

M.Sc. Botany

(Semester- II)

MBOTCC-S: Biofertilizer Technology (5 Credits)

Time: 3hrs Marks: 70

The question paper will consist of 7 questions divided into 3 sections.

Section A: Question No.1 will be compulsory comprising ten objective types questions (two from each Unit) each carrying two marks (10x2:20 marks).

Section B: Question No. 2 will also be compulsory and comprise five short answer types questions (one from each Unit) and students will have to attempt only four questions (4 x 5:20marks).

Section C: Five long answer types questions are to be set (one from each Unit) of which any three questions are to be answered (3 x 10:30 marks).

Unit I

Introduction to biofertilizers - Structure and characteristic features of the following biofertilizer organisms: Bacteria: *Azospirillum*, *Azotobacter*, *Rhizobium* and Frankia; cyanobacteria; *Anabaena*. *Nostoc*; Fungi: *Glomus* etc..

Unit-II

Nitrogenous Biofertilizers: Bacteria - Isolation and purification of *Azospirillum* and *Azotobacter*, mass multiplication of *Azospirillum* and *Azotobacter*, formulation of inoculum of *Azospirillum* and *Azotobacter*, application of inoculants of *Azospirillum* and *Azotobacter*. Isolation and purification of *Rhizobium*, mass multiplication and inoculum production of *Rhizobium*, Methods of application of *Rhizobium* inoculants.

Unit-III

Isolation and purification of Cyanobacteria- Mass multiplication of cyanobacterial bioinoculants - Trough or Tank method, Pit method, Field method; methods of application of cyanobacterial inoculum. *Azolla* - mass cultivation and application in rice fields.

Unit-IV

Myconhizae - Ecto and endomycorrhizae and their importance in agriculture. Isolation of AM fungi - Wet sieving method and sucrose gradient method. Mass production of AM inoculants and field applications. Isolation and Purification of phosphate solubilizers. Mass multiplication and field applications of phosphate solubilizer (*Pseudomonas striata*).

Unit-V

Biofertilization processes -Decomposition of organic matter and soil fertility and vermicomposting
Biofertilizers: Storage, shelf life, quality control and marketing

**M.Sc. Botany
(Semester-II)**

MBOTCC-6: Taxonomy, Anatomy & Embryology (5 Credits)

Time: 3hrs

Marks: 70

The question paper will consist of 7 questions divided into 3 sections.

Section A: Question No.1 will be compulsory comprising ten objective types questions (two from each Unit) each carrying two marks (10x2:20 marks).

Section B: Question No. 2 will also be compulsory and comprise five short answer types questions (one from each Unit) and students will have to attempt only four questions (4 x 5:20marks).

Section C: Five long answer types questions are to be set (one from each Unit) of which any three questions are to be answered (3 x 10:30 marks).

Unit-I

Classification: A historical account of Pre-Linnaean, Linnaean, Post-Linnaean and Pre-Darwinian Natural Systems and Post-Darwinian Phylogenetic Systems contemporary Systems: Arthur Cronquist, Armen Takhtajan

Unit II

Concept of taxa: Species, sub-species, variety and form; genus, family and higher categories
Concept of characters: 'Good' and 'Bad' characters, correlation of characters, character weighting
And variation

Botanical nomenclature: Binomial system and International Code of Botanical Nomenclature (ICBN)

Unit III

Post Mendelian approaches: An introduction to Genealogy, Experimental, taxonomy
Cytotaxonomy, Biosystematics, Palynotaxonomy, Chemotaxonomy,

Unit IV

Differentiation, dedifferentiation, re-differentiation, polarity and symmetry of meristems.
Organization of shoot apical meristem (SAM). Organization of root apical meristem (RAM).
Differentiation of Epidermal tissue with reference to stomata and appendages. Anatomical features
and significance of nodal anatomy and floral anatomy

Unit V

Development of ovule, megasporogenesis and organization of female gametophytes (embryo sacs)
Double fertilization and post fertilization changes leading to formation of seed, development of
embryo, endosperm. Polyembryony and Apomixis. Role of embryology in taxonomy

M.Sc. Botany

(Semester-II)

MBOTCC-7: Physiology & Biochemistry (5 Credits)

Time: 3hrs Marks: 70

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Section A: Question No 1 will be compulsory comprising ten objective types questions (two from each Unit) each carrying two marks (10x2=20 marks).

Section B: Question No. 2 will also be compulsory and comprise five short answer types questions (one from each Unit) and students will have to attempt only four questions (4 x 5=20marks).

Section C: Five long answer types questions are to be set (one from each Unit) of which any three questions are to be answered (3 x 10=30 marks).

Unit- I

Osmotic relations; Transport phenomenon in plants: Transport of water and organic solutes, mechanism of xylem transport, mechanism of phloem transport, phloem loading and unloading

Unit- II

Energy transduction mechanism in plants: Photosynthesis: Difference between two pigment systems, Light reaction and dark reaction, water oxidizing complex; carbon fixation in C₃ and C₄ plants
N₂ fixation: Non-symbiotic and Symbiotic.

Unit-III

Plant growth and development: Growth hormones and growth regulators, mode of action of auxin, transport of auxin, physiological role of auxin. Gibberellin: Mode of action and physiological role
Cytokinin: Physiological role and mode of action

Unit-IV

Enzymology: Enzymes: structure and classification, cofactors, coenzymes, prosthetic groups, isoenzymes, allosteric enzymes, multienzymes, mechanism of enzyme action, properties of enzymes

Unit-V

Biochemical energetics : Glycolysis, TCA Cycle, E.T.S. Oxidative phosphorylation. Photorespiration and its biological importance. Difference between oxidative phosphorylation and photo-phosphorylation.

M.Sc. Botany

(Semester-II)

MBOTCC-8: Plant tissue culture, ethanobotany, biodiversity & biometry (5 Credits)

Time: 3hrs

Marks: 70

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Section A: Question No.1 will be compulsory comprising ten objective types questions (two from each Unit) each carrying two marks (10x2:20 marks).

Section B: Question No. 2 will also be compulsory and comprise five short answer types questions (one from each Unit) and students will have to attempt only four questions (4 x 5:20marks).

Section C: Five long answer types questions are to be set (one from each Unit) of which any three questions are to be answered (3 x 10:30 marks).

Unit I

Cell and Tissue culture: Laboratory equipments; General techniques of aseptic manipulation; Composition of culture media and its preparation Callus culture and suspension culture . Organ culture: In vitro culture of vegetative and reproductive. Plant protoplasts: Isolation, culture methods and plant regeneration Role of tissue culture in crop improvement

Unit II

Traditional ethnobotanical knowledge base: Traditional knowledge base of Indian ethnic and local communities and their practices. Ethnopharmacology, medical and paramedical use of plant by the local ethnic people. Ethnoecology: Use of local biodiversity by the local tribe / schedule caste

Unit III

Biodiversity concept: origin of the term, themes of biodiversity concept. Types of Biodiversity: Genetic, species and ecosystem diversity, distribution at global and national level. Assessment and inventory based on recommendation of IUCN, Biodiversity conventions and Biodiversity Act2002. Benefits of Biodiversity: Direct economic benefits to mankind, genetic resources, essential ecosystem services. Patterns of loss of Biodiversity: Red lists, Red Data Book and Green Book Red Data categories: Extinct, endangered, vulnerable and threatened species.

Unit- IV

Distinctions between preservation and conservation, Conservation potential index, Protocols for conservations, Traditional conservation practices *In situ* and *ex situ* conservation. Patenting, Intellectual property right, Biosafety protocols

Unit-V

Biometry : Distribution and measurement of variation, Mean, Median, Mode, Standard deviation, standard error, coefficient of variability, test of significance- t test, F- test (analysis of variants); Measurement of correlation coefficient, Application of chi-square test for testing hypothesis

MBOTCC-9: Practical 2
(Based on MBOTCC 5o 6,7,8 & 9) (5 Credits)

Time: 5 hrs

Marks: 70

1. Preparation of culture media for growth of *Rhizobium*, *Azotobacter* and *Nostoc*.
2. Production microbial Biofertilizers: *Rhizobium*, *Azotobacter* and *Nostoc*.
3. Family description of some locally available Plants.
4. Anamalous secondary growth of some common plants (*Tinospora*, *Boerhaavia*, *Nyctanthes*, *Aristolochia*, *Amaranthus*).
5. Staining of Xylem and Phloem elements.
6. Study of stigma by squash method
7. Study of pollen germination
8. Mounting and study of embryo and endosperm.
9. Separation of chlorophyll pigment by paper chromatography.
10. Determination of water potential using plasmolytic method.
11. Estimation of protein by Lowry method.
12. Study of alpha-amylase in germinating seedlings.
13. Separation of amino acids by TLC.
15. Preparation of MS media for plant tissue culture.
14. Ex-plant culture and callus initiation.
15. Taxonomy and significance of some important medicinal plant.