

M.Sc. I SEMESTER (BIOLOGY)

BIOLOGY AND DIVERSITY OF PTERIDOPHYTES AND GYMNOSPERMS

Paper III (P.G.-103)

Total Credit 05

Teaching Hrs. 60

I PTERIDOPHYTA

- General Characters of Pteridophytes . Classification of Pteridophyta.
- Geological Time - scale. Process of fossilization & Types of Fossil .
- Structure, reproduction & life history of Psilopsida (*Psilotum* , *Rhynia* ) -12 Hrs.

II PTERIDOPHYTA

- Type & evolution of stele . Heterospory & Seed habit
- Structure, reproduction & life history of -
- Lycopada (*Isoetes*, *Lepidodendron* ), Sphenopsida (*Equisetum* , *Calamites* ), Pteropsida (*Ophioglossum* , *Osmunda* ) -12 Hrs.

III GYMNOSPREM

- General Characters of Gymnosperms .
- Classification of Gymnosperms .
- Economic importance of Gymnosperms
- General account of Pteridospermales (*Lyginopteris* , *Medullosa* , *Caytonia* ) - 12 Hrs

IV GYMNOSPREM

- General account of Cycadeoidales (*Williamsonia* ) Cordaitales (*Cordaites* )
- Structure and reproduction of Cycadales (*Nilssonia* , *Cycas* ), Ginkgoales (*Ginkgo* )

V GYMNOSPREMS

- Structure of reproduction of -
- Coniferales (*Pinus* ), Ephedrales (*Ephedra* ), Welwitschiales (*Welwitschia* )
- Gnetales (*Gnetum* ). Evolution of Gymnosprems. - 12 Hrs.

A collection of handwritten signatures and a blue official stamp. The stamp is from the 'महाराष्ट्र शासन, स्नातक कक्षा' (Maharashtra State, Graduate Class) and is located at the 'महाराष्ट्र राज्य मॉरीटोसिलेस इन्स्टीट्यूट' (Maharashtra State Moricology Institute).

M.Sc. I Semester (Botany)

Biology and Diversity of Pteridophytes and Gymnosperms

Paper III (PG- 103)

Total Credit- 05

Teaching Hrs. – 60

- Unit I- General characteristics and classification of Pteridophytes. Geological timescale, process of fossilization. Types of fossil. Structure reproduction and life history of Psilopsida. -12 hrs.
- Unit II- Structure, Reproduction and life history of Lycopsida, Sphenopsida and Pteropsida. Types and Evolution of stele, heterospory and origin of seed habit. -12 hrs.
- Unit III- General characters, classification and economic importance of Gymnosperms. General account of Pteridospermales with special reference to Lyginopteridaceae. Medullosaceae, Caytoniaceae, Glossopteridaceae. -12 hrs.
- Unit IV- Structure and reproduction of Cycadales, Ginkgoales and coniferales. -12 hrs.
- Unit V- Structure, reproduction and Affinities of Ephedrales, Welwitschiales and Gnetales. Evolution of Gymnosperms. -14 hrs.

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महाविद्यालय मों. वि. वि. कानपुर (उ.)

**M.Sc. III Semester (Botany)**  
**Molecular Biology**  
**Paper IV (PG- 304)**

Total Credit- 05  
 Teaching Hrs. – 60

- Unit I -** DNA structure, A, B and Z forms  
 DNA replication in prokaryotes and eukaryotes.  
 Structure and functions of t-RNA, r-RNA and m-RNA, hnRNA  
 DNA damage and repair.
- Unit II -** Fine structure of gene., split gene, overlapping gene,  
**Cis trans test.**  
 Gene expression in prokaryotes and eukaryotes and their  
 regulation.
- Unit III -** Mechanisms of transcription, translation, initiation, elongation and  
 termination in prokaryotes and eukaryotes, transcription factors, m-  
 RNA splicing.  
 Protein sorting and protein targeting, Chromosome walking. *in like mitochondria, Endo Reti, Peroxisome and Golgi apparatus*
- Unit IV -** Molecular techniques – basic concept, principles, technique and  
 application. Gel electrophoresis.  
*In situ* hybridization, Southern blotting technique, Northern  
 blotting technique. Western blotting technique. Dot blot.  
 Restriction mapping sequenced tagged site (STS) mapping.
- Unit V -** Immuno techniques – Precipitin test, agglutination, complement  
 fixation test, radio immune assay, immunosorbent assay, ELISA,  
 fluorescent antibody technique – Flow cytometry  
 Fluorescent *in situ* hybridization (FISH)  
 Genomic *in situ* hybridization (GISH)

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## M.Sc. I Semester (Botany)

## Biology and Diversity of Pteridophytes and Gymnosperms

## Paper III (PG-103)

Total Credit- 05

Teaching Hrs. - 60

- I- General characteristics and classification of Pteridophytes. Geological timescale, process of fossilization. Types of fossil. Structure reproduction and life history of Psilopsida. -12 hrs.
- Unit II- Structure, Reproduction and life history of Lycopsidea, Sphenopsida and Pteropsida. Types and Evolution of stele, heterospory and origin of seed habit. -12 hrs.
- Unit III- General characters, classification and economic importance of Gymnosperms. General account of Pteridospermales with special reference to Lyginopteridaceae. Medullosaceae, Caytoniaceae, Glossopteridaceae. General account of Cycadales. -12 hrs.
- Unit IV- Structure and reproduction of Cycadales, Ginkgoales and coniferales. -12 hrs.
- Unit V- Structure, reproduction and Affinities of Ephedrales, Welwitschiales and Gnetales. Evolution of Gymnosperms. -14 hrs.

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**M.Sc. II Semester (Botany)**  
**Plant Development & Reproduction**  
**Paper I (PG- 201)**

Total Credit- 05

Teaching Hrs. - 60

- I- Plant Development** : organization of shoot apical meristem (SAM). Wood development in relation to environmental factors- Primary anomalous structures in dicot stem Normal and anomalous secondary growth in stem. Nodal Anatomy. -10 hrs.
- Unit II-** Leaf growth and differentiation. Organization of root apical meristem (RAM) vascular tissue differentiation : lateral roots : roots hairs - Anatomy of root-stem transition. -10 hrs.
- Unit III-** Vegetative propagation and sexual reproduction : flower development : genetics of floral organ differentiation : homeotic mutants in *Arabidopsis* and *Antirrhinum*. Structure of anthers, microsporogenesis. Role of tapetum, pollen development, pollen storage, pollen allergy, pollen embryo. -14 hrs.
- Unit IV-** Structure of pistil. Ovule development megasporogenesis, organization of embryo sac : Structure of embryo sac cells. Pollination mechanism and vectors, pollen germination, pollen tube growth and guidance. -12 hrs.
- Unit V-** **Floral characteristics** : Pollen stigma interactions : sporophytic and gametophytic selfincompatibility. Double fertilization. Endosperm development during early maturation and dessication stages : embryogenesis storage proteins of endosperms and embryo. Polyembryony, apomixis. Dynamics of fruit growth : biochemistry and molecular biology of fruit maturation. -14 hrs.

## M.Sc. I SEMESTER (BIOLOGY)

## BIOLOGY AND DIVERSITY OF VIRUSES, BACTERIA AND FUNGI

## Paper I ( P.G.-101 )

Total Credit- 05

Teaching Hrs. - 60

## I-I VIRUSES-

Characteristics and ultrastructure of Virions, isolation and purification of viruses, chemical nature of Viruses: replication and transmission of viruses, economic importance of viruses.

10 Hours

## I-II ARCHAEABACTERIA AND EUBACTERIA-

General characters of Archaeobacteria. Eubacteria- General Characters. Ultrastructure. Nutrition. Reproduction. Biological and Economic Importance of Bacteria: Classification of Bacteria - Outline of Bergey's manual of systematic Bacteriology.

General account of Actinomycetes. Mycoplasma. Cyanobacteria- salient features, their biological importance with special reference to Nitrogen fixation.

11 Hours

## I-III MYCOLOGY

General Characteristics. Substrate relationship of Fungi. Cell ultrastructure, thallus organization, mode of nutrition. (Saprophytic, Biotrophic and Symbiotic). Reproduction-Vegetative, Asexual and Sexual. Economic importance of fungi.

- 10 Hours

## I-IV MYCOLOGY

Classification (Alexopoulos And Ainsworth). Recent trends in classification of Fungi. Heterothallism. General Account of Mastigomycotina (*Synchytrium*, *Saprolegnia*, *Phytophthora*, *Pythium*, *Peronospora*, *Albugo*) and Zygomycotina (*Rhizopus*, *Pilobolus*)

- 11 Hours

## I-V MYCOLOGY

Diagnostic features and general account of Ascomycotina (*Erysiphe*, *Penicillium*, *Neurospora*), Basidiomycotina (*Melampsora*, *Ustilago*, *Protomyces*) and Deuteromycotina (*Alternaria*, *Fusarium*, *Cercospora*); Parasexuality. Mycorrhizal associations.

14 Hours

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UNIT I . Organization of shoot apical meristem (SAM)

- . Wood development in relation to environmental factors .
  - . Primary anomalous structure in dicot stem (*Nyctanthis*, *Achyranthus*, *Berberis* ). Normal secondary growth in dicot stem .
  - . Anomalous secondary growth in stem. (*Bignonia*, *Leptadenia*, *Salvadora*, *Dracaena*)
  - . Nodal anatomy .
- 10 Hrs.

UNIT II . Organization of root apical meristem (RAM)

- . Vascular tissue differentiation .
  - . Lateral root and root-hairs .
  - . Anatomy of root-stem transition .
  - . Leaf growth and differentiation .
- 10 Hrs.

UNIT III . Vegetative propagation & sexual reproduction ,

- . Flower development ( ABC Model ), Genetic floral organ differentiation .
  - . Homeotic mutants in *Arabidopsis* and *Antirrhinum* .
  - . Structure of Anther , Microsporogenesis , Role of tapetum , Pollen storage , Pollen allergy, Pollen embryo .
- 14 Hrs.

UNIT IV . Structure of pistil , Ovule development , Megasporogenesis , Structure and types of embryosac ( Monosporic, Bisporic and Tetrasporic ) . Pollination mechanism and vectors , Pollen germination , Pollen tube growth and guidance .

- 12 Hrs.

UNIT V . Pollen-stigma interaction , Sporophytic and gametophytic self incompatibility ,

- . Double fertilization , Endosperm development ( Nuclear, Cellular and Helobial type )
- . Embryogenesis ( Development of Dicot embryo and Monocot embryo )
- . Storage proteins of endosperms and embryo. Polyembryony , Apomixis .
- . Dynamics of fruit growth : biochemistry of fruit maturation . - 14 Hrs.

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M.Sc. II Semester (Botany)  
Morphology and Taxonomy of angiosperms  
Paper II (PG- 202)

Total Credit- 05  
Teaching Hrs. -- 60

- Unit I -** Morphology of stamen and carpel. Carpel evolution. Placentation types and their origin. Species concept. Salient features of International code of Botanical Nomenclature (ICBN). - 10 hrs.
- Unit II -** Taxonomic evidences – Morphology, anatomy Palynology, embryology, cytology, phytochemistry.  
Taxonomic tools – Herbarium and floras. Relevance of taxonomy to conservation. Hot and Hottest spots, Endemism. - 12 hrs.
- Unit III -** Systems of angiospermic classification – Phenetic versus phylogenetic systems. Outline, merits and demerits of classifications proposed by Bentham and Hooker, Hutchinson and Cronquist. - 14 hrs.
- Unit IV –** Taxonomic study of families –  
Magnoliaceae, Annonaceae, Papavaraceae, Capparidaceae, Caryophyllaceae, Meliaceae, Rosaceae, Myrtaceae, Cucurbitaceae. -12 hrs.
- Unit V -** Taxonomic study of Families –  
Rubiaceae, Asteraceae, Apocynaceae, Convolvulaceae, Acanthaceae;  
Verbenaceae, Orchidaceae, Musaceae and Arecaceae. - 12 hrs.

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MATA JIJABAI GOVERNMENT P.G. GRILLS' COLLEGE, INDORE

M.Sc. IV Semester (Botany)  
Plant Cell, Tissue and Organ Culture  
Paper I (PG- 401)

Total Credit- 05  
Teaching Hrs. - 60

Unit I -

- Plant tissue culture - Introduction, History and scope
- Concept of Totipotency and importance of totipotency in plant science
- Concept of cyto differentiation and organogenesis.
- General technique of plant tissue culture.
- Callus and suspension culture.

Unit II -

- Somatic embryogenesis.
- Organ culture - Meristem, anther and embryo culture - Principle, technique and significance.

Unit III -

- Protoplast culture - Principle, technique of isolation of protoplast and its significance. Viability testing of protoplast.
- Protoplast fusion - methods and importance.
- Hybrid selection and regeneration.
- Somatic hybridization.

Unit IV -

- Somaclonal variation and role of Tissue culture in Agriculture, production of disease resistant plants, viral free plants, Stress resistant plants, Herbicide resistant plants.

Unit V -

- Applications of plant tissue culture - clonal propagation.
- Artificial seeds.
- Production of secondary metabolites / natural products.
- Cryopreservation and Germ plasm storage.

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M.Sc. IV Semester (Botany)  
Biotechnology and Genetic Engineering  
Paper II (PG 402)

Total credits - 05  
Total Teaching hrs. - 60

Unit I -

- Biotechnology basic concept, principles and scope.
- Recombinant DNA technology.
- Tools (Vectors and Enzymes) and Techniques.
- CDNA and Genomic Libraries.

Unit II -

- Agrobacterium mediated gene transfer. - 166 to 150 pg (112)
- Transposon tagging direct gene transfer techniques.
- DNA finger printing.
- Polymerase Chain Reaction.

Unit III -

- Strategies for development of transgenic plants.
- Transgenic plants - Ecological risk and ethical concern.
- Intellectual Property Rights.

Unit IV -

- Genetic improvement of industrial microbes, Nitrogen Fixers.
- Fermentation technology - Basic concept, characteristics of ideal fermentor, upstream and down stream processing.
- Genomics - Basic concept, types and strategies for genome analysis.

Unit V -

- Protein profiling technology and its application.
- Bioinformatics - Basic concept and its application in biological science.
- Genome projects - Basic concept.
- **High through put sequencing.** Illumina . Pyrosequencing
- Microarrays.

biotech papers

ABBY

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Sukla

prachar  
Egon

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