DEGREE OF MASTER OF SCIENCE
CHOICE BASED CREDIT SYSTEM

SYLLABUS FOR
M.SC. BOTANY
( SEMESTER PATTERN )
( For Candidates admitted in the Colleges affiliated to Periyar University from 2017-2018 onwards )
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M.Sc. BOTANY

REGULATIONS

AIM

1. Aims at providing skills in critical thinking and evaluation of information.
2. To install knowledge across wide areas of plant science.
3. Help to understand the evolution of land plants from simple ancestors.
4. Providing an opportunity to familiarize with life cycles and mode of Reproduction in different plant groups.
5. As the course includes units from related branches like Biochemistry, Biophysics, Microbiology, and Biotechnology, Bioinformatics, and Nanobiotechnology an opportunity is provided to understand the relationship between Botany and other related branches.
6. Appreciating the importance of Ecology of population and communities, the dynamics of Ecosystem, the Biosphere, and future of the Biosphere.
7. Identifying different flowering plants based on their characters.
8. The topics included in different units of different papers aim to enable the Students to develop technical skills and innovative approach in Botanical and Related branches.

SCOPE

- This course considers the patterns of plant diversity and the processes that generate and maintain plant diversity. It is an interdisciplinary approach in which major groups of plants are overviewed in holistic manner.
- This course also considers the Biology of plants. Different branches of Botany are given due importance as they deserve. Practical are framed with an aim to improve skills in microcopy, observation, drawing, and laboratory exercise. During field trips the students are exposed to basic ecological principles and interactions.
- Students who complete this course will have better understanding on the types and sources of plants by diversity and the role of human and non-human factors in plant diversity. Students will better understanding plants and their importance in Biosphere as life sustaining components.
- Students who complete this course can pursue research. As topics from relevant course are included there is a scope for the student to have opportunity in employment in state and central governments. Also the student has a scope for self employment.
REGULATIONS OF PG COURSE FOR BOTANY OFFERED IN THE AFFILIATED COLLEGES

1. CONDITION FOR ADMISSION
A candidate who has passed Br. V in Botany or Br. V (a) Botany Vocational -Biotechnology or any of the above degree of any other University accepted by the syndicate as equivalent, there to subject to such condition as may be prescribed therefore shall be permitted to appear examination and qualify for M. Sc. degree in Botany at this University after a course of study of two academic years.

2. DURATION OF THE COURSE
The course for the degree of Master of Science shall consist of two academic years divided in to four semesters. Each Semester consists of 90 working days. Practical examinations will be at the end of even semesters

3. PASSING MINIMUM
Theory

<table>
<thead>
<tr>
<th>University Examination (EA)</th>
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Classification of Internal Assessment Structure

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<th>Marks</th>
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<td>Total Marks</td>
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Passing minimum (CIA) 50% - 12 Marks
Passing minimum (EA) 50% - 38 Marks
Total Passing minimum - 50 Marks
PRACTICAL

<table>
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<th>Internal Assessment (CIA)</th>
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Classification of Internal Assessment Structure

Marks

| Submission  | - 10 Marks |
| Test        | - 10 Marks |
| Attendance  | - 10 Marks |
| Continuous assessment in Practical class | - 10 Marks |

Total Marks - 40 Marks

Passing minimum (CIA) 50% - 20 Marks
Passing minimum (EA) 50% - 30 Marks
Total Passing minimum - 50 Marks

1. The candidate shall be declared to have passed the examination if the candidates secure not less than 38 marks out of 75 marks in the University examination in each theory paper and 12 marks out of 25 marks in the Internal Assessment and in total not less than 50 marks.

2. For the practical paper 30 marks out of 60 marks in the University examination and the record notebook taken together and 20 marks out of 40 marks in the Internal Assessment and in total 50 marks. There is no passing minimum for the record notebook. However submission of a record notebook is a must.

3. For the project work and viva-voce a candidate should secure 50% of the marks for pass. The candidate should compulsorily attend Viva-voce examination to secure pass in that paper.
4. **CLASSIFICATION OF SUCCESSFUL CANDIDATES**

- Candidates who secure not less than 60% of the aggregate marks in the whole Examination shall be declared to have passed the examination in First class.

- All other successful candidates shall be declared to have passed in the Second class. Candidates who obtain 75% of the marks in the aggregate shall be deemed to have passed the examination in First Class with Distinction provided they pass all the examinations prescribed for the course at the first appearance.

- Candidates who pass all the examinations prescribed for the course in the first Instance and within a period of two academic years from the year of admission to the course only are eligible for University Ranking.

5. **MAXIMUM DURATION FOR THE COMPLETION OF THE PG PROGRAMME**

   The maximum duration for completion of the PG Programme shall not exceed eight semesters.

6. **COMMENCEMENT OF THIS REGULATION**

   These regulations shall take effect from the academic year 2017 18, i.e., for students who are to be admitted to the first year of the course during the academic year 2017 2018 and thereafter.

7. **TRANSITORY PROVISION**

   Candidates who were admitted to the PG course of study before 2017 shall be permitted to appear for the examinations under these regulations for a period of three years i.e., upto and inclusive of the examinations of May 2020. Thereafter, they will be permitted to appear for the examination only under the regulation then in force.
## COURSE OF STUDY AND SCHEME OF EXAMINATION

<table>
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<tr>
<th>S.No.</th>
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<td>Biodiversity of Plants-II (Pteridophytes, Gymnosperms and Paleobotany)</td>
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<td>Taxonomy of Angiosperms (Taxonomy Practical Assessment and credit carried to Core Course-VIII)</td>
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<td><strong>PRACTICAL-I</strong> (Algae, Fungi, Lichens, Bryophytes, Pteridophytes, Gymnosperms and Paleobotany)</td>
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<td>Plant resources and utilization</td>
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<td>Anatomy of Angiosperms, Plant micro-techniques and Embryology of Angiosperm</td>
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<td>Core - VII</td>
<td>Cell biology, Genetics and Molecular biology</td>
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UNIT I: Algae


UNIT II


UNIT III: Fungi


UNIT IV: Lichens


UNIT V: Bryophytes

Classification (Rothmaler, 1951) - Origin - Distribution - Structure - Reproduction and life cycle of Hepaticapsida (Marchantia, Porella, Fossombronia), Anthocerotopsida (Anthoceros, Notothylus) and Bryopsida (Sphagnum, Polytrichum). Evolution of gametophytes and sporophytes. Economic importance of bryophytes. Bryophytes as indicators of Pollution.
ALGAE

TEXT BOOKS

REFERENCE BOOKS

FUNGI

TEXT BOOKS

REFERENCE BOOKS
M.Sc. BOTANY

LICHENS

REFERENCE BOOKS


BRYOPHYTES

TEXT BOOKS


REFERENCE BOOKS

UNIT I

UNIT II

Apogamy and Apospory. Alternation of generation – Affinities of various classes of Pteridophytes.

UNIT III

UNIT IV

UNIT V
M.Sc. BOTANY

PTERIDOPHYES

TEXT BOOKS

REFERENCE BOOKS

GYMNOSPERMS

TEXT BOOKS
REFERENCE BOOKS


PALEOBOTANY

REFERENCE BOOKS

M.Sc. BOTANY

SEMESTER - I

CORE III - TAXONOMY OF ANGIOSPERMS

(Taxonomy Practical Assessment and Credit carried to Core Course VIII)

UNIT I


UNIT II


UNIT III


UNIT IV

A detailed study of vegetative, floral features and economic importance of Magnoliaceae, Menispermaceae, Polygalaceae, Meliaceae, Sapindaceae, Rosaceae, Combretaceae, Lythraceae, Onagraceae, Rubiaceae and Sapotaceae.

UNIT V

Oleaceae, Gentianaceae, Boraginaceae, Bignoniaceae, Pedaliaceae, Nyctaginaceae, Aristolochiaceae, Casuarinaceae, Commelinaceae, Cyperaceae and Orchidaceae.
**TEXT BOOKS**


**REFERENCE BOOKS**


Study of the Morphology and Anatomy of the vegetative and Reproductive parts of the following:

I. Algae
   a) Cyanobacteria: *Gloeocapsa, Spirulina, Nostoc, Scytonema*
   b) Chlorophyceae: *Dunanella, Pandorina, Cladophora, Spirogyra, Codium, Caulerpa, Nitella, Coleochiaete*
   c) Bacillriphyceae: *Cyclotella and Navicula (Diatoms)*
   d) Phaeophyceae: *Padina, Turbinaria, Sargassum*
   e) Rhodophyceae: *Batrchospermum, Gracillaria*

II. Fungi
   a) Oomycetes: Saprolegenia
   b) Zygomycetes: *Pilobolus, Rhizopus, Mucor*
   c) Myxomycetes: *Plasmodiophora*
   d) Ascomycetes: *Neuropsora, Tapharina, Penicillium*
   e) Basidiomycetes: *Pleurerotus, Lycoperdon*
   f) Duteromycetes: *Cercospora, Fusarium, Colleotrichum*

III. Lichens
    Usnea, Parmelia

VI. Bryophytes
   a) Hepaticapsida: *Marchantia, Porella, Fossombronia*
   b) Anthocerotopsida: *Anthoceros, Notothylus*
   c) Bryopsida: *Sphagnum, Polytrichum*
VII. Pteridophytes
   a) Isoetaceae: *Isoetes*
   b) Equisetaceae: *Equisetum*
   c) Ophioglossales: *Ophioglossum*
   d) Osmundaceae: *Osmunda*
   e) Gleicheniaceae: *Gleichenia (Dicrynopteris)*
   f) Pteridaceae: *Pteris*
   g) Azollaceae: *Azolla*

V. Gymnosperms
   a) Araucariaceae: *Araucaria*
   b) Podocarpaceae: *Podocarpus*
   c) Cupressaceae: *Cupressus*
   d) Cycadaceae: *Cycas*

VI. Fossil
   a) Pteridophytes- *Rhynia, Sphenophyllum, Lepidocarpon, Cladoxylon, Pentoxylon, Botryopteris*
   b) Gymnosperms - *Lyginopteris, Lagenostoma, Cordaites*

Note
Submission of 20 herbarium sheets from Algae /Fungi /Lichens /Bryophytes/ Pteridophytes / Gymnosperms
Field trip to hill stations and Coastal area for a minimum period of Five days for the Collection of herbarium specimens and to observe and study the lower plants in their Natural habitat.
Certified record work done in the laboratory during practical classes
* Practical examination at the end of Second semester
M.Sc. BOTANY
SEMESTER - I
ELECTIVE I - PLANT RESOURCES AND UTILIZATION

UNIT I


UNIT II

Binomial, Cultivation and uses of food crops: cereals (Rice, wheat and Ragi); Pulses [Gram and Black gram]; Vegetables - [Cabbage, Beetroot]; Fodder crops [Natural grass and cultivated fodder]. Fiber and fiber plants: Nature of fibers. Binomial and uses of Cotton and Jute.

UNIT III

Medicinal plants: Classification of drugs, drugs from various parts of plants –chemical constituents– therapeutic uses. Binomial, cultivation, medicinal properties and uses of: Centella asiatica, Piper nigrum, Curcuma, Asafoetida, Adathoda vasica, Solanum nigrum, Piper betel, Phyllanthus emblica, Aegle marmelos, Trigonella foenumgraceum, and Catharanthus roseus

UNIT IV

A Brief account of the following drugs
Drugs containing carbohydrates- Isapgol.
Drugs containing tannins- Myrobalan.
Drugs containing lipids- Arachis oil.
Drugs containing resin and resin combination- Cannabis
Drugs containing alkaloids- Cinchona.

UNIT V

M.Sc. BOTANY

TEXT BOOKS


REFERENCE BOOKS


M.Sc. BOTANY
SEMESTER - II
CORE V - MICROBIOLOGY AND PLANT PATHOLOGY

UNIT I

General microbiology

History, Scope and branches of microbiology-Microbial stains- staining methods- simple, differential and special stains and confirmatory test, Growth Curve, Sterilization techniques -Establishment of pure culture, Culture media - (Chemical, complex and special media), Decimal dilution techniques. Synchronous, Batch and continuous culture, chemostate and turbidostate – preservation of microbes.

UNIT II


UNIT III


UNIT IV

Plant pathology

UNIT V

Study of the disease symptoms, causal organism, and transmission and control Measures of the following plant diseases.

1. Damping off of *Pythium*.
2. Little leaf of Brinjal (Mycoplasma).
4. Bunchy top of Banana (Virus).
5. *Citrus* canker (Bacteria).
6. Blight of potato (Early Late blight).
7. Tobacco mosaic disease (TMV).

**TEXT BOOKS**


**REFERENCE BOOKS**


M.Sc. BOTANY
SEMESTER - II
CORE VI - ANATOMY OF ANGIOSPERMS, PLANT MICRO
TECHNIQUES AND EMBRYOLOGY OF ANGIOSPERMS

UNIT I
Meristems – Types (shoot and root). Procambium-Cambium, Vascular cambium - origin, types, structure and etiology. season activity, role in wound healing and grafting. Complex tissues-Secondary xylem - ontogeny, structure and function - wood - diffuse and porous - Sap and heart wood - compression and tension wood-
Arrangement of vessels in secondary.
Xylem, Growth rings. Secondary phloem - structure and function and ontogeny. periderm formation- lenticels.

UNIT II

UNIT III
Plant Microtechnique

UNIT V

UNIT V
Embryology
ANATOMY

TEXT BOOKS

REFERENCE BOOKS

EMBRYOLOGY

TEXT BOOKS

REFERENCE BOOKS
M.Sc. BOTANY

MICROTECHNIQUES

TEXT BOOKS

REFERENCE BOOKS
UNIT I:
Cell biology
Cell structure, organization of prokaryotic and eukaryotic cell. Cell wall, nucleus, mitochondria, Golgi bodies, lysosomes, endoplasmic reticulum, peroxisomes, plastids, vacuoles, structure and function of cytoskeleton and its role in motility.

UNIT II
Nucleosome organization, chromosome Structure in prokaryotes and eukaryotes, Structure of model membrane, lipid bilayer and membrane protein diffusion, osmosis, ion channels, active transport, electrical properties of membranes. Cell division and cell cycle: Mitosis and meiosis, their regulation, steps in cell cycle, regulation and control.

UNIT III
Genetic
Mendelian principles- Dominance, Segregation and independent assortment, Genetic interaction- Complementary genes, Epistasis, Lethal genes, Multiple factor hypothesis. Linkage and crossing over – kinds of linkage, significance of linkage. Types of crossing over mechanism, models for homologous recombination. Construction of genetic map. Two point test cross, three point test cross.

UNIT IV
Sex Determination and differentiation - Types, mechanism and significance. Sex linked inheritance Population genetics- Hardy- Weinberg Law.

UNIT V
**TEXT BOOKS**


**REFERENCE BOOKS**

M.Sc. BOTANY
SEMESTER - II
PRACTICAL –II (COVERING THE CORE COURSE III & V)
[TAXONOMY OF ANGIOSPERMS, MICROBIOLOGY AND PLANT PATHOLOGY]

Taxonomy 45hrs

Identification of Specimen at family, generic and specific level belonging to the following families:

1. Magnoliaceae
2. Menispermaceae
3. Polygalaceae
4. Meliaceae
5. Sapindaceae
6. Rosaceae
7. Combretaceae
8. Lythraceae
9. Onagraceae
10. Rubiaceae
11. Sapotaceae
12. Oleaceae
13. Gentianaceae
14. Boraginaceae
15. Bignoniaceae
16. Pedaliaceae
17. Nyctaginaceae
18. Aristolochiaceae
19. Casuarinaceae
20. Commelinaceae
21. Cyperaceae
22. Orchidaceae.

- Economic importance of families mentioned above
- Familiarity with the use of Flora
- Preparation of Dichotomous artificial key using locally available plants
- A field trip of not less than four days to a place of luxuriant vegetation to study. The flora and to study the different types of vegetation.
- Submission of a tour report and 25 herbarium sheets (Specimens collected from Tour collection / locally available plants during the internal practical Examination.
- Certified record work done in the laboratory during practical classes
M.Sc. BOTANY

**Microbiology**

**Experiments**
1. Isolation and identification of bacteria and fungi from spoiled food.
2. Preparation of culture media (Bacteria).
3. Gram's staining of bacteria found in milk, curd and root nodules.
4. Testing quality of milk by Methylene blue reduction test (MBRT)

**Demonstration**
1. Media preparation and culturing of *Cyanobacteria*.
2. Preparation of spawn for cultivation of edible mushroom.
3. Mass cultivation of *Rhizobium, Azotobacter*.
4. Microbiological test for soil fertility (Phosphate solubilizing Bacteria).
5. Production of citric acid using *Aspergillus niger*.
6. Fermentation - Solid state, submerged.

**Note:** visit to nearby leading laboratories / industries.

**Phytopathology**

Study of the disease symptoms, causal organism, transmission and control measures of the following plant diseases:
1. Damping off of *Pythium*.
2. Little leaf of Brinjal (Mycoplasma).
4. Bunchy top of Banana (Virus).
5. Citrus canker (Bacteria).
6. Blight of potato (Early Late blight).
7. Tobacco mosaic disease (TMV).
M.Sc. BOTANY
SEMESTER - II
PRACTICAL –III
(COVERING THE CORE COURSE VI & VII)
[ANATOMY OF ANGIOSPERMS, PLANT MICRO TECHNIQUES, EMBRYOLOGY OF ANGIOSPERMS, CELL BIOLOGY, GENETICS AND MOLECULAR BIOLOGY]

ANATOMY OF ANGIOSPERMS AND PLANT MICRO TECHNIQUE

Preparation of hand sections, maceration and clearing

1. Temporary and permanent mounting of whole specimens and Sections using different types of mountants.
2. Calibration of microscope and micrometry
3. Microtomy and microtome sectioning
4. Examination of different cell and tissue types with help of suitable techniques
5. Structure of (primary and or secondary) leaf, root, stem and floral parts (including fruits)
6. Examination of vascular cambium and study of its activity
7. Examinations of Anomalous secondary thickening mentioned in syllabus
8. Examination of Structural and identification of Wood of some common Indian Timbers such as Prunus, Mangifera indica, Terminalia, Tectona grandis, Swietenia, Mahagoni, Azadirachta indica, Lagerstroemia and Pterocarpus.

EMBRYOLOGY OF ANGIOSPERMS

1. Organization of anthers and pollens, pollen wall patterns, pollen germination and Pollen tube growth.
2. Study on ovary, ovules and their modification.
3. Isolation of plant embryos and embryonic tissues

Note

1. A minimum of 10 double stained permanent sections to be submitted.
2. Record and observation note book.
3. Wax blocks and slides mounted with wax ribbons.
4. Group report on ontogenetic change in a selected plant.
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CELL BIOLOGY
2. Microscopic view of cell organelles in plant cells – viewing Cystolith & Raphides, Chloroplast (Hydrilla leaf).
3. Isolation of plant organelles by centrifugation techniques (Demonstration).
4. Separation of giant chromosome (Chironomus larvae).

GENETICS
1. Evaluation of Genetic concept by solving problem of Mendelian hypothesis.
2. Genetic Interaction (Mendelian modified ratios) complementary, supplementary, duplicate factor, Multiple alleles.
4. Three point test cross – chromosome map.
5. Isolation of auxotrophs by UV mutagenesis (Demonstration).
6. Isolation of spontaneous mutations in bacteria by gradient plate technique (Demonstration)

MOLECULAR BIOLOGY
1. Colorimetric estimation of DNA & RNA.
2. Regulation of gene expression (With the help of models /Charts /Book diagram.)
3. Protein biosynthesis with the help of models /chart/ Book diagram.
UNIT I

UNIT II

UNIT III
Nitrogen fixation: Types, Nitrogenase, nif gene, Assimilation of nitrate and ammonium ion NR, NIR, GDH and GS/GOGAT pathways. Applications of auxins, gibberellins, cytokinins in agriculture and horticulture, Physiology of growth retardants - ethylene and abscisic acid, phytochrome mediated processes. Physiology of flowering and fruit ripening.

UNIT IV
Dormancy of seeds, causes and methods of breaking dormancy. Ageing and senescence -types. Physiological and biochemical changes. Physiology of seed germination.
Stress Physiology: definition, types and resistance mechanisms of water, drought, salt, stresses. Secondary metabolites: Biosynthesis of terpenes, phenols and nitrogenous compounds and their roles.

UNIT V
Photobiology: Dual nature of light, characteristics of solar radiation, solar energy - Efficiency of atoms - Absorption spectra in molecules, energy states, De-excitation.
M.Sc. BOTANY

TEXT BOOKS

REFERENCE BOOKS
UNIT I


UNIT II

Species interactions: Types of interactions, Inter specific competition, herbivory, carnivory, pollination, symbiosis. Ecological Niche: Concept of habitat and niche; niche width and overlap; fundamental and realized niche; Population ecology - characteristics of a population; population growth curves; age structural populations. Population regulations; life history strategies (r and k selection).

UNIT III


UNIT IV


UNIT V

Phytogeography - Principles and importance of plant geography- Phytogeographic regions of India. Willis - Age and Area hypothesis. Continuous range, cosmopolitan circum polar, circum boreal and circum austral, Discontinues distribution - Wagener theory - continental drift hypothesis, endemism. Biodiversity and Conservation Biology: Types, benefits, and conservation of Biodiversity, Biodiversity Hotspots.
TEXT BOOKS

REFERENCES BOOKS
PLANT PHYSIOLOGY AND BIOPHYSICS
1. Determination of water potential (Shardakov’s method)
2. Determination of solute potential
3. Estimation of Chlorophyll
4. Estimation of Carotenoids.
5. Estimation of anthocyanin
6. Estimation of Leg-hemoglobin content
7. Estimation of starch by perchloric method.
8. Estimation of nitrogen by Nessler’s method
9. Estimation of proline and phenols in plant tissues under different environmental and physiological conditions.
10. Calculation of stomatal index of upper and lower epidermal peelings of Moringa.
11. Determination of km-value, V-max, M

DEMONSTRATION
1. Plant physiology experiment
   a) Demonstration experiment on aerobic respiration.
   b) Demonstration of photosynthetic experiment.
   c) Demonstration of transpirational water loss by using Ganong’s Photometer.
2. In vivo assay of NR, NiR.
3. Estimation of IAA
4. C3 and C4 anatomy, C4 subtypes
PLANT ECOLOGY AND PHYTOGEOGRAPHY PRACTICALS

1. Analysis of vegetation – by using quadrat / line transect to find out frequency, Density and abundance of different species.

2. Garden soil experiment to make texture.

3. Capillary water.

4. Field capacity.

5. Wilting coefficient.

6. pH of the soil/water

7. Chemistry of the soil (NO₃, PO₄, SO₃)

8. Water analysis for dissolved oxygen.

9. Estimation of primary production in the given water sample by the Light-Dark bottle Method.

10. Estimation of carbonate, bicarbonate and chloride content in water samples.

PHYTOGEOGRAPHY

11. A study of plant distribution maps - continuous, discontinuous, circum polar, circum tropical, endemic distribution

Note

1. Field study of an area (not less than a period of 4 days) to document environmental assets and study the ecosystems and different types of vegetation (Forest / Grassland / Mountain / National parks / Sanctuary / Botanical garden / Lake / Pond / River / Waterfalls / Estuary / Mangrove / Sea coast) submit a tour report (during the internal practical examination).

2. Certified record of work done in the laboratory during practical classes
UNIT I


UNIT II

Pharmacognosy - Definition and Scope. Drug adulteration, Drug evaluation, Chemical evaluation, Physical evaluation and Biological evaluation. Phytochemical investigations, standardization and quality control of herbal drugs.

UNIT III

Cultivation, collection and preparation of natural drugs - Detailed study of the following medicinal plants: Plantago ovata, Hypericum perforatum, Digitalis purpurea, Terminalia chebula, Saraca indica, Oleaeu ropoea, Strychnosnux vomica. Women entrepreneurship development, marketing cultivated medicinal plants -National Medicinal Plants Board of India.

UNIT IV

Neutraceuticals-classification, Antioxidants, Probiotics, Prebiotics, Spirulina, Royal jelly, Soya beans, Garlic and Cosmeceuticals. Natural Pesticides- Pyrethrum, Neem, Derris; Antiobiotics, Allergenic extracts.

UNIT V

Ethnobotany -definition-Traditional and Folklore medicines- Native medicine. Major tribes of South India and their ethnobotanical and ethnobiological heritage. Ethno Medicines. Ethnobotany and conservation of plants with special reference to India - mythology and conservation of ecosystems, conservation of selected plant species: sacred groves, forestry and unique ecosystems and their ethnobiological values, plants and animals in art, tradition and ethnography: Ethnobotanical field methods.
M.Sc. BOTANY

TEXT BOOKS

REFERENCE BOOKS
UNIT I


UNIT II


UNIT III


UNIT IV


UNIT V

M.Sc. BOTANY

TEXT BOOKS

REFERENCE BOOKS
M.Sc. BOTANY
SEMESTER - IV

CORE XIII - BIOCHEMISTRY AND NANOBIOTECHNOLOGY

UNIT I : Basics of chemistry

UNIT II : Carbohydrate and Nucleic acids
Nucleic acids: Nomenclature, Nucleosides, Nucleotides, polynucleotides, Types of Nucleic acids- biosynthesis, regulation of biosynthesis and breakdown.

UNIT III : Amino acids, Proteins and Enzyme Metabolism
Enzymes-Classification, Enzyme catalysis, specificity of enzyme action-Factors affecting enzymes activities, feedback and allosteric inhibition, reversible and irreversible inhibition, bi substrate reaction-Chemical kinetics and order of reactions, Michaelis and Menten equation, V max and Michaelis constant. Coenzymes.

UNIT IV : Lipids and Secondary metabolism

UNIT V : Nanobiotechnology
M.Sc. BOTANY

TEXT BOOKS

REFERENCE BOOKS
UNIT I : Analytical techniques based on optical principles

UNIT II : Quantitative procedures based on physical principles

UNIT III : Methods targeting the electrolytic behavior:

UNIT IV : Research methodology

UNIT V : Biostatistics and Bioinformatics

Bioinformatics: Introduction to bio informatics, NCBI, Database similarity searching-BLAST N, BLAST P. Biological data bases- structural, sequence data bases for nucleic acid, proteins. Sequence alignment – Pairwise and multiple. Gene sequence submission format- FASTA.
TEXT BOOKS

REFERENCE BOOKS
M.Sc. BOTANY  
SEMESTER - IV  
CORE XV – PRACTICAL - V  
(BIOCHEMISTRY, NANO BIOTECHNOLOGY,  
BIOINSTRUMENTATION, BIOSTATISTICS AND  
BIOINFORMATICS)  

BIOCHEMISTRY  
1. Preparation of Phosphate and Citrate buffers  
2. Estimation of reducing sugars by DNS Method (Dinitrosalicylic acid).  
3. Estimation of Carbohydrate by Anthrone method.  
4. Estimation of proteins by Lowry's method  
5. Estimation of DNA by Diphenylamine method  
6. Estimation of free fatty acid by titration  
7. Catalase assay from plant source  
8. Peroxidase assay from plant source  
9. Qualitative test for Protein, lipid and carbohydrates.  
10. TLC separation of dyes.  

Demonstration  
1. Determination of km value, V max, Michaelis constant for amylase or phosphorylase  
2. Estimation of oil in oil seed by Soxhlet extraction  
3. Preparation of Silver nanoparticles  

BIOINSTRUMENTATION  
1. Verification of Beer's law using CuSO4 / K2Cr2O7 Solution  
2. Separation of sugar/Amino acid by paper chromatography  
4. Measurement of pH from fruit juice.  

Demonstration  
1. Separation of plant pigments by Colum chromatography  
2. Electrophoretic separation of Nucleic acid /protein  
3. Separation of lipids by TLC
M.Sc. BOTANY

BIOSTATISTICS
1. Collection and tabulation of data (Continuous and discrete)
2. Construction of Bar diagrams, Pie Diagrams.
4. Calculation of Measures of central tendency (Mean, Median and Mode)
5. Calculation of measures of Dispersion (Standard Deviation and standard error).
6. Calculation of correlation and regression significance test of correlation coefficient significance test for regression coefficient.
7. Calculation of Chi – square test (To test the goodness of fit, to test the detection of linkage).
8. Calculation of student’s ‘t’ test. Comparison of means of two samples-(‘t’ test for paired samples).
9. Calculation of One factor and two factor analysis of variance (ANOVA).

BIOINFORMATICS
1. Exploring NCBI database system,
2. Querying the PUBMED and GenBank databases ,
3. EBI server and searching the EMBL databases,
4. Exploring & querying SWISSPROT & UniProt KB.
5. Structural Visualization of DNA, Proteins by using rcsb website.

REFERENCE BOOKS

Important websites for bio informatics;
3. www...ncbi.nlm.gov/blast/db/
M.Sc. BOTANY
SEMESTER - IV
ELECTIVE IV - HORTICULTURE AND FORESTRY

UNIT I : Horticulture

UNIT II

UNIT III
Gardens types - formal, informal and kitchen - principle and design, landscaping. Aftercare of plants: weeding, Pruning, Garden adornments, garden designing, garden components- lawns, shrubs and trees, borders, hedges, edges, drives, walks, topiary, trophy, rockery., Gardening - Garden tools and implements, types of garden - ornamental gardens, indoor gardens, kitchen gardens, terrestrial and aquatic gardens. Famous gardens of India.

UNIT IV :

UNIT V : FORESTRY
TEXT BOOKS

REFERENCE BOOKS
11. Shujnrnoto, (1982), The Essentials of Bonsai, David & Charles
**M.Sc. BOTANY**  
**SEMESTER - IV**  

**CORE - XVI: PROJECT AND DISSERTATION WORK**

Project is a component of the active learning module that teaches approach and research techniques. Students would have hands on experience in investigating a selected research problem where he/she shall be trained in framing and testing hypothesis through suitable research design. Students are required to select their research topic in the one of the following domain.

**BROAD RESEARCH AREAS**

- Plant diversity and Systematic
- Plant physiology and Biochemistry
- Plant Molecular Biology and Biotechnology
- Microbiology and Plant pathology
- Environmental biology

**Allocation**

- Student may select their broad research area during the end of the third semester and will be guided by a suitable research supervisor in the area allotted by the HOD.
- Each research supervisor may be allotted with one or two students based on the Number of students
- Summer vacation may be used by the students to initiate their project work.

**Objective of the study**

- Topic investigated will have defined area of study.
- Project students will have hands on experience in all the instruments and techniques conduct his/her original research.
- Minimum of 5-10 yrs of literature will be added in the review with recent publication of the year.
- Standard of the project work should be high enough to be presented in conferences or to communicate as a papers and be subjected to peer review.
M.Sc. BOTANY

Evaluation

Internal Assessment mark based on (40 marks)
1. Literature collection 10 marks
2. Data collection 10 marks
3. Methodology 10 marks
4. Presentation of result - Statistical analysis/tabulation/Thesis writing/Reference Citing 10 marks.

External marks 60 marks
i) Dissertation 40 marks
ii) Viva voce 20 marks

Dissertation format
- Introduction
- Review of literature
- Materials and methods
- Results
- Discussion
- Summary
- Bibliography
M.Sc. BOTANY
SEMESTER - II

EXTRA DISCIPLINARY COURSE - PAPER I: HORTICULTURE

UNIT I

UNIT II

UNIT III

UNIT IV

UNIT V
TEXT BOOKS


REFERENCE BOOKS

M.Sc. BOTANY  
SEMESTER - II  

EXTRA DISCIPLINARY COURSE - PAPER II: HERBAL BOTANY

UNIT I  
Brief history of medicinal plants. Indian systems of Medicine: Siddha. Ayurvedha and Unani and Naturopathy. Traditional and Folklore medicine- Native medicine. Definition of Drug - Classification of natural drugs: Alphabetical, Morphological, Pharmacological and Chemical

UNIT II  
Drug adulteration, Drug evaluation, Chemical evaluation and Biological evaluation of drugs, Phytochemical investigations. Chemistry of drugs (Alkaloids, Flavanoids, Glycosides and Tannins) Quality control of herbal drugs.

UNIT III  
Cultivation, macro and microscopic characters, chemical constitutions and therapeutic uses of drugs from root (Vinca rosea and Rauwolfia serpentina), drugs from bark (Cinchona officinalis), drugs from stem of wood (Ephedra sp) and drugs from underground stem (Zingiber officinale).

UNIT IV  
Cultivation, micro and macrostructure, chemical constitutions and therapeutic uses of leaves (Aloe vera and Ocimum sanctum), flower (Eugenia jambolana), fruits and seeds (Feronia elephantum and Coriandrum sativum).

UNIT V  
Pharmacognosy - Definition and scope. A brief account on drugs acting on central nervous system (CNS stimulants, CNS depressants and Hallucinogenics). Drugs used in disorders of gastrointestinal tract (Carminatives, Bulk laxatives and Purgatives) and cardio vascular drugs (Cardiotonics, Cardia depressants and Antihypertensives).
TEXT BOOKS


MODEL QUESTION PAPER
SEMESTER - I
CORE COURSE-I: BIODIVERSITY OF PLANTS-I
(ALGAE, FUNGI, LICHEN AND BRYOPHYTES)

Time: 3 Hrs.         Max. Marks: 75

Part A (10x2=20 marks)
Answer all questions; all questions carry equal marks;
Draw diagrams wherever necessary; each answer should not exceed 50 words.
1. Phycology
2. Pyrenoids
3. Agar agar
4. Algal bloom
5. Heterothallism
6. Coenocytic mycelium
7. Helotism
8. Saxicolus
9. Operculum
10. Antheridiophore

Part B (5x5=25 marks)
Answer all questions (either a or b); all questions carry equal marks;
Draw diagrams wherever necessary; each answer should not exceed 200 words.
11. a) Write a short note on range of thallus structure in Chlorophyceae. (Or)
    b) List out the characteristic features of Cyanophyceae.
12. a) Briefly list out the general characters of Fresh water algae.(Or)
    b) Describe the cultivation methods of algae.
13. a) Briefly list out the general characters of Myxomycetes. (Or)
    b) Write shorts on economic importance of Fungi.
14. a) Classification of lichens. (Or)
    b) List out the economic importance of Lichens.
15. a) Describe the evolution of gametophytes in Bryophytes. (Or)
    b) Describe the structure Marchantia thallus.

Part C (3x10=30 marks)
Answer all questions (either a or b); all questions carry equal marks,
Draw diagrams wherever necessary; each answer should not exceed 500 words.
16. a) Give an account on Fritsch Classification of Algae. (Or)
    b) Write an essay on economic importance of Algae.
17. a) Give an account on growth and mode of nutrition in fungi. (Or)
    b) Describe the morphology and internal structure of lichen thallus.
18. a) Give an account on Reproduction and life cycle of Polytrichum. (Or)
    b) Write an essay on economic importance of Bryophytes.
MODEL QUESTION PAPER
SEMESTER - I
CORE COURSE II: BIODIVERSITY OF PLANTS – II
(PTERIDOPHYTES, GYMNOSPERMS AND PALEOBOTANY

Time: 3 Hrs.         Max. Marks: 75

Part A (10x2=20 marks)
Answer all questions; all questions carry equal marks;
Draw diagrams wherever necessary; each answer should not exceed 50 words.
1. Leptosporangiate
2. Glossopodium
3. Heterospory
4. Protostele
5. Corraloid root
6. Megasporophyll
7. Resin canal
8. Canada balsam
9. Pseudofossil
10. Compression

Part B (5x5=25 marks)
Answer all questions (either a or b); all questions carry equal marks;
Draw diagrams wherever necessary; each answer should not exceed 200 words.
11. a) Write a short notes on general features of Pteridophytes.(Or)
   b) List out the Economic importance of Pteridophytes.
12. a) Describe the cone of the Equisetaceae. (Or)
   b) Write short notes on Apogamy and Apospory
13. a) Classification of Gymnosperms. (Or)
   b) Give an account of phylogeny of Cycadales.
14. a) “Ginkgo is a living fossil” Discuss. (Or)
   b) Compare the Affinities of Pteridophyte with Gymnosperms.
15) a) Describe the method of fossilization. (Or)
    b) Write short notes on fossil Pteridophytes.

Part C (3x10=30 marks)
Answer all questions (either a or b); all questions carry equal marks,
Draw diagrams wherever necessary; each answer should not exceed 500 words.
16. a) Give the classification of Pteridophytes. (Or)
    b) Write an essay on morphology and reproduction of Ophioglossaceae.
17. a) Write a essay on stelar Evolution in Pteridophytes. (Or)
    b) Give a detailed account on life cycle of Cupressaceae.
18. a) Give general charterers of Ginkgoales. (Or)
    b) Write an essay on fossil types.
MODEL QUESTION PAPER
SEMESTER I
CORE III: TAXONOMY OF ANGIOSPERMS

Time: 3 Hrs.                     Max. Marks: 75

Part A (10x2=20 marks)
Answer all questions; all questions carry equal marks;
Draw diagrams wherever necessary; each answer should not exceed 50 words.

1. Bionomial nomenclature
2. Holotypes
3. Palynology
4. Paleobotany
5. Molecular taxonomy
6. Barcoding
7. Flower of polygala
8. Androphore
9. Epipetalous
10. Resupination

Part B (5x5=25 marks)
Answer all questions (either a or b); all questions carry equal marks;
Draw diagrams wherever necessary; each answer should not exceed 200 words.

11. a) Discuss the Linnaean principle of Classification (Or)
    b) Give a short account on Botanical gardens.
12. a) Write notes on Chemotaxonomy. (Or)
     b) Give an account on taxonomy in relation to embryology.
13. a)Briefly discuss the DNA finger printing and their application in Plant taxonomy (Or)
     b) Give a short account on Phenotypic Plasticity.
14. a) Evaluate the characters of Menispermaceae in the light of the of its Phylogeny. (Or)
     b) Give an account of floral characters of Onagraceae.
15. a) Give an account of floral characters of Aristolochiaceae (Or)
     b) Describe the flowers in Cyperaceae.

Part C (3x10=30 marks)
Answer all questions (either a or b); all questions carry equal marks,
Draw diagrams wherever necessary; each answer should not exceed 500 words.

16. a) Give an account of Bentham and Hookers system of classification and add a note on its merits. (Or)
     b) Write an essay on principle and Priority of botanical nomenclature
17. a) Give a detail account on Chemotaxonomy. (Or)
     b) Critically examine the classical experiments of Turresson
18. a) Explain the feature of taxonomic interest in Sapindaceae and example its Systematic position (Or)
     b) Explain the floral feature of Oleaceae with its economic importance
MODEL QUESTION PAPER
SEMESTER I
ELECTIVE COURSE- I: PLANT RESOURCES AND UTILIZATION

Time: 3 Hrs.         Max. Marks: 75

Part A (10x2=20 marks)
Answer all questions; all questions carry equal marks;
Draw diagrams wherever necessary; each answer should not exceed 50 words.

1. Acclimatization
2. Secondary center
3. Binomial of Rice
4. Natural fibres
5. Colchicum
6. Asafoetida
7. Cinchona
8. Myrobalan
9. Biodiesel
10. Name any two oil yielding plants

Part B (5x5=25 marks)
Answer all questions (either a or b); all questions carry equal marks;
Draw diagrams wherever necessary; each answer should not exceed 200 words.

1. a) Discuss the biodiversity status in India  (Or)
   b) Give short account on economic importance of lichens

12. a) Write short notes on Pulse and their importance  (Or)
   b) Give a brief account fodder crops

13. a) Write the Chemo-taxonomical classification of crude drug.  (Or)
   b) Explain the medicinal uses of Centella asiatica and Phyllanthus embilica.

14. a) Give brief an account on Isapgol.  (Or)
   b) Write a brief note on Arachis oil.

15. a) Write a brief note on vegetable oil and their fat content. (Or)
   b) Write short notes on gum yielding plants and their uses.

Part C (3x10=30 marks)
Answer all questions (either a or b); all questions carry equal marks,
Draw diagrams wherever necessary; each answer should not exceed 500 words.

16. a) Write an essay on plant introduction (Or)
   b) Discuss the nutritional value and industrial application of certain widely
      exploited marine Algae

17. a) Give an account on cultivation of Rice. (Or)
   b) Write about the botanical description, cultivation and medicinal properties of
      Catharanthus and Adathoda

18. a) Write an essay on Cannabis (Or)
   b) Give a detailed account of the structure, types, chemical composition, Properties
      and uses of Wood
MODEL QUESTION PAPER
SEMESTER -II
CORE COURSE – V: MICROBIOLOGY AND PLANT PATHOLOGY

Time: 3 Hrs.         Max. Marks: 75

Part A (10x2=20 marks)
Answer all questions; all questions carry equal marks;
Draw diagrams wherever necessary; each answer should not exceed 50 words.

1. Growth curve
2. Synchronous
3. Mycophages
4. Interferons
5. Xenobiotics
6. Biofiltration
7. Phytoalexin
8. SAR
9. Citrus Canker
10. Damping off

Part B (5x5=25 marks)
Answer all questions (either a or b); all questions carry equal marks;
Draw diagrams wherever necessary; each answer should not exceed 200 words.

11. a) Write a short notes on Scope of Microbiology   (Or)
    b) Explain the gram staining method.
12. a) Write a short notes on food spoilage. (Or)
    b) Explain the structure of Bacteriophage.
13. a) Explain the mass cultivation method of Rhizobium. (Or)
    b) Briefly explain the organic composting.
14. a) Give a brief account on general symptoms of Plant diseases. (Or)
    b) Briefly explain the plant disease forecasting..
15. a) Briefly explain the Tobacco mosaic disease. (Or)
    b) Explain Bunchy Top of Banana.

Part C (3x10=30 marks)
Answer all questions (either a or b); all questions carry equal marks,
Draw diagrams wherever necessary; each answer should not exceed 500 words.

16. a) Give a detailed account on Batch and continuous culture methods. (Or)
    b) Write an essay on Biopesticide.
17 a) Explain mass cultivations of Azotobacter in detail. (Or)
    b) Describe the bio degradation of petroleum.
18. a) Write an essay on defense mechanisms in plants. (Or)
    b) Explain i) Little leaf of Brinjal ii)Bacterial Blight of Paddy
MODEL QUESTION PAPER
SEMESTER -II
CORE COURSE -VI: ANATOMY OF ANGIOSPERMS, PLANT MICRO TECHNIQUE AND EMBRYOLOGY OF ANGIOSPERMS.

Time: 3 Hrs. Max. Marks: 75

Part A (10x2=20 marks)
Answer all questions; all questions carry equal marks;
Draw diagrams wherever necessary; each answer should not exceed 50 words.
1. Diffuse porous wood
2. Tension wood
3. Medullary Vascular bundle
4. Unilacunar node
5. Numerical apertures
6. Smears
7. Simple stain
8. FAA
9. Endothelium
10. Polyembryony

Part B (5x5=25 marks)
Answer all questions (either a or b); all questions carry equal marks;
Draw diagrams wherever necessary; each answer should not exceed 200 words.
11. a) Write the types and its functions of cambium. (Or)
   b) Differentiate the Sap wood from Heart wood.
12. a) Give a detailed account on cortical inverted vascular bundle. (Or)
    b) Diagrammatically describe Anomalous structure of Aristolochia stem
13. a) Write an principle and organization of light microscope (Or)
    b) Write notes on clearing techniques.
14. a) Give an account on fixation and fixatives. (Or)
    b) Give an account on micrometry.
15. a) Describe the various types of haustoria associated with cellular Endosperms (Or)
    b) Discuss the development of pollen wall in angiosperms plant

Part C (3x10=30 marks)
Answer all questions (either a or b); all questions carry equal marks,
Draw diagrams wherever necessary; each answer should not exceed 500 words.
16. a) Give a detailed account on types of meristems (Or)
    b) Write the internal structure dorsiventral leaf.
17. a) Discuss the root and shoot transition (Or)
    b) Explain principle and functions of TEM.
18. a) Give a detailed account on types, principles and uses of Camera lucida.(Or)
    b) Describe the development of dicot embryo
MODEL QUESTION PAPER
SEMESTER -II
CORE COURSE VII CELL AND MOLECULAR GENETICS

Time: 3 Hrs.         Max. Marks: 75

Part A (10x2=20 marks)
Answer all questions; all questions carry equal marks;
Draw diagrams wherever necessary; each answer should not exceed 50 words.

1. Nucleoid
2. Lysosomes
3. Active transport
4. Nucleosome
5. Epistatic gene
6. Linkage
7. Sex linked genome
8. Induced Mutation
9. Transcription
10. Heat Shock Proteins

Part B (5x5=25 marks)
Answer all questions (either a or b); all questions carry equal marks;
Draw diagrams wherever necessary; each answer should not exceed 200 words.

11. a) Write a note on peroxisome. (Or)
    b) Briefly explain about plastids.
12. a) Briefly explain about Lipid bilayer concept (Or)
    b) Explain the chromosome structure in prokaryotes.
13 a) What do you know about lethal gene. (Or)
    b) Write a short note Complementary gene interaction.
14. a) Briefly explain the Hardy- Weinberg Law. (Or)
    b) Briefly discuss the significance and role of polyploidy in Evolution.
15 a) Write a short note on RNA. (Or)
    b) Write a note on Genetic code.

Part C (3x10=30 marks)
Answer all questions (either a or b); all questions carry equal marks,
Draw diagrams wherever necessary; each answer should not exceed 500 words.

16. a) Describe the structure and function of mitochondria. (Or)
    b) Write a detailed note on cell division and cell cycle
17. a) Give an account on Mendelian principles. (Or)
    b) Explain the mechanism and significance of sex determination.
18. a) Write an essay on mutation. (Or)
    b) Explain the mechanism and significance of prokaryotic and eukaryotic transcription.
MODEL QUESTION PAPER
SEMESTER III
CORE COURSE X: PLANT PHYSIOLOGY AND BIOPHYSICS

Time: 3 Hrs.         Max. Marks: 75

Part A (10x2=20 marks)
Answer all questions; all questions carry equal marks;
Draw diagrams wherever necessary; each answer should not exceed 50 words.

1. Define osmotic potential
2. Anti Transpirants
3. Photophosphorylation
4. Kranz type of anatomy
5. Nitrogenase
6. ABA
7. Terpenes
8. Proline
9. Redox potential
10. ATP bioenergetics

Part B (5x5=25 marks)
Answer all questions (either a or b); all questions carry equal marks;
Draw diagrams wherever necessary; each answer should not exceed 200 words.

11. a) Distinguish between active and passive absorptions. (Or)
    b) Describe the biological significance of Water
12. a) Describe the outline of CAM pathway (Or)
    b) Write short notes on Gluconeogenesis.
13. a) Highlight the role of leghaemogolbin in nitrogen fixation. (Or)
    b) Brief account on phytochrome in flowering.
14. a) Explain the drought tolerant mechanisms of higher Plant (Or)
    b) Write short notes on Ageing and Senescence.
15. a) Explain the laws of thermodynamics. (Or)
    b) Give an account on De - excitation.

Part C (3x10=30 marks)
Answer all questions (either a or b); all questions carry equal marks,
Draw diagrams wherever necessary; each answer should not exceed 500 words.

16. a) Explain the possible mechanisms of solutes and assimilates (Or)
    b) Explain the regulatory mechanisms of stomatal behavior
17. a) Give an account on of Photorespiration and its significance (Or)
    b) Write an essay on physiology of fruit ripening.
18. a) Explain causes and methods of breaking of dormancy. (Or)
    b) Give an account on energy transductions in biological system.
MODEL QUESTION PAPER
SEMESTER III
CORE COURSE XI: PLANT ECOLOGY AND PHYTOGEOGRAPHY

Time: 3 Hrs.         Max. Marks: 75

Part A (10x2=20 marks)
Answer all questions; all questions carry equal marks;
Draw diagrams wherever necessary; each answer should not exceed 50 words.

1. Food web
2. Ecotones
3. Herbivory
4. Symbiosis
5. Tsunami
6. E- waste
7. WWF
8. UNESCO
9. Hotspots
10. Endemism

Part B (5x5=25 marks)
Answer all questions (either a or b); all questions carry equal marks;
Draw diagrams wherever necessary; each answer should not exceed 200 words.

11. a) Write a brief account on the aim and scope of ecology. (Or)
    b) Explain ecological indicators.
12. a) Discuss in brief the various factor that regulate the population growth. (Or)
    b) Give an account on species interactions.
13. a) Brief account on noise pollution. (Or)
    b) Write short on Rio de janeiro summit.
14. a) Explain the principle and application of remote sensing (Or)
    b) Discuss about environmental education programme
15. a) Explain the age and area hypothesis (Or)
    b) Give a brief account on continental drift hypothesis.

Part C (3x10=30 marks)
Answer all questions (either a or b); all questions carry equal marks,
Draw diagrams wherever necessary; each answer should not exceed 500 words.

16. a) Describe the various method of study of communities .point out merits and
     Demerits of each method. (Or)
     b) Define ecosystem. Give an account of the structure and function of an
        ecosystem
17. a) Define ecological niche. How this phenomenon is involved in completion between
     the organisms (Or)
     b) Write about the causes, effect and control measures of air pollution.
18. a) Write an essay on principles and applications of remote sensing. (Or)
     b) Describe the phytogeographical regions of India
MODEL QUESTION PAPER

SEMESTER III

ELECTIVE COURSE- III: PLANT BIOTECHNOLOGY AND GENETIC ENGINEERING

Time: 3 Hrs.         Max. Marks: 75

Part A (10x2=20 marks)

Answer all questions; all questions carry equal marks;

Draw diagrams wherever necessary; each answer should not exceed 50 words.

1. Genome.
2. Germplasm.
3. Totipotency.
5. S1 nucleases.
6. RAPD
7. Flavrsavr
8. Lipofection.
9. TRIPS
10. ELSI.

Part B (5x5=25 marks)

Answer all questions (either a or b); all questions carry equal marks;

Draw diagrams wherever necessary; each answer should not exceed 200 words.

11. a) Give a brief account on history and scope of Plant biotechnology. (Or)
   b) Write a note on cryopreservation.
12. a) Write a short note on Cell suspension culture (Or)
   b) Briefly explain about Explant sterilization.
13. a) Briefly explain the principles of r DNA technology. (Or)
   b) Write a note on cosmids.
14 a) Write a note on micro injection. (Or)
   b) Briefly explain about Antisense technology.
15. a) Write about Farmers rights. (Or)
   b) Write the current scenario of IPR in India.

Part C (3x10=30 marks)

Answer all questions (either a or b); all questions carry equal marks,

Draw diagrams wherever necessary; each answer should not exceed 500 words.

16. a) Give an account on plant genome organization. (Or)
   b) Write a detailed account on protoplast technology.
17. a) Explain the mechanism, principles of PCR. (Or)
   b) Describe the Agrobacterium mediated gene transfer.
18. a) Write an essay on transgenic plants. (Or)
   b) Discuss the ELSI impact on GMOs.
MODEL QUESTION PAPER
SEMESTER III
CORE COURSE-XIII: BIOCHEMISTRY AND NANOBIOTECHNOLOGY

Time: 3 Hrs.         Max. Marks: 75

Part A (10x2=20 marks)
Answer all questions; all questions carry equal marks;
Draw diagrams wherever necessary; each answer should not exceed 50 words.

1. Atom.
2. Molarity.
4. Nucleotide.
5. Transamination.
6. Coenzymes.
7. Simple Lipid.
8. Glycoside.

Part B (5x5=25 marks)
Answer all questions (either a or b); all questions carry equal marks;
Draw diagrams wherever necessary; each answer should not exceed 200 words.

11. a) Write the importance of pH in biological system. (Or)
    b) Write the Structure, properties of water.
12. a) Classify the Carbohydrates. (Or)
      b) Write a note on Nucleic acids.
13. a) Write a note on Urea cycle. (Or)
      b) Explain Ramachandran plot.
14. a) Write a note on steroid metabolism. (Or)
      b) Write short note on flavonoids.
15. a) Write briefly on Nanoparticles. (Or)
      b) Write about biosensors and their applications.

Part C (3x10=30 marks)
Answer all questions (either a or b); all questions carry equal marks,
Draw diagrams wherever necessary; each answer should not exceed 500 words.

16. a) Discuss about molecules and chemical bonds. (Or)
      b) Describe the TCA cycle.
17. a) Give an account on the structural conformations of proteins. (Or)
      b) Discuss Michaelis-Menton equation.
18. a) Explain the biosynthesis and biochemical importance of alkoloids. (Or)
      b) Explain the applications of nano biotechnology in agriculture and medicine.
MODEL QUESTION PAPER
SEMESTER IV
CORE COURSE– XIII: BIOINSTRUMENTATION, BIOSTATISTICS AND BIOINFORMATICS

Time: 3 Hrs.         Max. Marks: 75

Part A (10x2=20 marks)
Answer all questions; all questions carry equal marks;
Draw diagrams wherever necessary; each answer should not exceed 50 words.
1. IR.
2. AAS
3. Centrifugation.
4. HPLC.
5. AGE
6. Isoelectro focusing.
7. Monography.
8. Bibliography
10. NCBI.

Part B (5x5=25 marks)
Answer all questions (either a or b); all questions carry equal marks;
Draw diagrams wherever necessary; each answer should not exceed 200 words.
11. a) Give an account on fluorescence microscopy. (Or)
    b) Write short note on principle of Spectroscopy.
12. a) Briefly explain the principle of centrifuge. (Or)
    b) Write short note on autoradiogram.
13. a) Write short note on PH meter. (Or)
    b) Write short note on buffers.
14. a) Briefly explain oral and poster presentation. (Or)
    b) Write notes on review paper.
15. a) Write a note on classification and tabulation of data. (Or)
    b) Write briefly on sequence alignment.

Part C (3x10=30 marks)
Answer all questions (either a or b); all questions carry equal marks,
Draw diagrams wherever necessary; each answer should not exceed 500 words.
16. a) Describe the principle and mechanisms of UV visible spectrometer. (Or)
    b) Explain the principles and applications of chromatography in biological research.
17. a) Explain the principles, applications of Electrophoresis. (Or)
    b) Write an essay on literature collection.
18. a) Discuss the chi square test with suitable examples. (Or)
    b) Give an account on biological data bases?
MODEL QUESTION PAPER
SEMESTER IV
ELECTIVE COURSE- IV. HORTICULTURE AND FORESTRY

Time: 3 Hrs. Max. Marks: 75

Part A (10x2=20 marks)
Answer all questions; all questions carry equal marks;
Draw diagrams wherever necessary; each answer should not exceed 50 words.

1. Liquid manure
2. Pomology
3. Nursery Stock
4. Types of layering
5. Kitchen garden
6. Topiary
7. Jasmine concrete
8. Olericulture
9. Species invasion
10. Felling

Part B (5x5=25 marks)
Answer all questions (either a or b); all questions carry equal marks;
Draw diagrams wherever necessary; each answer should not exceed 200 words.

11. a) Write the divisions of horticulture (Or)
   b) Explain the different organic substrates
12 a) Write about types of Budding (Or)
   b) Explain nursery soil bed preparation
13. a) Write notes on Top dressing and Topiary (Or)
   b) Write short notes on Garden adornments.
14. a) Explain Ikebana (Or)
   b) Give an account on hydrophonics.
15. a) Write the scope and practices of Silviculture. (Or)
   b) Describe the Social forestry.

Part C (3x10=30 marks)
Answer all questions (either a or b); all questions carry equal marks,
Draw diagrams wherever necessary; each answer should not exceed 500 words.

16. a) Explain different types of Irrigation. (Or)
   b) Write about types of Grafting and its application
17. a) Define the designing of different types of gardens (Or)
   b) Elaborate the types of flower arrangements
18. a) Write short notes on i) Afforestation and Reforestation ii) Silviculture (Or)
   b) Discuss the drawbacks of Human interference in forest
1. Make suitable micro preparations of A, B, C, D and E. Draw labeled sketches. Identify and give the reasons. Submit the slides for valuation. (5 x 4 = 20 marks)

2. Make suitable micro preparations of F and G. Draw labeled sketches identify and give the reasons. Submit the slides for valuation. (2 x 5 = 10 marks)

3. Identify any two algae from the given algal mixture H. Draw diagrams only. (4 marks)

4. Name the genus and group of the given specimens I and J. (2 x 2 = 4 marks)

5. Draw diagrams and notes of interest on K, L, M and N. (4 x 3 = 12 marks)

<table>
<thead>
<tr>
<th>Serial Number</th>
<th>Materials</th>
<th>Marks Numbers x No. of Questions</th>
</tr>
</thead>
<tbody>
<tr>
<td>A, B, C, D &amp; E</td>
<td>Algae, Fungi, Bryophytes, Pteridophytes and Gymnosperms.</td>
<td>4 x 5</td>
</tr>
<tr>
<td>F &amp; G</td>
<td>Reproductive parts one each from Pteridophytes and Gymnosperms</td>
<td>5 x 2</td>
</tr>
<tr>
<td>H</td>
<td>Mixture of three micro algae Macroscopic structure of Bryophytes</td>
<td>4 x 1</td>
</tr>
<tr>
<td>I &amp; J</td>
<td>2 x 2</td>
<td>4 marks</td>
</tr>
<tr>
<td>K, L, M &amp; N</td>
<td>Materials one each from Fungi, Lichens and Fossils, bacteria or Viruses</td>
<td>3 x 4</td>
</tr>
<tr>
<td>Practical - Total Marks</td>
<td></td>
<td>50 marks</td>
</tr>
</tbody>
</table>

Note:
- Submission of 15 herbarium sheets from Lichens / Bryophytes/Pteridophytes / Gymnosperms (during the internal practical examination).
- Field trip to a hill station and coastal area for a minimum period of five days for the Collection of specimens and to study the plants in their natural habitat.
- Certified record work done in the laboratory during practical classes.
MODEL QUESTION PAPER
SEMESTER-II
CORE COURSE VIII. - PRACTICAL II
(COVERING THE CORE COURSES III & V)
[TAXONOMY OF ANGIOSPERMS, MICROBIOLOGY AND PLANT PATHOLOGY]

Time: 4 Hrs. Max. Marks: 60
Practical: 50 marks Record: 05 marks Viva - voce: 05 marks

1. Find out the binomials of A and B. (3x2=6marks)
2. Refer specimens C and D to their respective families, give the reasons at each level of Hierarchy. (3x2=6marks)
3. Construct a key using E, F, G, H,I and J. (6 marks)
4. Determine whether the given sample K is contaminated with bacteria or not. Leave Sample for valuation. (4 marks)
5. Perform the gram staining to identify the given bacterial sample L -5 marks
6. Name the causal organism, disease symptoms and control measures of the given Material. (4marks)
7. Mention the family, genus and species of N,O and P (3x3=9marks)
8. Write notes on Q, R and S. (3x2=6marks)
9. Write economic importance of T and U. (2x2=4marks)

<table>
<thead>
<tr>
<th>Serial Number</th>
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</tr>
</thead>
<tbody>
<tr>
<td>A &amp; B</td>
<td>Families prescribed in the syllabus</td>
<td>3 x 2</td>
</tr>
<tr>
<td>C &amp; D</td>
<td>Flowering plants from families prescribed in the syllabus</td>
<td>3 x 2</td>
</tr>
<tr>
<td>E, F, G, H, I &amp; J</td>
<td>Flowering twigs</td>
<td>1 x 6</td>
</tr>
<tr>
<td>K</td>
<td>Samples given in the practical</td>
<td>4 x 1</td>
</tr>
<tr>
<td>L</td>
<td>Samples given in the practical</td>
<td>5 x 1</td>
</tr>
<tr>
<td>M</td>
<td>Pathological material specified in the syllabus</td>
<td>4 x 1</td>
</tr>
<tr>
<td>N, O &amp; P</td>
<td>Plants given in practical syllabus</td>
<td>3 x 3</td>
</tr>
<tr>
<td>Q, R &amp; S</td>
<td>Spotters from microbiology (Equipment's/Instruments/Chemicals/culture Media /stains/Photographs/Slides)</td>
<td>2 x 3</td>
</tr>
<tr>
<td>T &amp; U</td>
<td>Economic importance of families</td>
<td>2 x 2</td>
</tr>
<tr>
<td></td>
<td>Practical - Total Marks</td>
<td></td>
</tr>
</tbody>
</table>

Note:
- Submission of a tour report and 25 herbarium sheets (Specimens collected from Tour collection / locally available plants during the internal practical Examination.
- Certified record work done in the laboratory during practical classes.
1. Cut transverse section of “A”. Identify the anomaly by giving reasons. Draw diagrams and submit the slides for valuation. -6 marks.
2. Macerate and identified the elements in the “B”. Measure the length or breadth using Micrometer. - 6 marks.
3. From the given material “C” dissect and mount any two stage of embryo. Draw diagrams. Submit the slides for valuation. - 6 marks.
5. Prepare a squash of “E”. Display any 2 stages of cell divisions. Draw labeled sketches. 4 marks.
6. Construct a chromosome map; calculate interference and coefficient of variation from a three point test cross data given in F. - 8 marks.
7. Solve the genetic problem “G” and “H”. (2 x 3=6).
8. Write notes of interest on “I, J, K and L”. (2 x 4=8)

<table>
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<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>A, B, C &amp; D</td>
<td>Material given in the practical class and Gymnosperms.</td>
<td>6 x 4</td>
</tr>
<tr>
<td>E</td>
<td>Material given in the practical class</td>
<td>4 x 1</td>
</tr>
<tr>
<td>F</td>
<td>Construct a chromosome map / Three point test cross data</td>
<td>8 x 1</td>
</tr>
<tr>
<td>G &amp; H</td>
<td>Genetic problem given in the practical (Mono &amp; Dihybrid ratio)</td>
<td>3 x 2</td>
</tr>
<tr>
<td>I, J &amp; K</td>
<td>Spotters from Anatomy, Micro technique &amp; Embryology (Slide/ Chemical/instrument)</td>
<td>2 x 3</td>
</tr>
<tr>
<td>L</td>
<td>Spotter from molecular Biology</td>
<td>2 x 1</td>
</tr>
<tr>
<td></td>
<td>Practical - Total Marks</td>
<td></td>
</tr>
</tbody>
</table>

Note:
- Submission of 5 double stained permanent slides (Microtome or free hand sections – 2, Cleared material-1, Peel –1 and Maceration-1)
- Certified record work done in the laboratory during practical classes.
1. Set up the experiment A assigned to you. Record your observation and interpret the Results. Leave the set up for valuation. 10 marks.

2. Comment on the setup B. 5 marks

3. Writes notes of physiological interest of C and D 3x2=6 marks.

4. Construct a meter quadrat F. studies the plant community by determining frequency, Density and abundance of different species. Analyses the vegetation. Record your data and interpret the results. 10 marks.

5. Determine the content of the given sample G. (pH/ dissolve oxygen/ bicarbonate Content/Primary productivity - 7 marks.

6. Write notes of ecological interest of H, I, J and K 4x3=12 marks

<table>
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<tr>
<th>Serial Number</th>
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<th>Marks Numbers x No. of Questions</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Plant physiology experiment given the syllabus (Selected by each student by lot).</td>
<td>10 x 1 10 marks</td>
</tr>
<tr>
<td>B</td>
<td>Plant physiology experiment (Set up)</td>
<td>5 x 1 5 marks</td>
</tr>
<tr>
<td>C &amp; D</td>
<td>Charts/Figures/Graphs/tables/ Instruments/Apparatus, Chemicals/ Models/photographs</td>
<td>3 x 2 6 marks</td>
</tr>
<tr>
<td>F</td>
<td>Meter quadrat</td>
<td>10 x 1 10 marks</td>
</tr>
<tr>
<td>G</td>
<td>Soil sample/water sample</td>
<td>7 x 1 7 marks</td>
</tr>
<tr>
<td>H, I, J,&amp;K</td>
<td>Ecological tools/Chemicals/Graphs/ photographs/Maps</td>
<td>3 x 4 12 marks</td>
</tr>
<tr>
<td></td>
<td>Practical - Total Marks</td>
<td>50 marks</td>
</tr>
</tbody>
</table>
MODEL QUESTION PAPER
SEMESTER -IV
CORE COURSE-XV: PRACTICAL-V: (COVERING THE CORE COURSES XIII&XIV)
(BIOCHEMISTRY, NANOBIOТЕХНОLOGY, BIOINSTRUMENTATION,
BIOSTATISTICS AND BIOINFORMATICS)

Time: 4 Hrs. Max. Marks: 60
Practical: 50 marks Record: 05 marks Viva - voce: 05 mark

1. Conduct the experiment (A) assigned to you. Record your results. Leave the set up Valuation. (10 marks)

2. For the given data (B) perform students “t” test and prove the statements -(7 marks)

3. From the given material (C) find out mean and calculate the standard deviation with Reference to its length. Present your data in the form of a graph. (6 marks)

4. Verify Beers law using the given solution / Determine the pH of given sample by using pH meter and comment on it (D)- (7marks)

5. Separate and identify the given sample (E) using either TLC or Paper Chromatography (10 Marks)

6. Write notes on F,G, H, I, and J (5x2=10 marks)

<table>
<thead>
<tr>
<th>Serial Number</th>
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<th>Marks Numbers x No. of Questions</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Biochemistry experiment from the syllabus (Selected by each student by lot)</td>
<td>3 x 2</td>
</tr>
<tr>
<td>B</td>
<td>Statistical data and tables are to be provided</td>
<td>7 x 1</td>
</tr>
<tr>
<td>C</td>
<td>Leaves or Seed sample (50numbers)</td>
<td>6 x 1</td>
</tr>
<tr>
<td>D</td>
<td>CuSO4 solution /K2Cr2 O7 solution/ Determine the pH</td>
<td>7 x 1</td>
</tr>
<tr>
<td>E</td>
<td>Amino acid / Sugar/ pigments</td>
<td>10 x 1</td>
</tr>
<tr>
<td>F</td>
<td>Biochemistry(Equipment/Apparatus/ Chemicals/Photographs/Charts/Diagrams)</td>
<td>2 x 1</td>
</tr>
<tr>
<td>G</td>
<td>Nanobiotechnology (Spotter)</td>
<td>2 x 1</td>
</tr>
<tr>
<td>H</td>
<td>Bioinstrumentaion(Equipment/Apparatus/ Chemicals/Photographs/Charts/Diagrams)</td>
<td>2 x 1</td>
</tr>
<tr>
<td>I</td>
<td>Biostatistics</td>
<td>2 x 1</td>
</tr>
<tr>
<td>J</td>
<td>Bioinformatics</td>
<td>2 x 1</td>
</tr>
</tbody>
</table>

Practical - Total Marks 50 marks
MODEL QUESTION PAPER
SEMESTER II
EXTRA DISCIPLINARY COURSE I: HORTICULTURE

Time: 3 Hrs. Max. Marks: 75

Part A (10x2=20 marks)
Answer all questions; all questions carry equal marks;
Draw diagrams wherever necessary; each answer should not exceed 50 words.

1. Pomology
2. Layering
3. Kitchen garden
4. Topiary
5. IAA
6. Write the binomial name of any two vegetables.
7. Cut flowers
8. Jasmine concrete
9. Nursery
10. Spaghetti tube

Part B (5x5=25 marks)
Answer all questions (either a or b); all questions carry equal marks;
Draw diagrams wherever necessary; each answer should not exceed 200 words.

11. a) Give a brief account on scope of horticulture. (Or)
    b) Briefly explain the methods of layering.
12. a) Write a short notes on indoor gardening. (Or)
    b) Describe the designing of garden.
13. a) Explain the role of growth regulators in horticultural crops. (Or)
    b) Write short notes on cultivation of brinjal.
14. a) Explain Ikebana. (Or)
    b) Describe the extraction of Papain.
15. a) Discuss about the management of nursery. (Or)
    b) Write a note on types of soil.

Part C (3x10=30 marks)
Answer all questions (either a or b); all questions carry equal marks,
Draw diagrams wherever necessary; each answer should not exceed 500 words.

16. a) Give a detailed account on stock scion relationship in horticultural crops. (Or)
    b) Write an essay on components of garden.
17. a) Explain the preservation of fruits and vegetables. (Or)
    b) Describe the cultivation methods of commercial flowers with two examples.
18. a) Briefly explain the cultivation methods of Mango. (Or)
    b) Write an essay on organic and inorganic manures.
MODEL QUESTION PAPER
SEMESTER II
EXTRA DISCIPLINARY COURSE II: HERBAL BOTANY

Time: 3 Hrs.          Max. Marks: 75

Part A (10x2=20 marks)
Answer all questions; all questions carry equal marks;
Draw diagrams wherever necessary; each answer should not exceed 50 words.

1. Siddha
2. Ayurvedha
3. Adulteration
4. Alkaloids
5. Cinchona
6. Serpentine
7. Aloe
8. Ocimum
9. Hallucinogenics
10. Carminatives

Part B (5x5=25 marks)
Answer all questions (either a or b); all questions carry equal marks;
Draw diagrams wherever necessary; each answer should not exceed 200 words.

11. (a) Briefly discuss about Unani system of medicine. (Or)
    (b) Discuss the history of medicinal plants.
12. (a) Explain the methods of biological evaluation of drugs. (Or)
    (b) Discuss the drug flavanoids.
13. (a) What are the medicinal uses of Ephedra (Or)
    (b) Explain the chemical constituents of Vinca.
14. (a) Explain the cultivation of Eugenia. (Or)
    (b) Write down the chemical constituents of Coriandrum.
15. (a) What are the drugs used for central nervous system? (Or)
    (b) How will you cure the gastrointestinal disorders by using plant drugs?

Part C (3x10=30 marks)
Answer all questions (either a or b); all questions carry equal marks,
Draw diagrams wherever necessary; each answer should not exceed 500 words.

16. a) Explain the classification of crude drugs. (Or)
    b) Briefly discuss the chemical structure of glycosides and tannins.
17. a) Explain the cultivation, microscopic, chemical constituents and uses of Rauwolfia. (Or)
    b) Explain the cultivation, microscopic, chemical constituents and uses of Zingiber officinale.
18. a) Give a detailed account on wood apple. (Or)
    b) Explain the drugs acting on the cardiovascular system.