

BOTANY
(Semester-I)

(For examinations to be held in the years 2016, 2017, 2018)

Course No: UBOTC101	Title: Diversity of Microbes & Cryptogams (Theory)
Duration of Exam: 3hrs	Maximum Marks: 100
Credits: 04	External Examination: 80 Marks
	Internal Assessment: 20 Marks

Objectives:

The course is designed to familiarize the students with microbes and cryptogams. These plant groups are of great human use in agriculture, horticulture, medical and biotechnology based industries. Therefore, students need to know about their structural diversity, biology and utilization.

Unit-I Microbes and Microbiology

- 1.1 General account of plant viruses (TMV), transmission and control; concept of viroids and prions.
- 1.2 Bacteria-Ultrastructure, nutrition and reproduction, general account of Mycoplasma and Cyanobacteria.
- 1.3 Genetic recombination in bacteria (transformation, transduction and conjugation).
- 1.4 Economic importance of bacteria and plant viruses.

Unit-II Algae

- 2.1 General characteristics and classification of algae (Parker, 1982) up to class level.
- 2.2 Important features of Chlorophyceae and Xanthophyceae; life histories of *Volvox*, *Oedogonium*, *Chara* and *Vaucheria*.
- 2.3 Important features of Phaeophyceae and Rhodophyceae; Life histories of *Ectocarpus* and *Polysiphonia*.
- 2.4 Economic importance of algae (as food and feed; algal blooms and toxins).

Unit-III Fungi

- 3.1 General characteristics and classification of fungi (Ainsworth 1971), Economic importance of fungi, General account of Lichens.
- 3.2 Important features of Mastigomycotina; Life histories of *Pythium* and *Allomyces*.

- 3.3 Important characteristics of Zygomycotina and Ascomycotina; Life histories of *Rhizopus*, *Eurotium* and *Morchella*.
- 3.4 Important characteristics of Basidiomycotina and Deuteromycotina; Life histories of *Puccinia*, *Agaricus*, *Colletotrichum* and *Cercospora*.

Unit-IV Bryophytes

- 4.1 Bryophytes as the earliest land dwellers; general characteristics, classification (Smith, 1955) and alternation of generations.
- 4.2 Structure and reproduction in Hepaticae with reference to *Marchantia*.
- 4.3 Structure and reproduction in Anthocerotae and Musci with reference to *Anthoceros* and *Funaria*.
- 4.4 Evolution of sporophyte in bryophytes; importance of bryophytes in preventing soil erosion; monitoring and controlling pollution; geobotanical prospecting; in horticulture and as source of antibiotics.

Unit-V Pteridophytes

- 5.1 General characteristics, classification (Sporne, 1975) and origin of pteridophytes (the first vascular plants); stelar system and alternation of generations.
- 5.2 Important characteristics of Psilopsida and Lycopsida; Structure and reproduction in *Psilotum*, *Lycopodium* and *Selaginella* (excluding development).
- 5.3 Important characteristics of Sphenopsida; structure and reproduction in *Equisetum* (excluding development).
- 5.4 Important characteristics of Pteropsida; structure and reproduction in *Pteris* and *Marsilea* (excluding development).

Note for paper setters

External End Semester Examination (Total marks: 80)

The question paper will have 2 sections. Section 'I' will be compulsory having ten questions of 2 marks each. The questions will be short answer type having answers not exceeding 20 to 50 words. Section II will have long answer type questions of 12 marks each, two from each unit. The candidates will be required to answer one question from each unit.

Internal Assessment (Total Marks: 20)

20 marks for theory paper in a subject reserved for internal assessment shall have one long answer type question of 10 marks and five short answer type question of 2 marks each.

Suggested Readings

1. Bilgrami, K.S. and Saha L.C. 1992. A Textbook of Algae. CBS Publishers and Distributors, Delhi.
2. Dube, H.C. 1990. An Introduction to Fungi. Vikas Publishing House Pvt. Ltd., Delhi.
3. Parihar, N. S. 1996. The Biology and Morphology of Pteridophytes. Central Book Distributors, Allahabad.
4. Puri, P. 1980. Bryophyta: Broad perspectives. Atma Ram & Sons, Delhi.
5. Rashid A. 1976. An Introduction to Pteridophytes- Diversity and Differentiation. Vikas Publishing House.
6. Smith, G.M. 1971. Cryptogamic Botany. Vol-I: Algae & Fungi. Tata McGraw Hill Publishing Co., New Delhi.
7. Smith, G.M. 1971. Cryptogamic Botany. Vol. II; Bryophytes & Pteridophytes. Tata McGraw Hill Publishing Co., New Delhi.
8. Sporne, K. R. 1970. The Morphology of Pteridophytes. Hutchinson Univ. Library, London.
9. Sumbali, G. and Mehrotra, R. S. 2009. Principles of Microbiology. The McGraw Hill Education Pvt. Ltd. New Delhi.
10. Sumbali G. 2010. The Fungi. 2nd Edn. Narosa Publishing House, New Delhi.

BOTANY
(Semester-I)
(For examinations to be held in the years 2016, 2017, 2018)

Course No: UBOPC102 **Title: Diversity of Microbes & Cryptogams (Practical)**

Duration of Exam: 3hrs. **Maximum Marks: 100**
Credits: 02 **External Examination: 50 Marks**
 Internal Assessment: 50 Marks

Suggested Laboratory Exercises

1. Study of the genera included under algae and fungi.
2. Study of morphology, reproductive structures and anatomy of the examples cited in theory under Bryophyta and Pteridophyta.
3. Observation of disease symptoms in hosts infected by fungi, viruses and mycoplasma. Section cutting of diseased materials and identification of the pathogens as per the theory syllabus.
4. Gram staining of bacteria.
5. Study of crustose, foliose and other types of lichen thalli.

Note for distribution of 50 Marks in Practical Examination:

I. Internal Assessment

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|----|---|----------|
| 1. | Day to Day performance in the laboratory: | 20 Marks |
| 2. | Class Test: | 10 Marks |
| 3. | Regularity of Attendance: | 10 Marks |
| 4. | Viva-voce | 10 Marks |

II. External Assessment

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|----|-----------|---|----------|
| 1. | Test | : | 40 Marks |
| 2. | Viva-voce | : | 10 Marks |

BOTANY
(Semester-II)
(For examination to be held in the years 2016, 2017, 2018)

Course No: UBOTC201	Title: Characteristics and Systematics of seed plants (Theory)
Duration of Exam: 3hrs	Maximum Marks: 100
Credits: 04	External Examination: 80 Marks Internal Assessment: 20 Marks

Objectives:

Gymnosperms and angiosperms represent the important botanical groups exhibiting great diversity. The course, therefore, is designed to study these groups for structural aspects and analyse these in a scientific manner for establishing their grouping.

UNIT-I: Seed Plants-Origin, Evolution and Characteristics

- 1.1 Fossilization –Processes and types, age of fossils and their importance.
- 1.2 Fossil gymnosperms - a general account; Bennettiales (Cycadeoidales)- history and distribution.
- 1.3 Characteristic features, morphology, anatomy and reproduction in *Williamsonia* and *Cycadeoidea*.
- 1.4 Fossil angiosperms – a general account.

UNIT-II Classification, Morphology and Reproduction in Gymnosperms

- 2.1 General characters of gymnosperms; classification of gymnosperms as proposed by Sporne (1965).
- 2.2 Morphology, anatomy, reproduction and life cycle of *Cycas*
- 2.3 Morphology, anatomy, reproduction and life cycle of *Pinus*.
- 2.4 Morphology, anatomy, reproduction and life cycle of *Ephedra*.

UNIT-III Angiosperm-Origin and Nomenclature

- 3.1 Origin of angiosperms, characteristics of some primitive angiosperms with special reference to *Magnolia*.
- 3.2 History of angiosperm taxonomy - classical and modern, species concept and speciation.
- 3.3 Taxonomic identification: taxonomic keys and literature (floras, monographs and reviews).
- 3.4 Botanical nomenclature- principles and rules, taxonomic ranks, type concept and principle of priority.

UNIT-IV Classification and Tools in Angiosperm Taxonomy

- 4.1 Salient features of the classification of Bentham and Hooker; merits and demerits.
- 4.2 Salient features of the classification of Engler and Prantl; merits and demerits.
- 4.3. Contribution of anatomy and embryology to taxonomy.
- 4.4 Contribution of cytology and phytochemistry to taxonomy.

UNIT-V Diversity of Angiosperms

- 5.1 Morphological diversity of families: Ranunculaceae, Brassicaceae, Malvaceae and Asteraceae.
- 5.2 Morphological diversity of families: Fabaceae, Rosaceae, Apiaceae and Acanthaceae.
- 5.3 Morphological diversity of families: Apocyanaceae, Solanaceae, Lamiaceae and Euphorbiaceae.
- 5.4 Morphological diversity of families: Liliaceae, Amaryllidaceae and Poaceae.

Note for paper setters

External End Semester Examination (Total marks: 80)

The question paper will have 2 sections. Section 'I' will be compulsory having ten questions of 2 marks each. The questions will be short answer type having answers not exceeding 20 to 50 words. Section II will have long answer type questions of 12 marks each, two from each unit. The candidates will be required to answer one question from each unit.

Internal Assessment (Total Marks: 20)

20 marks for theory paper in a subject reserved for internal assessment shall have one long answer type question of 10 marks and five short answer type question of 2 marks each.

Suggested readings:

1. Bhatnagar, S.P. and Moitra, A. 1996. Gymnosperms. New Age International Limited, New Delhi.
2. Davis, P.H. and Heywood, V.H. 1963. Principles of Angiosperm Taxonomy. Oliver and Boyd, London.
3. Gifford, E.M. and Foster, A.S. 1988. Morphology and Evolution of Vascular Plants. W.H. Freeman and company, New York.
4. Jeffery, C. 1982. An Introduction to Plant Taxonomy. Cambridge University Press , London.
5. Jones, S.B. and Luchsinger, A.E. 1986. Plant Systematics. 2nd Edn. Mc Graw Hill Book Co., New York.
6. Radford, A.E. 1986. Fundamentals of Plant Systematics. Harper and Row, New York.
7. Singh, G. 1999. Plant Systematics: Theory and Practice. Oxford and IBH Pvt. Ltd., New Delhi.
8. Sporne, K.R. 1965. The Morphology of Gymnosperms. Hutchinson and Co. Ltd., London.
9. Stace, C.A. 1989. Plant Taxonomy and Biosystematics. 2nd Edn., Edward Arnold, London.
10. Stewart, W.M. 1983. Paleobotany and the Evolution of Plants. Cambridge University Press, Cambridge.

BOTANY
(Semester-II)
(For examinations to be held in the years 2016, 2017, 2018)

Course No: UBOPC202	Title: Characteristics and Systematics of seed plants. (Practical)
Duration of Exam: 3hrs	Maximum Marks: 100
Credits: 02	External Examination: 50 Marks Internal Assessment: 50 Marks

ANGIOSPERMS

Locally available genera/species of following families should be included. This list is only indicative. Teachers may select plants available in their locality.

1. Ranunculaceae: *Ranunculus, Delphinium*
2. Brassicaceae: *Brassica, Alyssum, Iberis, Coronopus*
3. Malvaceae: *Hibiscus, Abutilon*
4. Asteraceae: *Tagetes, Ageratum*
5. Fabaceae:
Faboideae: *Lathyrus, Cajanus, Melilotus, Trigonella,*
Caesalpinioideae: *Cassia, Caesalpinia,*
Mimosoideae: *Prosopis, Mimosa, Acacia.*
6. Apiaceae: *Coriandrum, Foeniculum, Anethum*
7. Acanthaceae: *Adhatoda, Peristrophe*
8. Apocynaceae: *Vinca, Thevetia, Nerium*
9. Asclepiadiaceae: *Calotropis*
10. Solanaceae: *Solanum, Withania, Datura, Petunia*
11. Euphorbiaceae: *Euphorbia, Phyllanthus*
12. Lamiaceae: *Ocimum, Salvia*
13. Chenopodiaceae: *Chenopodium, Beta*
14. Lilliaceae: *Asphodelus, Asparagus, Allium*
15. Poaceae: *Zea mays, Triticum aestivum, Oryza sativa*

GYMNOSPERMS

CYCAS

- i. Habit, armour of leaf bases on the stem (if specimen is not available show photograph), very young (circinate venation) and old foliage leaves, scale leaves, bulbils, male cone (specimen), microsporophyll, megasporophyll, mature seed.

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

PINUS

1. Habit, long and dwarf shoots showing cataphylls and scale leaves, T.S. Wood showing growth rings, male cones of 1st year, 2nd year and 3rd year, female cones, winged seeds.
2. Study through permanent slides-root (T.S), female cone (L.S), ovule (L.S) and embryo (WM) showing polycotyledonous conditions.
3. Study through hand sections or dissections-young stem (T.S), old stem (Wood) (T.L.S and R.L.S), needle (T.S), male cone (L.S and T.S) and Pollen grains (W.M.).

EPHEDRA

1. Habit and structure of whole male and female cones
2. Permanent slides-female cone (L.S)
3. Hand sections, dissections-node (L.S), internode (T.S), macerated stem to see vessel structure, epidermal peel mount of vegetative parts to study stomata; male cone (T.S and L.S) and pollen grains (W.M.)

In addition to laboratory exercises, study of plant diversity in nature is required, for which a field trip should be organized.

Note for distribution of 50Marks in Practical Examination:

I. Internal Assessment

- | | | |
|----|---|----------|
| 1. | Day to Day performance in the laboratory: | 20 Marks |
| 2. | Class Test: | 10 Marks |
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II. External Assessment

- | | | |
|----|-----------|----------|
| 1. | Test: | 40 Marks |
| 2. | Viva-voce | 10 Marks |