

CMJ UNIVERSITY, SHILLONG

REGULATION FOR MSC BOTANY

Duration – Two Years

Eligibility - B.Sc. with relevant subject or its equivalent

Scheme of Distribution of Marks

Sr. No.	First Year	Internal Assessment Marks	Term End Examination	Total Marks	Passing Marks
1	Algae, Fungi, Lichens, Plant Pathology & Bryophytes	30	70	100	40
2	Pteridophytes, Gymnosperms & Paleobotany	30	70	100	40
3	Taxonomy Of Angiosperms & Economic Importance	30	70	100	40
4	Plant Anatomy, Embryology & Microtechnique	30	70	100	40
Sr. No.	Second Year	Internal Assessment Marks	Term End Examination	Total Marks	Passing Marks
1	Cell biology & Genetics	30	70	100	40
2	Microbiology And Biotechnology	30	70	100	40
3	Plant Physiology And Biochemistry	30	70	100	40
4	Plant Ecology And Phytogeography	30	70	100	40
5	Practical				40

M.Sc BOTANY (Second Year)

ALGAE, FUNGI, LICHENS, PLANT PATHOLOGY AND BRYOPHYTES

MSY 101

SYLLABUS

UNIT – I

Classification of algae (F.E. Fritsch). Range of cell structure – prokaryotic and Eukaryotic cell organization. Thallus organization in algae. Evolutionary trends seen in Chlorophyceae, Phaeophyceae and Rhodophyceae. Economic importance of algae.

UNIT – II

Systematic position, distribution, thallus structure, cell structure, pigmentation, method of reproduction and life history of the following genera of algae. Scytonema, Hydrodictyon, Cladophora, Enteromorpha, Nitella, Cyclotella, Padina, Batrachospermum and Gracilaria..

UNIT – III

Classification of fungi (Alexopoulos). Spore dispersal mechanism in fungi. Nutrition in fungi. Economic importance of fungi. Detailed study of the occurrence, structure and reproduction of the following genera of fungi. *Peranospora*, *Rhizopus*, *Yeast*, *Penicillium*, *Puccinia*, *Lycoperdon* and *Fusarium*. A general account of lichens with special reference to their structure, nutrition, reproduction and economic importance.

UNIT – IV

Stages in plant disease development, inoculum – predisposition – penetration – infection – invasion – growth, reproduction and dispersal of pathogen.

Host – pathogen interaction – physiological, chemical and bio – defence mechanism in host. Plant disease control – prophylaction – protection – chemical, environmental manipulation – sanitation – biological control of disease.

Study of the following plant disease with reference to causes, symptoms, dissemination, control and preventive measures – Bacterial blight of Rice, wilt of cotton, Bunchy top of banana, Little leaf of Brinjal.

UNIT – V

Thallus organization of gametophytes and range of structure and evolution of sporophytes in Bryophytes. Vegetative reproduction in Bryophytes. Origin of Bryophytes. Ecology of Bryophytes. Structure and reproduction of the following genera of Bryophytes – *Reboulia*, *Porella*, *Anthoceros* and *Sphagnum*.

PTERIDOPHYTES, GYMNOSPERMS AND PALEOBOTANY

MSY 102

SYLLABUS

UNIT – I

General features of Pteridophytes – Classification of Pteridophytes (Reimers) – Stellar evolution – Origin of Pteridophytes – Heterospory and Seed habit – Apogomy and Apospory – Spore Producing Organs and Evolution of Spores – Economic importance.

UNIT – II

Range in Morphology, Structure, Reproduction, Gametophyte, and Embryogeny in Psilotales (PSILOPHYTES), Equisetales (EQUISETUM), Isoetales (ISOETES), Ophioglossales (OPHIOGLOSSUM), Marattiales (ANGIOPTERIS), Osmundales (OSMUNDA), Filicales (PTERIS) and Salviniales (SALVINIA).

UNIT – III

General characters, Distribution, Phylogeny, and Economic importance of Gymnosperms – classification of Gymnosperms (Sporne 1965) – evolution of male and female gametophytes in Gymnosperms.

UNIT – IV

Morphology Anatomy, Reproduction and Phylogeny of Cycadales(CYCAS), Coniferales (ARAUCARIA), Ginkgoales (GINKGO) and Gnetales (GNETUM).

UNIT – V

Geological time scale – types of Fossils – methods of Fossilization – A study of the following fossils of Pteridophytes and Gymnosperms.

PTERIDOPHYTES

- A. rhytnia
- B. lepidodendron
- C. spenophyllum
- D. calamites

GYMNOSPERMS

- a. lagenostoma
- b. cordites
- c. pentoxylon

TAXONOMY OF ANGIOSPERMS AND ECONOMIC IMPORTANCE

MSY 103

SYLLABUS

UNIT – I

A detailed account of the classification of Linnaeus. Bentham and Hooker, Cronquist (Including Merits and demerits). Phylogeny of Angiosperms. National and International herbaria.

UNIT – II

Modern trends in classification Taximetrics, Chemotaxonomy, Botanical Survey of India [BSI]. ICBN, Herbarium technique. Typification, Priority, Publication, Author Citation.

UNIT – III

A detailed account of the following families and their economic importance.

Ranunculaceae – Magnoliaceae – Capparidaceae – Caryophyllaceae – Meliaceae – Sapindaceae

UNIT – IV

Asteraceae - Sapotaceae – Asclepiadaceae – Solanaceae – Bignoniaceae - Verbenaceae

UNIT – V

Amaranthaceae - Euphorbiaceae - Casuarinaceae – Typhaceae – Poaceae - Zingiberaceae

PLANT ANATOMY, EMBRYOLOGY AND MICROTECHNIQUE

MSY 104

SYLLABUS

UNIT-I

Cell wall - types, ultra structure of cell wall, pits, plasmodesmata, functions. Theories of organization of meristem in stem and root. Secondary cambium types - vascular cambium and phellogen - structure and functions. Cambial activity, wound healing and grafting. Nodal anatomy - types.

UNIT-II

Simple tissues structure and their functions. Secondary xylem, secondary pholem - structure and functions. Ontogeny and phylogeny of vessels. Leaf structure - types - ontogeny of dorsiventral leaf. Secondary and anomalous secondary growth in dicot and monocot stems. wood types & structures.

UNIT-III

Microsporogenesis and male gametophyte development. Megasporogenesis and female gemetophyte development. Pollen-pistil interaction, sexual incompatibility .

UNIT-IV

Structure and development of different types of Endosperms. Embryo development - Dicot (*Capsella bursa - pastoris*) monocot (*Luzula forsteri*) polyembryony, apomixes.

UNIT-V

Microtechnique steps - Fixation & fixatives, dehydration clearing, infiltration, embedding & block making, microtome - Rotary, sledge & freezing, Section cutting, staining. Camera lucida - types principle, Micrometry. Phase contrast microscopy, Electron microscope (TEM & SEM) - principle & preparation techniques.

MASTER OF SCIENCE (BOTANY) Second Year
CELL BIOLOGY AND GENETICS
MSY - 201

CELL BIOLOGY

UNIT – I:

Introduction - Definition; History and Scope of Biotechnology, Biotechnology in India, Recent trends in Biotechnology.

UNIT – II :

Cell as a Basic unit, Cell theory, Classification of cell types, specialized cells such as motile, nerve and muscle cells ultra structure of prokaryotic and eukaryotic cells – Structure and functions of cell organelles. Comparison of microbial, plant and animal cells

UNIT – III :

Cell division (Prokaryotic and Eukaryotic), Cell cycle, mitosis and meiosis, Special types of chromosomes; Salivary gland and Lamp brush chromosomes, Amoeboid, Ciliary and flagella movements.

GENETICS

UNIT – IV :

Mendelism: Mendel's work, laws of heredity, Test cross, Incomplete dominance and simple problems. Genome organization in bacteria, plant and animals; DNA, RNA and replication – chromosomal theory of inheritance.

UNIT – V :

Cytoplasmic Inheritance : Plastid inheritance in *Mirabilis*, petite characters in yeast and kappa particles in paramecium. Mutations: Types: spontaneous and induced, Mutagens: Physical and chemical, Mutation at the molecular level.

MICROBIOLOGY AND BIOTECHNOLOGY

MSY - 202

MICROBIOLOGY

UNIT-I

Scope of microbiology – sterilization techniques – culture media – Pure culture and Sub – culture. Microbial examination of water and air - Food spoilage and preservation – Pasteurization – Soil microbes – microorganisms associated with nitrogen cycle and organic matter decomposition.

UNIT-II

Sources and importance of primary metabolites (vitamins, organic acids, alcohols, amino acids), Sources and importance of secondary metabolites : toxins, antibiotics (Penicillin) – microbial proteins and SCP – mushroom cultivation and uses – microorganisms producing enzymes – methods of enzyme production and application – microbial pesticides and herbicides – microbial degradation of xenobiotics – microbial enzyme production and application.

BIOTECHNOLOGY :

UNIT-III

Recombinant DNA technology : Enzymes (nucleases, polymerases, ligases, alkaline phosphatase, reverse transcriptase, SI nucleases), brief study vectors (Plasmids, cosmids, phages and transposons). Gene cloning. Amplification of genes by PCR – Gene transfer using Ti plasmid of *Agrobacterium tumefaciens* – transgenic plants.

UNIT-IV

Plant cell and tissue culture : - culture media (MS medium, White's medium – Cell culture). Organogenesis – Somatic Embryogenesis – Micropropagation – Synthetic seeds – Uses of tissue culture.

UNIT-V

Protoplast culture and regeneration of plants – isolation of protoplast methods – protoplast viability testing – isolation of sub – protoplasts – protoplast fusion and somatic hybridization – uses of protoplast fusion – cybrids.

PLANT PHYSIOLOGY AND BIOCHEMISTRY

MSY - 203

PLANT PHYSIOLOGY

UNIT-I

Mechanism of water absorption and ascent of sap. Transpiration – types and mechanism. Role and deficiency symptoms of micro and macro nutrients. Mechanism of mineral salt uptake and transport of solutes across membrane.

UNIT-II

Photochemical reactions – Non – cyclic and cyclic electron transport – photophosphorylation. Calvin cycle. Hatch and Slack pathway. Photorespiration and Glycolate metabolism cycle.

UNIT-III

Glycolysis (EMP) pathway. Kreb's (TCA) cycle. Electron transport system and oxidative phosphorylation. Pentose phosphate pathway - Symbiotic & Asymbiotic nitrogen fixation. Ammonium assimilation (GDH, GS & GOGAT) pathway.

UNIT-IV

Plant growth regulators – Physiological effects of auxins, gibberellins, cytokinins, abscissic acid and ethylene - Role of phytochrome - Photoperiodism and mechanism of flowering - Vernalization, Dormancy and Seed viability.

BIOCHEMISTRY

UNIT-V

Classification and properties of carbohydrates - Classification of amino acids - Classification and structures of protein - Classification and mode of action of enzymes.

PLANT ECOLOGY AND PHYTOGEOGRAPHY

MSY – 204

UNIT-I

Scope and importance of Ecology. The environment – climatic factors (Light, Temperature, rainfall, humidity and wind), Edaphic factors – Components of soil. Soil erosion and conservation. Biotic factors (human activity and forest fire).

UNIT-II

Ecosystem – structure and function. Types of ecosystem (Grassland and Pond). Energy flow in ecosystem. Interaction between plants and animals. Plant succession – causes of succession, climax concept. Kinds of succession (Hydrosere, Xerosere).

UNIT-III

Autecology and Synecology – Population ecology. Quantitative analysis of plant community structure (quadrat, transect and point methods). Habitat ecology (Fresh water, Marine and Estuary).

UNIT-IV

Environmental pollution, air, water, soil and their control measures. Impact of pollution on vegetation. Conservation of natural resources – water resources and energy resources. Wild life management. Endangered species of plant and animals, Red Data Book.

UNIT-V

Disaster management – floods, earthquake, and Tsunami – Age and area hypothesis – endemism – Continuous and discontinuous distribution of vegetation. Phytogeographical regions of India - Remote sensing – principle, tools and application in forestry.

***** MSY 205 – Practical *****