FACULTY OF SCIENCE

SYLLABI

FOR

B.Sc. (Hons. School) Botany

(Semester System)

EXAMINATIONS 2015-2016

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Outlines of tests, syllabi and courses of reading in the subject of Botany for B.Sc. (Hons. School) semester I-VI examinations of 2015-16

B.Sc. (Hons. School) Semester-I

<table>
<thead>
<tr>
<th>THEORY (500 Marks)</th>
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<tbody>
<tr>
<td>Paper I: Phycology</td>
<td>75 (60A+15CA) + 25 (20A+5CA)</td>
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<tr>
<td>Paper II: Cytology</td>
<td>75 (60A+15CA) + 25 (20A+5CA)</td>
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<tr>
<td>Paper III: Subsidiary</td>
<td>75 (60A+15CA) + 25 (20A+5CA)</td>
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<tr>
<td>Paper IV: Subsidiary</td>
<td>75 (60A+15CA) + 25 (20A+5CA)</td>
</tr>
<tr>
<td>Paper V: Subsidiary (English)</td>
<td>100 (80A+20CA)</td>
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B.Sc. (Hons. School) Semester-II

<table>
<thead>
<tr>
<th>THEORY (500 Marks)</th>
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<tbody>
<tr>
<td>Paper I: Bryology</td>
<td>75 (60A+15CA) + 25 (20A+5CA)</td>
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<tr>
<td>Paper II: Economic Botany</td>
<td>75 (60A+15CA) + 25 (20A+5CA)</td>
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<tr>
<td>Paper III: Subsidiary</td>
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The Environment & Road Safety Education is a compulsory qualifying paper, which the students have to study in the B.Sc. 1st year (2nd Semester). If the student/s failed to qualify the paper during the 2nd Semester, he/she/they be allowed to appear/qualify the same in the 4th or 6th Semester/s.

B.Sc. (Hons. School) Semester-III

<table>
<thead>
<tr>
<th>THEORY (500 Marks)</th>
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<tbody>
<tr>
<td>Paper I: Pteridology</td>
<td>75 (60A+15CA) + 25 (20A+5CA)</td>
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<tr>
<td>Paper II: Plant Anatomy</td>
<td>75 (60A+15CA) + 25 (20A+5CA)</td>
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<tr>
<td>Paper III: Ethnobotany</td>
<td>75 (60A+15CA) + 25 (20A+5CA)</td>
</tr>
<tr>
<td>Paper IV: Subsidiary</td>
<td>75 (60A+15CA) + 25 (20A+5CA)</td>
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B.Sc. (Hons. School) Semester-IV

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<tr>
<th>THEORY (500 Marks)</th>
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<tbody>
<tr>
<td>Paper I: Gymnosperms</td>
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<tr>
<td>Paper II: Plant Morphogenesis</td>
<td>75 (60A+15CA) + 25 (20A+5CA)</td>
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<tr>
<td>Paper III: Paleobotany</td>
<td>75 (60A+15CA) + 25 (20A+5CA)</td>
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<tr>
<td>Paper IV: Subsidiary</td>
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B.Sc. (Hons. School) Semester-V

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<thead>
<tr>
<th>THEORY (500 Marks)</th>
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<tbody>
<tr>
<td>Paper I: Taxonomy of Angiosperms</td>
<td>75 (60A+15CA) + 25 (20A+5CA)</td>
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<tr>
<td>Paper II: Plant Ecology</td>
<td>75 (60A+15CA) + 25 (20A+5CA)</td>
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<tr>
<td>Paper III: Genetics</td>
<td>75 (60A+15CA) + 25 (20A+5CA)</td>
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<tr>
<td>Paper IV: Plant Breeding</td>
<td>75 (60A+15CA) + 25 (20A+5CA)</td>
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<tr>
<td>Paper V: Molecular Biology</td>
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B.Sc. (Hons. School) Semester-VI

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<th>THEORY (500 Marks)</th>
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<tbody>
<tr>
<td>Paper I: Mycology and Lichenology</td>
<td>75 (60A+15CA) + 25 (20A+5CA)</td>
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<tr>
<td>Paper II: Plant Physiology</td>
<td>75 (60A+15CA) + 25 (20A+5CA)</td>
</tr>
<tr>
<td>Paper III: Plant Biochemistry</td>
<td>75 (60A+15CA) + 25 (20A+5CA)</td>
</tr>
<tr>
<td>Paper IV: Microbiology – Viruses, Bacteria, Mycoplasma</td>
<td>75 (60A+15CA) + 25 (20A+5CA)</td>
</tr>
<tr>
<td>Paper V: Embryology of Angiosperms</td>
<td>75 (60A+15CA) + 25 (20A+5CA)</td>
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ENVIRONMENT AND ROAD SAFETY EDUCATION (SEMESTER – II)

Note: The syllabus has 15 topics to be covered in 25 hour lectures in total, with 2 lectures in each topic from 2 to 11 and one each for the topics 1 and 12 to 15.

1. Environment Concept:
Introduction, concept of biosphere – lithosphere, hydrosphere, atmosphere; Natural resources – their need and types; Principles and scope of Ecology; concepts of ecosystem, population, community, biotic interactions, biomes, ecological succession.

2. Atmosphere:
Parts of atmosphere, components of air; pollution, pollutants, their sources, permissible limits, risks and possible control measures.

3. Hydrosphere:
Types of aquatic systems; Major sources (including ground water) and uses of water, problems of the hydrosphere, fresh water shortage; pollution and pollutants of water, permissible limits, risks and possible control measures.

4. Lithosphere:
Earth crust, soil – a life support system, its texture, types, components, pollution and pollutants, reasons of soil erosion and possible control measures.

5. Forests:
Concept of forests and plantations, types of vegetation and forests, factors governing vegetation, role of trees and forests in environment, various forestry programmes of the Govt. of India, Urban Forests, Chipko Andolan.

6. Conservation of Environment:
The concepts of conservation and sustainable development, why to conserve, aims and objectives of conservation, policies of conservation; conservation of life support systems – soil, water, air, wildlife, forests.

7. Management of Solid Waste:
Merits and demerits of different ways of solid waste management– open dumping, landfill, incineration, resource reduction, recycling and reuse, vermicomposting and vermiculture, organic farming.

8. Indoor Environment:
Pollutants and contaminants of the in-house environment; problems of the environment linked to urban and rural lifestyles; possible adulterants of the food; uses and harms of plastics and polythene; hazardous chemicals, solvents and cosmetics.

9. Global Environmental Issues:
Global concern, creation of UNEP; Conventions on climate change, Convention on biodiversity; Stratospheric ozone depletion, dangers associated and possible solutions.

10. Indian Laws on Environment:
Indian laws pertaining to Environmental protection: Environment (Protection) Act, 1986; General information about laws relating to control of air, water and noise pollution. What to do to seek redressal.

11. Biodiversity:
What is biodiversity, levels and types of biodiversity, importance of biodiversity, causes of its loss, how to check its loss; Hotspot zones of the world and India, Biodiversity Act, 2002.

12. Noise and Microbial Pollution:
Pollution due to noise and microbes and their effects.

13. Human Population and Environment:

14. Social Issues:
Environmental Ethics: Issues and possible solutions, problems related to lifestyle, sustainable development; Consumerisms and waste generation.

**15. Local Environmental Issues:**
Environmental problems in rural and urban areas. Problem of Congress Grass & other weeds, problems arising from the use of pesticides and weedicides, smoking etc.

**Practical**
Depending on the available facility in the college, a visit to vermicomposting units or any other such non-polluting eco-friendly site or planting/caring of vegetation/trees could be taken.

**Examination Pattern:**
A qualifying paper of 50 marks comprising of fifty multiple choice questions (with one correct and three incorrect alternatives and no deduction for wrong answer or un-attempted question), and of 1 hour duration.

The students have to obtain 33% marks to qualify the paper. The marks are not added / included in the final mark sheet.

**UNIT II (ROAD SAFETY)**
1. Concept and Significance of Road Safety.
2. Role of Traffic Police in Road Safety.
3. Traffic Engineering – Concept & Significance.
5. How to obtain Driving License.
7. Common Driving mistakes.
8. Significance of First-aid in Road Safety.
9. Role of Civil Society in Road Safety.

**Note:** Examination Pattern:
- The Environment and Road Safety paper is 70 marks.
- Seventy multiple choice questions (with one correct and three incorrect alternatives and no deduction for wrong or un-attempted questions).
- The paper shall have two units: Unit I (Environment) and Unit II (Road Safety).
- Unit II shall comprise of 20 questions with minimum of 1 question from each topics 1 to 10.
- The entire syllabus of Unit II is to be covered in 10 hours.
- All the questions are to be attempted.
- Qualifying Marks 33 per cent i.e. 23 marks out of 70.
- Duration of examination: 90 minutes.
- The paper setter is requested to set the questions strictly according to the syllabus.

**Suggested Readings**
2. Road Safety Signage and Signs (2011), Ministry of Road Transport and Highways, Government of India.

**Websites:**
(a) [www.chandigarhpolice.nic.in](http://www.chandigarhpolice.nic.in)
(b) [www.punjabpolice.gov.in](http://www.punjabpolice.gov.in)
(c) [www.haryanapolice.gov.in](http://www.haryanapolice.gov.in)
(d) [www.hppolice.nic.in](http://www.hppolice.nic.in)
### B.Sc. (Hons. School) Semester-I Botany (Subsidiary)

<table>
<thead>
<tr>
<th>Paper-I</th>
<th>Plant Diversity – I (Cryptogams)</th>
<th>75 (60A+15CA) + 25 (20A+5CA)</th>
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<tbody>
<tr>
<td></td>
<td>Elementary Botany for Basic Medical Sciences (Bio-physics, Bio-chemistry and Microbiology)</td>
<td>75 (60A+15CA) + 25 (20A+5CA)</td>
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### B.Sc. (Hons. School) Semester-II Botany (Subsidiary)

<table>
<thead>
<tr>
<th>Paper-I</th>
<th>Plant Diversity – II (Phanerogams)</th>
<th>75 (60A+15CA) + 25 (20A+5CA)</th>
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### B.Sc. (Hons. School) Semester-III Botany (Subsidiary)

<table>
<thead>
<tr>
<th>Paper-I</th>
<th>Plant Diversity – III (Plant Anatomy, Applied Botany &amp; Cytogenetics)</th>
<th>75 (60A+15CA) + 25 (20A+5CA)</th>
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### B.Sc. (Hons. School) Semester-IV Botany (Subsidiary)

<table>
<thead>
<tr>
<th>Paper-I</th>
<th>Plant Diversity – IV (Plant Ecology &amp; Physiology)</th>
<th>75 (60A+15CA) + 25 (20A+5CA)</th>
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Syllabi for B. Sc. (Hons. School) 1st Semester Botany

Paper - I: Phycology

Objective: To acquaint the students about the morphology, biology and importance of algal organisms.

Teaching Methodology: It will involve class rooms lectures, practicals and field visits etc.

Instructions for the paper setter:

Question paper will have **four** units. Examiner will set a total of nine questions comprising two questions from each unit, and one compulsory question of short answer type covering the whole syllabus. Students will attempt one question from each unit and the compulsory question. All questions may carry equal marks, unless specified.

UNIT-I

1. Classification of Algae: Taxonomic parameters including those pertaining to photosynthetic pigments, cell wall, food reserves, flagellation etc. Details of latest system of classification.

UNIT-II

2. Salient features, cell structure, thallus organization, reproduction and broad classification of Cyanophyta, Chlorophyta, Rhodophyta, Bacillariophyta, Xanthophyta and Phaeophyta.

3. Economic aspects: Uses of algae as food and feed; importance in industry, agriculture, academics, water reservoirs etc. Algal toxicity and parasitism.

UNIT-III

4. Distribution, morphology, and life history of following genera:
   (a) Cyanophyta: Oscillatoria, Nostoc
   (b) Chlorophyta: Chlamydomonas, Volvox, Hydrodictyon, Zygnema, Oedogonium, Cladophora, Ulva, Chara.
   (c) Rhodophyta: Porphyra, Batrachospermum
   (d) Bacillariophyta: Pinnularia
   (e) Xanthophyta: Vaucheria.
   (f) Phaeophyta: Ectocarpus, Dictyota, Sargassum.

UNIT-IV

Practicals

1. Morphological studies of the following genera:
   (a) Prokaryotic Algae - Oscillatoria, Nostoc, Scytonema
   (b) Eukaryotic Algae -
       Unicellular - Cosmarium.
       Colonial - Hydrodictyon, Volvox.
       Filamentous - Ulothrix, Spirogyra, Zygnema, Oedogonium, Cladophora.

2. Morphology and reproductive organs of Codium, Chara, Vaucheria.

3. Internal organization of the thallus particularly in Ulva, Dictyota, Zonaria, Padina.

4. Identification of algae from dish flora.

5. Algal collections from different habitats and their identification.

Suggested Reading

Syllabi for B. Sc. (Hons. School) 1st Semester Botany

Paper - II: Cytology

**Theory : 75 (60A+15CA)**

**Practical : 25 (20A+5CA)**

**Objective:** Introduction to basic principles and methodology involved in Genetics and Cytology. Applications of Genetics and Cytology.

**Teaching Methodology:** Use of power point presentation as an aid for teaching wherever necessary.

**Instructions for the paper setter:**

Question paper will have four units. Examiner will set a total of nine questions comprising two questions from each unit, and one compulsory question of short answer type covering the whole syllabus. Students will attempt one question from each unit and the compulsory question. All questions may carry equal marks, unless specified.

**UNIT-I**

1. Structural and functional organization of prokaryotic and eu-karyotic cells; cell wall, membrane systems, endoplasmic reticulum, golgi apparatus, lysosomes, peroxisomes, ribosomes, mitochondria, chloroplast, nucleus, chromosomes.

**UNIT-II**


3. Chromosomes and Heredity: Physical and chemical structure of chromosomes, chromosome organization, chromosomal determination of sex, Morgan's cross and X-linked inheritance, non-disjunction as proof of chromosomal basis of heredity.

**UNIT-III**

4. Variations in chromosome number: Haploids, polyploids, autoploids, allopolyploids, aneuploids, and their behaviour in meiosis; role of polyploidy in breeding of crop plants.

**UNIT-IV**

5. Structural changes in chromosomes: Deletions, duplications, inversions and translocations, their significance; Meiosis in structural heterozygotes.

6. Mutations and mutagens: Spontaneous, induced, para-and point-mutations; Mutagens-types, and mechanism of action.

**Practicals**

1. Study of chromosomes, karyotypes.

2. Stages of mitosis and meiosis in plants; chromosomal alterations during meiosis following radiation.

3. Chemical induced chromosomal aberrations in somatic cells.

**Suggested Reading**


**Objective:** To build up a sound foundation in the subject of cryptogamic Botany in general and Bryophytes in particular so that the students may be able to apply the acquired knowledge while interacting into the other fields of Botany.

**Teaching Methodology:**
1. To make the students to understand the subject thoroughly, emphasis has always been to coordinate the text taught in the theory class with the practicals done in the laboratory in order to make the teaching-learning process more interesting,
2. The bio-visual aids are invariably used while teaching
3. The students are taken to the field for bryological excursions to familiarize them flora in nature.

**Instructions for the paper setter:**
Question paper will have four units. Examiner will set a total of nine questions comprising two questions from each unit, and one compulsory question of short answer type covering the whole syllabus. Students will attempt one question from each unit and the compulsory question. All questions may carry equal marks, unless specified.

**UNIT-I**
1. General characteristics of Bryophytes.
2. Broad classification and a comparative account of subdivisions Muscophytina, Hepatophytina and Anthocerophytina.

**UNIT-II**
3. Origin : Algal ancestry, Pteridophytic ancestry and origin from ‘Green Autotrophs’.
4. Gametophyte : Basic organization with suitable examples from Isophyllous (Takakia, Polytrichum, Funaria, Sphagnum), Anisophyllous (Porella, Frullania) and Thalloid (Anthoceros, Pellia, Marchantia, Riccia) types.

**UNIT-III**
5. Sporophyte : Variation of structure in bryophytes.

**UNIT-IV**
7. Ecological Significance of Bryophytes: Pioneer colonizers, role in water conservation and prevention of soil erosion and management of forest floors, geobotanical prospecting. Phytoremediation and pollution monitoring etc.
8. Economic importance of bryophytes.

**Practicals**
1. Morphological studies of the following : Funaria, Polytrichum, Sphagnum, Entodon, Porella, Marchantia, Riccia, Anthoceros.
2. Anatomical studies of Polytrichum, Funaria, Entodon.
3. Internal organisation of thallus in Anthoceros, Riccia, Marchantia, Pellia.
5. Peristome teeth of Polytrichum, Barbula, Funaria, Entodon.

**Suggested Reading**
**Objective:** To acquaint the students about the morphology, biology and economic importance of various plant groups.

**Teaching Methodology:** It will involve class room lectures, power point presentations, charts, models, practicals and field visits etc.

**Instructions for the paper setter:**
Question paper will have four units. Examiner will set a total of nine questions comprising two questions from each unit, and one compulsory question of short answer type covering the whole syllabus. Students will attempt one question from each unit and the compulsory question. All questions may carry equal marks, unless specified.

**UNIT-I**
1. **Wood and Cork:** Wood: definition, types, properties, seasoning, preservation and uses; common timber trees of India. Cork: source, extraction, properties, and uses.
2. **Latex Products:** Formation of latex in plants. Rubber: sources, extraction and processing of natural rubber; Some less important rubber plants.

**UNIT-II**
4. **Spices and Condiments:** Source, collection and uses of Ginger, Turmeric, Cinnamon, Saffaron, Clove, Pepper, Coriannder, Capsicum, Cumin, Fennel, Cardamom, Fenugreek, Peppermint, Vanilla, Nutmeg & Mace, Oregano, Thyme, Basil, Celery, and Rosemary.

**UNIT-III**
5. **Industrial Fatty Oils, Essential Oils:** Types, source, methods of extraction, and uses.
6. **Waxes:** Some important waxes, their source and uses.
7. **Fiber Plants and Pulp Plants:** Definition, classification, uses; important fiber yielding plants (Cotton, Jute, Coir,); Pulp Plants: Bamboo and Eucalyptus.

**UNIT-IV**
8. **Beverages:** Botany, processing and importance of Coffee, Tea, Cocoa.
9. **Crops:** Botany, cultivation practices, soil management, and important varieties of the following crops: Cereals: Wheat, Rice; Vegetables: Potato, Tomato; Fruits: Mango, Grape, Lemon; Fodder Plants: Sorghum and Barseem; Ornamental plants: two of each group i.e. trees, climbers and shrubs.

**Practicals**
1. Study of wood anatomical features of two soft woods and two hard woods.
2. Detailed morphology of some spices.
3. Morphological studies of some
   (a) gums and resins
   (b) fibers
   (c) important crops.

**Suggested Reading**
Objective: To acquaint the students about the classification, morphology, biology and economic importance of various pteridophytic plants.

Teaching Methodology: It will involve classroom lectures, power point presentations, charts, models, practicals and field visits etc.

Instructions for the paper-setter

Question paper will have four units. Examiner will set a total of nine questions comprising two questions from each unit, and one compulsory question of short answer type covering the whole syllabus. Students will attempt one question from each unit and the compulsory question. All questions may carry equal marks, unless specified.

UNIT-I
1. General characters of Pteridophytes.
2. Geological history of the earth, types of fossils and their formation.

UNIT-II
4. Evolution of stelar system: Telome theory.

UNIT-III
5. The earliest known records of Pteridophytes with special reference to Rhynia, Zosterophyllum, Asteroxylon, Sphenophyllum.

UNIT-IV
6. Distribution pattern, habitat, morphology, and life cycles in the following genera : Psilotum, Lycopodium, Selaginella, Isoetes, and Equisetum.

Practicals
1. Study of morphology, anatomy and reproductive organs of Lycopodium, Selaginella, Isoetes and Equisetum.
2. Study of fossil representatives from permanent records.
3. Study of some Pteridophytes in their natural habitats.

Suggested Readings
Syllabi for B. Sc. (Hons. School) III Semester Botany

Paper- II : Plant Anatomy
Theory : 75 (60A+15CA)  
Practical: 25 (20A+5CA)

Objective: To acquaint the students about the detailed anatomical studies of various tissues and plant organs.

Teaching Methodology: It will involve class room lectures, power point presentations, charts, models, practicals and field visits etc.

Instructions for the paper-setter

Question paper will have four units. Examiner will set a total of nine questions comprising two questions from each unit, and one compulsory question of short answer type covering the whole syllabus. Students will attempt one question from each unit and the compulsory question. All questions may carry equal marks, unless specified.

UNIT-I
1. History, scope and importance of plant anatomy.
2. Tissue Systems  
   (a) Epidermal : stomata, trichomes, nectaries, hydathodes;  
   (b) Fundamental : parenchyma, collenchyma, and sclerenchyma; distribution of mechanical tissue.

UNIT-II
(c) Vascular : Xylem: general structure of primary and secondary xylem, cell types; Phloem : cell types, primary phloem, secondary phloem.  

UNIT-III
5. The Stem : Primary and secondary state of growth.

UNIT-IV
6. Leaf : Basic structure and development of monocot and dicot leaves.
7. Meristems : Shoot apex, root apex and floral apex.

Practicals
Practicals based on theory topics.

Suggested Reading

Syllabi for B. Sc. (Hons. School) III Semester Botany

Paper- III : Ethnobotany
Theory : 75 (60A+15CA)  
Practical: 25 (20A+5CA)

Objective: To acquaint the students about the detailed study of ethnobotanical account of different plant groups.

Teaching Methodology: It will involve class room lectures, power point presentations, charts, models, practicals and field visits etc.

Instructions for the Paper-setter

Question paper will have four units. Examiner will set a total of nine questions comprising two questions from each unit, and one compulsory question of short answer type covering the whole syllabus. Students will attempt one question from each unit and the compulsory question. All questions may carry equal marks, unless specified.
UNIT-I
1. Ethnobotany – Introduction, Definition and its scope, interdisciplinary approach and contribution to modern world.
2. Ethnic centres of the world with special reference to India; Major and minor tribes, their life style and conservation practices for biodiversity conservation.

UNIT-II
3. Documentation of traditional herbal medicine and history of ethnobotany.
5. A general idea of active principle component of plants; their extraction, preparation and characterization of pharmacological purposes.

UNIT-III
6. Study of Ethnobotany – quantitative and qualitative analytical methods; e.g. collecting and identifying plants, herbaria and the curation of plant specimens.
7. Herbalist(s) and herbal vendors – their role in ethnobotanical studies.

UNIT-IV
9. Screening and evaluation of local plants of Chandigarh urban region for ethnobotanical and medicinal importance.
10. Study of some important plants in mythologies and religions, for examples: Ashoka (Saraca asoca), Banyan (Ficus benghalensis), Bael (Aegle marmelos), Bamboo spp. Banana (Musa paradisiaca), Bhang (Canabis sativa), Coconut (Cocos nucifera), Lotus (Nelumbo nucifera), Mango (Mangifera indica), Neem (Azadirachta indica), Peepal (Ficus religiosa), Red Sandalwood (Pterocarpus santalinus), Tulsi (Ocimum sanctum).

Practicals
1. Visit to nearby forest area.
2. Identification and description of some plants in relation to ethnobotany.
3. Field identification of 10 plants used by tribals for household purposes.
4. Quantitative estimation of use values of the local plants.
5. Ecology and distribution of some important medicinal plants locally available in Chandigarh urban environment.

Suggested Reading

B.Sc. (Hons. School) IV Semester Botany

Paper–I : Gymnosperms
Theory : 75 (60A+15CA)
Practical: 25 (20A+5CA)

Objective: To acquaint the students about the latest trends in classification, vegetative morphology, and reproductive biology of various specimens of gymnosperms.

Teaching Methodology: It will involve classroom lectures, power point presentations, charts, models, practicals and field visits etc.

Instructions for the paper setter:
Question paper will have four units. Examiner will set a total of nine questions comprising two questions from each unit, and one compulsory question of short answer type covering the whole
syllabus. Students will attempt one question from each unit and the compulsory question. All questions may carry equal marks, unless specified.

UNIT-I
1. Developments in classification; criteria, current concepts and characteristics of various groups.

UNIT-II
2. Morphology and life history, including development of gametophyte, sex organs and embryo of *Cycas* (Cycadales).

UNIT-III
4. Morphology and life history, including development of gametophyte, sex organs and embryo of *Pinus* (Coniferales).
5. Morphology and life history, including development of gametophyte, sex organs and embryo of *Ephedra* (Ephedrales).

UNIT-IV
6. Pteridospermic seeds and evolution of seed habit in gymnosperms.
7. Evolutionary status of pteridosperms and their angiospermic affinities.

Practicals
1. Study of morphology, anatomy; and reproductive organs in the available living cycads and taxads.

Suggested Reading

B.Sc. (Hons. School) IV Semester Botany

**Paper–II : Plant Morphogenesis**

**Theory :** 75 (60A+15CA)
**Practical: 25 (20A+5CA)**

**Objective:** To acquaint the students about the basics of plant morphogenesis, tissue culture techniques and micropropagation of plant specimens.

**Teaching Methodology:** It will involve class room lectures, power point presentations, charts, models, practicals and field visits etc.

**Instructions for the paper setter :**

Question paper will have *four* units. Examiner will set a total of nine questions comprising two questions from each unit, and one compulsory question of short answer type covering the whole syllabus. Students will attempt one question from each unit and the compulsory question. All questions may carry equal marks, unless specified.

**UNIT-I**
1. **Plant Morphogenesis** : Definition, Totipotency, Polarity, Regeneration; scope and importance.
2. **Plant Tissue and Cell Culture**: Introduction, Some commonly used terms, Landmarks on the way, Concept of differentiation, de-differentiation and re-differentiation.
3. **Laboratory Organization**: Introduction, General Layout, Washing up facilities, Preparation of culture media, sterilization, Aseptic manipulations, Incubation of cultures, Growth measurements and Conclusions.

UNIT-II

4. **Types of Cultures**: Types of cultures, Seed Culture, Embryo culture, Callus culture, Organ culture and Cell culture.

5. **Micropropagation**: Its definition, introduction, factors affecting different stages of micropropagation i.e. preparative stage, initiation of cultures, multiplication, differentiation, maintenance of plantlets and transfer to greenhouse conditions; its applications.

UNIT-III

6. **Callus Cultures**: Sources of Material, Isolation of Plant tissues, Preparation of explants, Standard Nutrient media, Basic mineral nutrients, Organic growth factors, Culture techniques, Solid media, Stationary and agitated liquid media, Sub-culture, Organogenesis and differentiation, Preservation of cultures, Histological techniques and Conclusions.

7. **Cell Suspension Cultures**: Introduction, Culture systems and nutrient media used, Maintenance of stock suspension cultures, Conclusions.

UNIT-IV

8. **Protoplast Culture**: Isolation, culture and fusion of protoplasts.


Practical

1. General Laboratory, Lay out, equipments used, transfer area, culture facilities, green houses, laboratory and personal safety measures.

2. Requirements of washing area, washing up of glassware and instruments and their sterilization.

3. Requirements of media preparation room, preparation of culture media and sterilization.

4. Steam, dry and ultra violet sterilization, maintenance of aseptic conditions.


6. Requirements of inoculation area, aseptic manipulations

7. Aseptic preparations of different explants and inoculations.

8. Incubation of cultures under different conditions.

9. Observations, data recording; growth measurements

10. To study concept of differentiation, re-differentiation and de-differentiation, under controlled conditions.

11. To study various kinds of callus cultures.

Suggested Reading


B.Sc. (Hons. School) IV Semester Botany

Paper–III : Paleobotany  
Theory : 75 (60A+15C A)  
Practical: 25 (20A+5CA)

Objective: To acquaint the students about the detailed study of fossils bryophytes, pteridophytes and gymnosperms.

Teaching Methodology: It will involve class room lectures, power point presentations, charts, models, practicals and field visits etc.

Instructions for the paper setter:

Question paper will have four units. Examiner will set a total of nine questions comprising two questions from each unit, and one compulsory question of short answer type covering the whole syllabus. Students will attempt one question from each unit and the compulsory question. All questions may carry equal marks, unless specified.

UNIT-I

Introduction, Basic principles of paleobotany, Detailed studies on Geologic Time Scale with special reference to the vegetation of each period, Fossilization, Types of Fossils, Techniques to study fossil age. Basic techniques for studying fossil plants.

UNIT-II

Fossil Bryophytes

Class Hepaticopsida: Jungermanniales, Metzgeriales, Sphaerocarpales, Marchantiales.
Class Anthocerotopsida: Anthocerotales
Class Bryopsida: Sub-class Sphagnidae-Protosphagnales, Sphagnales; Sub-class Andreaeidae – Andreaeales; Sub-class Bryidae – Eubryales.
Origin of Bryophyta (Fossil evidence)

UNIT-III

First Vascular Plants - Rhyniales, Zosterophyllales, Trimerophytales, Earliest Lycopods Prototlepidotendrales, Lepidodendrales, Calamitales, Sphenophyllales, Fossil ferns.

UNIT-IV

Fossil Gymnosperms:

Progymnospermopsida – Pityales, Protopityales, Aneurophytales.
Cycadopsida – Pteridospermales, Bennettitales, Cycadales, Pentoxyales.
Coniferopsida – cordiatales, Voltziales, Trichopityales

Fossil Angiosperms: Paleontological study of Angiospermous plants

Practicals

Based on theory contents of each unit.

Suggested Reading

B.Sc. (Hons. School) V Semester Botany

Paper–I: Taxonomy of Angiosperms

Objective: To acquaint the students about the detailed taxonomic study of various angiosperms families and their economic importance.

Teaching Methodology: It will involve class room lectures, power point presentations, charts, models, practicals and field visits etc.

Instructions for the paper setter: Question paper will have four units. Examiner will set a total of nine questions comprising two questions from each unit, and one compulsory question of short answer type covering the whole syllabus. Students will attempt one question from each unit and the compulsory question. All questions may carry equal marks, unless specified.

UNIT-I
1. Some relevant information about angiosperms; Artificial, natural and phylogenetic systems of classification; Summary of systems of classification proposed by Bessey, Engler and Prantl, Hutchinson, Takhtajan, Cronquist and Dahlgren. Details of Bentham and Hooker’s system of classification.

UNIT-II
2. Criteria for primitive and advanced nature of families and flowers.
3. Taxonomic literature i.e. manuals, floras etc.

UNIT-III
4. Salient Features and Economic Importance of the Following Dicot Families: Ranunculaceae, Magnoliaceae, Malvaceae, Brassicaceae, Rutaceae, Leguminosae (Fabaceae), Rosaceae, Cucurbitaceae, Apiaceae, Asteraceae, Apocynaceae, Asclepiadaceae, Solanaceae, Scrophulariaceae, Bignoniaceae, Polygonaceae, Chenopodiaceae, Acanthaceae, Lamiaceae, Verbenaceae, Nyctaginaceae, Amaranthaceae.

UNIT-IV
5. Salient Features and Economic Importance of the Following Monocot Families: Orchidaceae, Musaceae, Cannaceae, Liliaceae, Amaryllidaceae, Commelinaceae, Cyperaceae, and Poaceae.

Practicals
Study of cultivated and wild representatives of various families for their morphology and primitive and advanced characters; Study of basic structure of flower, variations; Floral parts in detail, floral symmetry, Insertion of floral parts, connation and adnation amongst the floral parts.

Suggested Reading
Instructions for the paper setter:

Question paper will have four units. Examiner will set a total of nine questions comprising two questions from each unit, and one compulsory question of short answer type covering the whole syllabus. Students will attempt one question from each unit and the compulsory question. All questions may carry equal marks, unless specified.

UNIT-I

1. Introduction: Physical environment; Biotic environment, Biotic and abiotic interactions
2. Habitat and Niche: Concept of habitat and niche; niche width and overlap; fundamental and realized niche; resource partitioning; character displacement.
3. Ecosystem Ecology: Ecosystem structure; ecosystem function; energy flow and mineral cycling (C,N,P); structure and function of some Indian ecosystems: terrestrial (forest) and aquatic (Pond or Lake).

UNIT-II

5. Community Ecology: Nature of communities, community structure and attributes, levels of species diversity and its measurement, edges and ecotones.
6. Synchorology and Synecology: Distribution of plants, spatial distribution, Relationship between area and species; Interactions between plants and animals; Interactions between plants.

UNIT-III

7. Ecological Succession: Types, mechanisms, changes involved during succession concept of climax.
8. Ecological Adaptations: Concept of ecads, ecotypes; coeno species; species adaptations in relation to soil and water.

UNIT-IV

11. Major Aquatic Biomes: Fresh water and marine biomes.
12. Biogeography: Introduction, Biogeographical zones of India, Theory of Island Biogeography

Practicals
- Determination of minimum quadrat size and number required to study a plant community.
- Phytosociological analysis of grass land vegetation by quadrat method.
- Evaluation of dominance and importance value index.
- Study of similarity and dissimilarity index between two communities.
- Evaluation of the degree of association between biota of a given environment.
- Determination of physical characteristics of soil like pH, temperature, moisture content, conductivity under different vegetation.
- To study ecological adaptations in hydrophytes and xerophytes.

Suggested Reading
B.Sc. (Hons. School) V Semester Botany

Paper–III: Genetics

Theory : 75 (60A+15CA)
Practical: 25 (20A+5CA)

Objective: Introduction to basic principles and methodology involved in genetics and cytology and its applications

Teaching Methodology: It will involve class room lectures, power point presentations, charts, models, practicals and field visits etc.

Instructions for the paper setter:

Question paper will have four units. Examiner will set a total of nine questions comprising two questions from each unit, and one compulsory question of short answer type covering the whole syllabus. Students will attempt one question from each unit and the compulsory question. All questions may carry equal marks, unless specified.

UNIT-I
1. Elements of heredity and variation: Mendel and his experiments, principles of segregation and independent assortment, test cross and back cross.

UNIT-II
4. Multiple Alleles: Blood groups in human (ABO and Rh), eye colour in Drosophila, coat colour in mammals, self-sterility in plants.

UNIT-III
5. Quantitative genetics: Quantitative traits and quantitative genetics; the multiple factor hypothesis; descriptive statistics.

UNIT-IV
7. Nucleic acids: Structure and biosynthesis of RNA and DNA; DNA as genetic material; transformation, transduction.

Practicals
1. Experiments in monohybrid and dihybrid ratios, gene interaction and modified dihybrid ratios.
2. Problems of gene mapping, interference and co-efficient of coincidence.

Suggested Reading


B.Sc. (Hons. School) V Semester Botany

Paper–IV: Plant Breeding

Objective: Introduction to basic principles and different methods of plant breeding, and their applications.

Teaching Methodology: It will involve class room lectures, power point presentations, charts, models, practicals and field visits etc.

Instructions for the paper setter :

Question paper will have four units. Examiner will set a total of nine questions comprising two questions from each unit, and one compulsory question of short answer type covering the whole syllabus. Students will attempt one question from each unit and the compulsory question. All questions may carry equal marks, unless specified.

UNIT-I
1. Introduction to plant breeding: History, objectives and achievements.
2. Types of plant reproduction; Vegetative, sexual and apomixis; modes of pollination.

UNIT-II
3. Methods of plant improvement: Pure line and mass selection; hybridization in self and cross pollinated crops; introduction and acclimatization; hybrid vigour.

UNIT-III

UNIT-IV

Practicals
1. Hybridization experiments: \( F_1 \) and available \( F_2 \) material analysis for specific characters.
2. Based on theory contents of each unit.
3. Life cycles: self- and cross- pollinated crops such as rice, wheat and maize.

Suggested Reading

Objective: Objective of this course is to expose students to current knowledge of plant molecular biology and the experimental basis of that knowledge.

Teaching Methodology: It will involve class room lectures, power point presentations, charts, models, practicals and field visits etc.

Instructions for the paper setter:
Question paper will have four units. Examiner will set a total of nine questions comprising two questions from each unit, and one compulsory question of short answer type covering the whole syllabus. Students will attempt one question from each unit and the compulsory question. All questions may carry equal marks, unless specified.

UNIT-I

UNIT-II
3. DNA: detailed structure, DNA as genetic material
4. DNA replication, transcription and translation.
5. Genetic Code: Salient features, wobble hypothesis, deciphering of genetic code, variations in genetic code.

UNIT-III
6. Transposable elements in bacteria, maize and drosophila.
7. Molecular markers: brief account

UNIT-IV
8. Types of microscopes, principles and applications.
9. Regulation of gene expression in prokaryotes.

Practicals
1. Study of various tools used for molecular biology
2. Study of different microscopes and their working.
3. PCR Technique: working and application

Suggested Reading

Objective: To acquaint the students about the morphology, biology and importance of fungal organisms.
Teaching Methodology: It will involve class room lectures, power point presentations, charts, models, practicals and field visits etc.

Instructions for the paper setter:

Question paper will have four units. Examiner will set a total of nine questions comprising two questions from each unit, and one compulsory question of short answer type covering the whole syllabus. Students will attempt one question from each unit and the compulsory question. All questions may carry equal marks, unless specified.

UNIT-I
1. Characteristic features and classification of fungi.
2. Economic importance of fungi.
3. General account of the following groups of fungi with the help of genera mentioned against each group:
   MYXOMYCOTA : Ceratiomyxa, Physarum, Stemonitis.
   OOMYCOTA : Saprolegnia, Achlya, Pythium, Phytophthora, Peronospora, Albugo.

UNIT-II
4. General account of the following groups of fungi with the help of genera mentioned against each group:
   CHYTRIDIOMYCOTA : Synchytrium, Allomyces
   ZYGOMYCOTA : Rhizopus, Mucor
   ASCOMYCOTA : Saccharomyces, Taphrina, Erysiphe, Phyllactinia, Aspergillus, Penicillium, Xylaria, Pyronema, Ascobolus, Peziza
   BASIDIOMYCOTA : Agaricus, Hydnum, Clavaria, Polyporus, Lycoperdon, Geastrum, Calvatia, Cyathus, Puccinia and Ustilago
   MITOSPORIC FUNGI : Helminthosporium, Cercospora, Pyricularia, Colletotrichum, Alternaria.

UNIT-III
Lichens
5. General account and classification.
6. Thallus organization and reproduction with a particular reference to Parmelia and Usnea.
7. Physiology and nutrition.

UNIT-IV
Lichens
8. Symbiosis and synthesis
11. Economic Importance.

Practical
1. To work out the histopathology of the following:
   (a) White rust of Crucifers
   (b) Peach leaf curl
   (c) Wheat rust
   (d) Linseed rust
   (e) Late blight of potato
   (f) Smut diseases of wheat and barley
   (g) Red rot of sugarcane
2. To make permanent preparations:
   (a) V.S. of an apothecium - *Peziza*
   (b) V.S. Gill of mushroom
   (c) V.S. of Lichen - *Usnea*
   (d) V.S. of an inoperculate fungus (*Hymenoscyphus*).

3. (a) Work out the hyphal system in higher fungi with examples from Aphyllophorales.
    (b) To study the tissue types in higher fungi—the Pezizales and Leotiales.

4. General survey (Morphology) of:
   Myxomycota, Zygomycota, Ascomycota and Basidiomycota.

5. To make temporary mount: A study of the fungi imperfecti viz. *Helminthosporium*,
   *Cercospora*, *Alternaria* and *Pyricularia*.

Suggested Reading

1. Alexopolous, C.J., Mims, C.W. and Blackwell, M. *Introductory Mycology*, John Wiley and
   Sons, New York, 1996.
2. Bilgrami, K.S. and Verma, R.N. *Physiology of Fungi*, Vikas Publishing House, New Delhi,
   1978.

B.Sc. (Hons. School) VI Semester

Paper-II: Plant Physiology

Theory : 75 (60A+15CA)
Practical: 25 (20A+5CA)

Objective: The course would deal with the subject by describing its relevance for Botany from
academic and practical point of view. Initiating with basic concepts and definitions, the course would
traverse through various processes such as photosynthesis, respiration, nitrogen metabolism, light
and temperature dependent events and end up with growth control by hormones.

Teaching Methodology: The teaching methodology would involve elaborative description of the
various topics on board along with demonstration through models and practicals.

Instructions for the paper setter:

Question paper will have four units. Examiner will set a total of nine questions comprising two
questions from each unit, and one compulsory question of short answer type covering the whole
syllabus. Students will attempt one question from each unit and the compulsory question. All
questions may carry equal marks, unless specified.

UNIT-I

1. Plant-Water Relations: Water transport processes; diffusion and osmosis; water potential
   and chemical potential; absorption of water, water transport through tracheids and xylem;
   transpiration and its significance; factors affecting transpiration; mechanism of stomatal
   movement.

2. Mineral Nutrition: Criteria of essentiality of elements; macro- and micronutrients; role of
   essential elements; mineral deficiency symptoms and plant disorders; nutrient uptake and
   transport mechanisms.
UNIT-II

3. **Photosynthesis**: Historical background and significance; structure and photosynthetic apparatus; photosynthetic pigments; accessory pigments and the photoprotective carotenoids; reaction center complexes; photochemical reactions; electron transport pathways in chloroplast membranes; photophosphorylation; the Calvin cycle; the C4 carbon cycle; crassulacean acid metabolism; photorespiration, factors affecting photosynthesis, Blackman’s Law of limiting factors.

4. **Transport of Organic Substances**: Transport of photosynthates; source-sink relationship; the mechanism of translocation in the phloem; assimilate partitioning.

UNIT-III

5. **Respiration**: Glycolysis; the TCA cycle and its regulation; electron transport in mitochondria; oxidative phosphorylation; pentose phosphate pathway; cyanide-resistant respiration.

6. **Nitrogen Metabolism**: Biological nitrogen fixation; nitrate and ammonium assimilation, role of leghaemoglobin.

UNIT-IV

7. **Growth and Development**: General aspects – definitions, phases of growth; kinetics of growth; physiology of seed dormancy and seed germination; concept of photoperiodism; vernalization; Functions of Phytohormones – auxins, cytokinins, gibberellins, abscisic acid and ethylene; Plant movements – tropic and nastic.

Practicals

1. To study the permeability of plasma membrane using different concentrations of organic solvents.
2. To study the effect of temperature on permeability of plasma membrane.
3. To extract enzymes and study their activity, e.g. amylase, lipase, acid phosphatase, catalase, peroxidase.
4. Effect of the following factors on enzyme activity: pH, temperature, enzyme and substrate concentration, heavy metals.
5. Comparative study of rate of respiration of various plant parts.
6. To extract and separate chloroplast pigments by solvent method and demonstration fluorescence in chloroplast extracts.
7. To determine the osmotic potential of vascular sap by plasmolytic method.
8. To determine the water potential of given tissue (any tuber)
10. To determine stomatal index, stomatal frequency and percentage of leaf area open through stomata. Also to study the effect of ABA on stomatal closure.
11. Role of light in germination of photoblastic seeds, e.g. *Lactuca sativa*.

Suggested Reading

B.Sc. (Hons. School) VI Semester

Paper–III: Plant Biochemistry

Theory : 75 (60A+15CA)
Practical: 25 (20A+5CA)

Objective: To acquaint the students about the various aspects of plant biochemistry including composition, structure and functions of bio-molecules.

Teaching Methodology: The teaching methodology would involve elaborative description of the various topics on board along with demonstration through models and practicals.

Instructions for the paper setter:

Question paper will have four units. Examiner will set a total of nine questions comprising two questions from each unit, and one compulsory question of short answer type covering the whole syllabus. Students will attempt one question from each unit and the compulsory question. All questions may carry equal marks, unless specified.

UNIT-I

1. **Introduction to Biochemistry:** Characteristics of living matter, Exchange of energy and matter, enzymes as the catalysts of living cells, transmission of energy in a chemical form, regulation of cell metabolism.

2. **Composition of Biomolecules:** Shape, dimension, Chemical properties, major classes of macromolecules and building-block molecules.

UNIT-II

3. **Carbohydrates – Structure and Biological Function:** Chemistry and classification of monosaccharides – aldoses & ketoses, di- and polysaccharide units, glycogen, cellulose and glycoproteins, significance of carbohydrates.

4. **Lipids and Membranes:** Classification and importance of lipids, properties of fatty acids and fats, phospholipids, lipoproteins.

UNIT-III

5. **Proteins - Structure and Properties:** Introduction, Classification, structure, properties and functions.

6. **Amino acids and Peptides:** Structure, classification, properties, peptides.

UNIT-IV

7. **Vitamins:** General characteristics, nomenclature and classification, essential organic, biochemical functions.

8. **Enzymes:** History, classification, chemical nature, properties, mode of action, optimum pH, substrate specificity, enzyme inhibition, allosteric enzymes, coenzymes- action and types.

Practicals

1. To prepare the standard curve of protein, carbohydrates and amino acids.

2. To study the enzyme activity of catalase and peroxidase.

3. Separation of amino acids in a mixture by paper chromatography.


Suggested Readings


B.Sc. (Hons. School) VI Semester

Paper-IV: Microbiology: Viruses, Bacteria, Mycoplasma

Objective: To acquaint the students about the morphology, biology and importance of fungal organisms.

Teaching Methodology: It will involve classroom lectures, power point presentations, charts, models, practicals and field visits etc.

Instructions for the Paper-setter

Question paper will have four units. Examiner will set a total of nine questions comprising two questions from each unit, and one compulsory question of short answer type covering the whole syllabus. Students will attempt one question from each unit and the compulsory question. All questions may carry equal marks, unless specified.

UNIT-I
1. Viruses, viroids and their diseases: Symptoms, transmission, structure, physical and chemical properties, infection, multiplication and movement.

UNIT-II

UNIT-III

UNIT-IV
4. Symptoms of bacterial plant diseases and important bacterial plants diseases, diseases of vegetables, fruits and crops and their control.

Practicals

Study of symptoms and characteristic features of plant diseases caused by Viruses, Bacteria and Mycoplasmas.

Suggested Reading


B.Sc. (Hons. School) VI Semester

Paper–V: Embryology of Angiosperms

Objective: To acquaint the students about the structure of various parts of flowers and pollination mechanisms.

Teaching Methodology: It will involve classroom lectures, power point presentations, charts, models, practicals and field visits etc.

Instructions for the paper setter:

Question paper will have four units. Examiner will set a total of nine questions comprising two questions from each unit, and one compulsory question of short answer type covering the whole syllabus.
syllabus. Students will attempt one question from each unit and the compulsory question. All questions may carry equal marks, unless specified.

UNIT-I
1. Historical account of embryology of angiosperms.
2. Flower: Structure, development from a primordium; variations, Placentation and inflorescence types.

UNIT-II
3. Stamen: Morphology, evolutionary trends, structure and development of anther tapetum; Microsporogenesis, structure and development of male gametophyte and aberrations.
4. Pollen: Structural organization, germinal furrows, wall development and ornamentation, role of callose and tapetum in pollen development; pollen agglutinations, germination and storage, and allergenic aspects.
5. Carpel: Morphology, evolutionary trends; Structure, development and types of ovules; Archesporium; Megasporogenesis and embryo sac ontogenies.

UNIT-III
7. Fertilization: Structure of stigma and style, stigma receptivity, post-pollination events leading to fertilization, syngamy and triple fusion.

UNIT-IV
8. Endosperm: Types of development, cytology, historical structures and functions.
9. Embryogeny: Zygote, its structural organization, proembryo types, embryo development in monocots and dicots, nutrition of embryo.

Practicals
Study of different flowers: basic structure of flowers; study of pollen grains and various pollen agglutinations; Study of various developmental stages; microsporogenesis, Megasporogenesis and embryo development.

Suggested Reading
UNIT-II
2. General characteristics, ultra-structure of cell, reproduction, gram-positive and gram-negative, role in soil fertility, industrial importance.
3. A brief account of their nature and structure, details of TMV and T2 viruses.

UNIT-III

UNIT-IV
5. Broad classification and characteristics of various groups.
6. Morphology and life history, (including development of gametophyte sex organs and embryo) of Pinus.
7. Morphology and life history, (including development of gametophyte sex organs and embryo) of Cycas
8. Morphology and life history, (including development of gametophyte sex organs and embryo) of Ephedra.

Practicals
1. Morphological studies of the following algae: Dictyota, Chara, Batrachospermum Vaucheria. Examine reproductive organs and stage of the above algal genera.
2. Identification and slide preparation of gram-positive and gram-negative bacteria.
3. To study any plant species cured by viral disease which is to be available in local climate.
4. Morphological observations, identification and reproductive organs and stage of the following fungal genera: Albugo, Aspergillus, Rupeinia, Ustilago and Agaricus.
5. Morphological anatomical and reproductive organs of following living gymnospermic genera: Cycas Pinus and Ephedra.

Suggested Reading

B.Sc. (Hons. Sch.) 1st Semester Botany (Subsidiary) For Basic Medical Sciences (Bio-Physics, Bio-chemistry and Microbiology)

Elementary Botany

Theory : 75 (60A+15HT)
Practical: 25 (20A+5CA)

Objective: To acquaint the students about basic study of plant morphology, nutrition and flower structure of various angiosperm families.

Teaching Methodology: It will involve class room lectures, power point presentations, charts, models, practicals and field visits etc.

Instructions for the paper-setter

Question paper will have four units. Examiner will set a total of nine questions comprising two questions from each unit, and one compulsory question of short answer type covering the whole syllabus. Students will attempt one question from each unit and the compulsory question. All questions may carry equal marks, unless specified.
UNIT-I
General structure of the Plant morphology; their components – stem, root, leaf. Modifications of root, stem, and leaf-mitosis and meiosis.

UNIT-II
Modes of nutrition – Autotrophs, heterotrophs, saprophytes and parasites, modes of life and pattern of a typical plant, adaptation, ecology and environment, plant biodiversity, global climate change.

UNIT-III
Structure of the flower with reference to their families particularly Ranunculaceae. Cruciferae, Fabaceae, Malvaceae and Poaceae. Description of floral formulae and diagrams; Seeds structure germination and dispersal.

UNIT-IV
Plant physiological process viz. – transpiration, photosynthesis, respiration and growth; Mendel’s Law and evolution.

Practicals
1. Study of modified root, stem and leaf of a plant species found in local climate.
2. Morphological study of root, stem and leaf component of plant species found in local climate.
3. To study local plant species adapted in contrasting habitats such as xerophytes, hydrophytes, mesophytes and halophytes.
4. Description of local plant species found in the families: Ranunculaceae. Cruciferae, Fabaceae, Malvaceae. Describe floral diagram and floral formulae of that plant.

Suggested Reading

B.Sc. (Hons. School) II Semester Botany (Subsidiary)

Plant Diversity –II (Phanerogams)

Objective: To acquaint the students about the structure and detailed description of various plant groups under phanerogams.

Teaching Methodology: It will involve class room lectures, power point presentations, charts, models, practicals and field visits etc.

Instructions for the paper-setter:

Question paper will have four units. Examiner will set a total of nine questions comprising two questions from each unit, and one compulsory question of short answer type covering the whole syllabus. Students will attempt one question from each unit and the compulsory question. All questions may carry equal marks, unless specified.

UNIT-I

1. Broad classification and a comparative account of different classes of Bryophytes.
2. Morphology and reproduction (including development of sex organs) of Riccia, Anthoceros, and Polytrichum.
UNIT-II
3. Broad classification and features of different classes of Pteridophytes.

UNIT-III
1. Artificial, natural and phylogenetic systems of classification; Salient features of Bentham and Hooker’s and Hutchinson’s system of classifications.
2. Criteria for primitive and advanced nature of families and flower; Binomial nomenclature; brief history, aims and fundamental components of angiosperms taxonomy.

UNIT-IV
3. Basic structure, variations in basic structure, floral parts in detail.
4. General characters and economic importance of following: families of angiosperms. Ranunculaceae, Malvaceae, Brassicaceae, Rutaceae, Rosaceae, Leguminosae, Solanaceae, Cucurbitaceae, Asteraceae, Liliaceae, Orchidaceae, Poaceae.

Practicals
Based on theory contents of each unit.

Suggested Reading

B.Sc. (Hons. School) III Semester Botany (Subsidiary)

Plant Diversity –III (Plant Anatomy, Applied Botany & Cytogenetics)

Objective: To acquaint the students about the anatomical and cytological studies of various plant groups and their applications.

Teaching Methodology: It will involve classroom lectures, power point presentations, charts, models, practicals and field visits etc.

Instructions for the paper setter:
Question paper will have four units. Examiner will set a total of nine questions comprising two questions from each unit, and one compulsory question of short answer type covering the whole syllabus. Students will attempt one question from each unit and the compulsory question. All questions may carry equal marks, unless specified.

UNIT-I
2. Tissue systems (including vascular elements)
3. The Root: General anatomical characteristics, dicot and monocot root anatomy, secondary growth in dicot root.

UNIT-II
5. Tissue Culture: Basic techniques, achievements, practicals applications of tissue culture, organ culture, somatic hybridization, and their role in crop improvement.
6. Utilization of Plants: Elementary knowledge of some of economically important plants used as source of:
   (a) Food: Wheat, rice, potato, sugarcane.
   (b) Timber: Tectona, Dalbergia, Shorea, Cedrus.
   (c) Fibres: Cotton, Jute, Coir.
   (d) Beverages: Tea, Coffee.
   (e) Spices: Ginger, Turmeric, Coriander.
   (f) Medicinal Plants: Ephedra, Cinchona, Atropa, Digitalis, Rauwolfia.

UNIT-III
8. Mushroom Cultivation: Species cultivated, their nutritional value, methods of cultivation, future prospects.

UNIT-IV
10. DNA the Genetic Material: DNA structure, replication and genicode.
12. Chromosomes: Physical and chemical structure; Dupraw’s model and nucleosomes.
13. Linkage, linear arrangement of genes and genetic maps.

Practicals
Practicals will pertain to the syllabus of the theory paper.

Suggested Reading
2. Butcher, D.N. and Ingram, D.S., 1976, Plant Tissue Culture, Edward Arnold Ltd., U.K.
Objective: The course is so designed to familiarize the students with the basics of ecology and plant physiology and their relevance to the various ecological processes, ecosystem and metabolism.

Teaching Methodology: It will involve class room lectures, power point presentations, charts, models, practicals and field visits etc.

Instructions for the paper-setter:
Question paper will have four units. Examiner will set a total of nine questions comprising two questions from each unit, and one compulsory question of short answer type covering the whole syllabus. Students will attempt one question from each unit and the compulsory question. All questions may carry equal marks, unless specified.

UNIT-I
1. Plants and Environment: Atmosphere, water, light, temperature, soil and biota.
2. Ecosystem: Structure, abiotic and biotic component, ecological pyramids of energy, number and biomass energy flow.

UNIT-II
3. Community Ecology: Main types, characteristics, frequency, density, ecological succession, account of hydrosere and xerosere.

UNIT-III
5. Relevance of different cell organelles in relation to physiological functions.

UNIT-IV
8. Respiration: Respiratory substrates and pathways, energy release, ATP synthesis and utilization, chemiosmotic regeneration of ATP.

Practicals
Practicals will pertain to the syllabus of the theory paper.

Suggested Reading
2. Butcher, D.N. and Ingram, D.S., 1976, Plant Tissue Culture, Edward Arnold Ltd., U.K.

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