), ovule (L.S.).
- ii. Study through hand sections or dissections - coralloid root (T.S.), rachis (T.S.), leaflet (T.S.), microsporophyll (T.S.), pollen grains (W.M.)

#### Pinus

- i. Study through permanent slides - root (T.S.), female cone (L.S.), ovule (L.S.), embryo (W.M.) showing polyembryonic condition.
- ii. Study through hand sections- young stem (T.S.), old stem (wood) (T.L.S. and R.L.S.), needle (T.S.), male cone (L.S.), male cone (T.S.), pollen grains (W.M.)

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## Ephedra

- i. Permanent slides - female cone (L.S.).
- ii. Hand sections/dissections - node (T.S.), internode (T.S.), male cone (T.S. and L.S.), pollen grains.

7. Study of bacteria using curd or any other suitable material by Gram staining of bacteria:

Study of Mycoplasma, TMV, Pox virus, bacteriophage (photographs)

Study of symptoms of plant diseases - Downy mildew of Bajra, Green ear of bajra, Mosaic of bhindi, White rust of crucifers, Loose smut of wheat and Covered smut of barley, Rusts of wheat.