M.Sc. Botany
(Semester-I)

M-Bot-101: Phycology, Mycology and Bryology (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

Thallus organization of algae, Cell ultra-structure and Reproduction: Vegetative, asexual and sexual
Role of pigments, reserve food, cell wall, flagella, eye spot and pyrenoids in classification and evolution of algae
Algal bloom, algal biofertilizers
Use of algae as food, feed and in industry
Indian phycologists and their contributions

Unit II

Salient features of Protochlorophyta, Chlorophyta, Charophyta, Xanthophyta, Bacillariophyta, Phaeophyta and Rhodophyta

Unit III

Lichen: General Account, Classification, Distribution, Morphology, Anatomy, Reproduction & Economic importance
General characters of fungi, substrate relationship in fungi, cell ultra structure, unicellular and multicellular organization, cell wall composition, nutrition (saprobic, biotrophic, symbiotic), reproduction: vegetative, asexual and sexual; heterothallism, heterokaryosis and parasexuality
Classification of fungi: Recent trends

Unit IV

General account of Mastigomycotina, Zygomycotina, Ascomycotina, Basidiomycotina, Deuteromycotina
Phylogeny of fungi
Fungi in industry, medicine and as food
Fungi as biocontrol agents

Unit V

Classification and general features of Marchantiales and Jungermanniales, Anthocerotales, Sphagnales and Polytrichales
Evolutionary trends in sporophytes
Vegetative propagation and perennation
Mechanism of dehiscence of capsules and dispersal of spores
Conducting tissues in Bryophytes
Economic importance of Bryophytes

M.Sc. Botany
(Semester-I)

M-Bot-102: Microbiology and Plant Pathology (4 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

General introduction; History and scope of microbiology; theory of spontaneous generation
Methods of microbiology: Sterilization-Different types of sterilization (moist heat, dry heat, filtration, radiation and chemicals)
Diversity of microorganisms: Archaea, Bacteria, Cyanobacteria, Phytoplasma, Rickettsia

Unit II

Structure of bacteria: Ultra structure of Gram positive and Gram negative bacteria; reproduction (vegetative, asexual and genetic recombination); Nutritional classification of bacteria; economic importance of bacteria

Viruses: Nature, characteristics and ultrastructure of Virions (TMV, Bacteriophages and Cyanophages), multiplication (Lytic and Lysogenic cycles) and transmission of viruses; economic importance; a brief account of Viroids and Prions

Unit III

Agriculture Microbiology: Biological nitrogen fixation and Biofertilizer
Industrial Microbiology: Industrial production of organic acids (specially citric acid), antibiotics (specially penicillin) and enzymes (specially amylase)

Unit IV

Classification of Plant disease and appearance of symptoms due to different microbes
Role of enzyme and toxin in pathogenesis
Effect of infection on the physiology of host with special reference to photosynthesis, respiration, nitrogen metabolism and osmoregulation
Host defence mechanism with special reference to structural and biochemical defence

Unit V

Seed pathology with special reference to seed-borne mycoflora, mycotoxin and its hazard
Quarantine regulation and seed certification
Rhizosphere and rhizoplane microflora and its significance in soil borne disease
Etiology, symptoms and control measures of the following plant diseases:
Rust of linseed, Leaf blight of maize, Tikka disease of groundnut, Bunchy top of banana, black tip of mango, Yellow vein mosaic of bhindi, Little leaf of brinjal and Citrus canker

M.Sc. Botany
(Semester-I)

M-Bot-103: Pteridophyta, Gymnosperm & Paleobotany (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

Marker Characters, relative position in the plant kingdom as well as emerging concepts and classification of Pteridophytes
Detailed general features: vegetative and reproductive, with special reference to development, characterization, position and kind of protection provided to the spore producing organs of the sporophytes and sexuality of the gametophytes in the following classes/orders:
Psilopsida – Psilotales
Lycopsida – Lycopodiates, Selaginellales and Isoetates
Special discussion has to be made about:
Stelar evolution within Lycopodiales
Gametophytic variations and evolution in Lycopodiales and
Heterospony *vs.* seed habit, with special reference to Selaginellales

Unit- II

Sphenopsida –Equisetales (only a brief account)
Pteropsida
Characterization, classification and distinction between Eusporangiate,
Protoleptosporangiatae and Leptosporagiatae
Structure, reproduction and Phylogenetic considerations of the followings:
Eusporangiate – Ohioglossales
Protoleptosporangiatae – Osmundales
Leptosporangiatae – Marsiliales , Salviniales and Filicales
Special reference has to be made about the followings:
Cytology *vs.* phylogeny of ferns
Role of polyploidy in evolution of ferns
Economic importance of pteridophytes

Unit-III

Characteristic features, distribution and economic importance of gymnosperms
Classification of Gymnosperms
Comparative morphology, anatomy, reproductive structures and interrelationships of the following living orders
Cycadales
Ginlgoales
Taxales

Unit- IV

Coniferales: Characteristic features, families of modern conifers, their distinguishing features, evolution of female cone with reference to "transition conifers" as evolutionary line between cordaitales and coniferales
Comparative account of reproductive structures of Ephedrals, Gnetales and Welwitchiales, angiospermic features within the group
Evolutionary trend in sporophytic and gametophytic structures

Unit-V

Types and Nomenclature of fossils; Fossilization process and geological time-scale; Principles and objectives of fossil study
Comparative morphology, anatomy, reproductive structure and affinities of the following fossil groups:

Psilophytales
Protolepidodedrales
Lepidodendrales
Cycadaeoidales
Cordaitales
Pentoxylales

M-Bot-104: Practical-I (Based on M-Bot-101, 102 & 103) [6 Credits]

M.Sc. Botany
(Semester-II)

M-Bot-201: Taxonomy, Anatomy & Embryology (4 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 Takhatajan, Robert F. Thorne and Rolf M.T. Dahlgren and K.R. Sporne's Advancement Index

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 Genecology, Experimental taxonomy, Cytotaxonomy, Biosystematics, Palynotaxonomy, Chemotaxonomy, Numerical Taxonomy/Taximetrics & Molecular Systematics

Unit IV

Differentiation, polarity, symmetry, factors affecting differentiation and morphogenesis
Meristems: Types
Organization of Shoot Apical Meristem (SAM)
Organization of Root Apical Meristem (RAM)
Differentiation of epidermis with special reference to stomata
Anomalous secondary growth
Nodal, Floral and Seed Anatomy – A phylogenetic consideration
Anatomy in relation to taxonomy

Unit V

Development of ovule, megasporogenesis and organization of female gametophytes (embryo sacs)
Pollen-Pistil interaction
Double fertilization and post fertilization changes leading to formation of seed, development of embryo, endosperm and seed coat
Polyembryony and Apomixis
Role of embryology in Taxonomy

M.Sc. Botany
(Semester-II)

M-Bot-202: Physiology & Biochemistry (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

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 C_3 and C_4 plants

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; Differences between enzymes, catalysts and hormones

Unit-V

Biochemical Energetics: Glycolysis, TCA cycle, ETS, oxidative phosphorylation, photorespiration; Difference between oxidative phosphorylation and photophosphorylation

M.Sc. Botany
(Semester-II)

M-Bot-203: Plant tissue culture, ethanobotany, biodiversity & biometry (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

Cell and Tissue culture: Laboratory equipments; General techniques of aseptic manipulation; Composition of culture media and its preparation
Callus culture, suspension culture and single cell culture
Organ culture: *In vitro* culture of vegetative and reproductive parts
Clonal propagation
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 plants in aboriginal of pro-literate societies in the world
Ethnomycology: Medicinal potential of Fungi
Ethnoecology: Use of local biodiversity by aboriginal people for sustenance

Unit III

Biodiversity concept: Origin of the term, themes of biodiversity concept
Benefits of Biodiversity: Direct economic benefits to mankind, genetic resources, essential ecosystem services
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 Act 2002
Patterns of loss of Biodiversity: Red lists, Red Data Book and Green Book
Red Data Categories: Extinct, endangered, vulnerable and threatened species.
Causes of biodiversity loss and extinction: Natural, genetic and ecological causes; human impacts including development pressure; Habitat loss, encroachments and overexploitation of resources
Repercussions of loss biodiversity including future climate change

Unit- IV

Conservation of Biodiversity (Phytodiversity)
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
People's movements for biodiversity conservation

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

M-Bot-204: Practical-II (Based on M-Bot-201, 202 & 203) [6 Credits]

M.Sc. Botany
(Semester-III)

M-Bot-301: Cell Biology & Cytogenetics (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

Cell theory and organization of the cell (Prokaryotic and Eukaryotic)
Ultrastructure chemical composition of the following:
Cell wall, Plasma membrane, Cytoplasm and cytoplasmic organelles (origin, ultrastructure & function: Plastids, Mitochondria, Endoplasmic reticulum, ribosomes, Golgi complex, Lysosomes, Peroxisomes and Centrosomes

Unit-II

Nucleus: Nuclear membrane, nuclear pore, nucleolus and karyolymph
Cell division, Cell cycle and apoptosis, Control mechanism, cytokinesis and cell plate formation

Unit-III

Chromosome: Organization and special types
Mendelian genetics
Gene interaction
Sex determination

Unit-IV

Extranuclear inheritance
Chromosomal aberration, polyploidy-types and role in speciation
Mutations- Molecular mechanism, induction by physical and chemical mutagens

Unit- V

Population Genetics
Microscopy: Phase contrast microscopy, Electron microscopy, Fluorescence microscopy
Microdensitometry

M.Sc. Botany
(Semester-III)

M-Bot-302: Molecular Biology and Biotechnology (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

Organization of DNA: Nucleic acids as hereditary material; Structure and forms of DNA and RNA, double helix, supercoiling of DNA, Packaging of DNA in Prokaryotes and eukaryotes
DNA replication: DNA replication models; Mechanism of DNA replication
DNA repair: Different methods for DNA repair

Unit II

Transcription: Concept of template surfaces, Transcriptions, Post-transcriptional processing and transport of RNA, Transcription factors
Genetic code: Cracking of code; characteristics
Translation: Machinery and mechanism in prokaryotes and eukaryotes

Unit III

Scope and different branches of biotechnology
Techniques used in biotechnology: Polyacrylamide and agarose gel electrophoresis
Blotting techniques: Southern, Northern and Western blotting
Polymerase chain reaction and its applications
DNA sequencing: Various methods of DNA sequencing

Unit IV

Recombinant DNA technology: History and scope: Core techniques and essential enzymes; Restriction enzymes-types and cleavage pattern; DNA ligase-types and ligation of DNA molecule *in vitro*
Cloning vectors: Plasmids (natural, pBR322, Ti plasmid vectors), phages, cosmid, artificial chromosome vector
Passenger DNA: Different strategies used for isolation/synthesis of gene; Organochemical synthesis of gene; Construction of genomic and cDNA libraries

Unit V

Construction of rDNA: Different strategies for construction of rDNA (Use of restriction enzymes, Linkers, Adaptors, Homopolymer tailing)
Methods of DNA transfer in suitable host: transformation, electroporation, microinjection, particle gun method
Selection strategies: Different methods for selection of clone (antibiotic resistant markers, colony hybridization, plaque hybridization, immuno screening)
Application of rDNA technology: In medicine, agriculture and forensic

M.Sc. Botany
(Semester-III)

M-Bot-303: Plant Ecology and Environmental Biology (4 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

Organism and population concept; Natality; Mortality; Density; Rate of population increase; *r* and *k* selection; Age and sex ratio; Aggregation
Interactions among populations: Commensalism, Amensalism, Mutualism, protocooperation and Symbiosis, predation and parasitism, competition Intraspecific and interspecific
Plant adaptations

Unit- II

(i) Community Structure:
Qualitative character : Physiognomy, Phenology, Sociability, Vitality, Raunkiaer's life forms
Quantitative Character : Frequency, Density, Abundance, Cover and basal area
Synthetic character : Presence and Constance, Fidelity, Importance value Index
Methods of studying plant community: Quadrates, Transects, Bisect, Plotless method
Classification of communities: Physiognomic classification, Floristic classification, Dynamic system, Continum concept

(ii) Community dynamics:

Concept of Succession, Nudation, Invasion, Competition and reaction, Stabilization and Climax, Xerosere and Hydrosere and their seral stage

Unit-III

Ecosystem: Abiotic and biotic components; Ecological pyramids; Structural organization of grassland, forest and aquatic ecosystem
Ecosystem energetic: Laws of thermodynamics, Productivity, energy food chain and ecosystem budget; Biogeochemical cycles

Unit-IV

Environmental Pollutions: Air, Water, Soil, waste radioactive and noise pollution; Global warming; green house effect; O_3 depletion; Climate change

Unit-V

Environmental Awareness: Man and Biosphere (MAB); International Union for Conservation of Nature and Natural Resources (IUCN); United Nations Environment Programme (UNEP); World Environmental Day; Wildlife Preservation Act (1972); Indian Forest Conservation Act (1989)

M-Bot-304: Practical-III (Based on M-Bot-301, 302 & 303) [6 Credits]

M.Sc. Botany
(Semester-IV)

M-Bot-401: Cytogenetics and Crop improvement I (4 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

Contributions of M.S. Swaminathan, Har Govind Khurana, Barbara Mc Clintock, V. Ramakrishnan and R.P. Roy
Chromatin organization and replication
Accessory chromosomes–structure, cytological behaviour, significance and effects

Unit- II

Structural changes in chromosomes
Sex linked, sex influenced and sex limited traits
Sex determination and differentiation

Unit- III

Haploidy- Origin, production, cytological behaviour and genetic uses
Aneuploidy-Origin, classification, production, cytological behaviour and genetic uses
Polyploidy- Types, cytological, genetical and evolutionary significance

Unit IV

A Brief account of classical methods of plant breeding
Modern techniques of plant breeding: Hybrids *vs* cybrids, protoplast fusion and somatic hybridization (parasexual hybridization techniques) and a brief idea of Terminator gene technology
Inbreeding depression; heterosis and heterosis breeding

Unit- V

Breeding for disease and drought resistance
Breeding works done in India on Wheat and Rice
Genetic basis of evolution and speciation

M.Sc. Botany
(Semester-IV)

M-Bot-402:Cytogenetics and Crop Improvement II (4 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

Evolution of karyotypes
Chromosome banding pattern: Techniques, functional differentiation of chromosome segments, their chemical nature, significance and effect

Unit II

Modern concept of gene
Molecular genetic maps & their uses
Transposons and controlling elements

Unit III

DNA replication: Models and mechanism
DNA repair and recombination
Southern & Northern blotting, DNA finger printing, DNA sequencing
Genetic code: Characteristics

Unit IV
Gene regulation in prokaryotes and eukaryotes
Mutations-Molecular mechanism, induction by physical and chemical mutagens, site directed mutagenesis and role of mutation in speciation and evolution
Incompatibility
Centres of diversity of cultivated plants: World centres of primary diversity, plant introductions and secondary centres

Unit- V

Population genetics
Human cytogenetics

M.Sc. Botany
(Semester-IV)

M-Bot-401: Applied Microbiology and Plant Pathology I (4 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

Fermentation technology: Scope and prospects
Isolation, screening and strain improvement of industrial microorganisms
Types of fermentation: Batch, continuous, fed-batch, solid state, submerged

Unit II

Microbial Metabolites: Primary and secondary metabolites; Production of organic acids (citric acid, acetic acid), amino acid (Glutamic acid) and Vitamin (Vitamin B_{12})
Production of antibiotics (specially Streptomycin)
Enzymes production and their commercial applications: Amylases, Proteases Renin

Unit III

Microbial production of foods:
Fermented beverages: Production of wine and beer
Fermented foods: soya sauce
Fermented dairy products: yogurt and cheeses
Single cell proteins

Unit IV

Microbial technology in agriculture:
Biofertilizer: Types and applications; Characteristics, mass cultivation and quality control of Nitrogen fixers: *Rhizobium*, *Azospirillum*, *Azotobacter* and Cyanobacteria; Azolla-Anabaena association, Phosphate solubilizers, Plant growth promoting rhizobacteria (PGPR), Mycorrhiza
Biopesticides: Bacterial, viral and fungal biopesticides and their and applications

Unit V

Environmental Microbiology:
Treatment of solid wastes: Composting & Land filling
Wastewater treatment methods: Oxidation pond, Trickling filter, Activated sludge methods; Anaerobic treatment of wastewater
Waste water treatments by plants
Bioremediation and biogas production

M.Sc. Botany
(Semester-IV)

M-Bot-402: Applied Microbiology and Plant Pathology II (4 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

History, classification and importance of plant pathology
Host parasite relationship, interaction and mechanism of infection
Biochemical defense mechanism in plants with special reference to phenolic compounds, enzymes & toxin
Contribution of eminent plant pathologist of India and abroad

Unit II

Chemical and biological management of plant disease control
Integrated pest management (IPM)
Disease dissemination and modern techniques for its forecasting
Forest pathology and its impacts on conservation

Unit III

Seed Pathology with special reference to seed borne mycoflora, mycotoxin and its hazards
Quarantine regulation and seed certification
Role of biotechnology in plant pathology with special reference to tissue culture and genetic engineering techniques

Unit IV

Important diseases of the following crops with special reference to symptoms, etiology and control measures
Cereals: Rust, smut of wheat, blast of rice, Ear cockle & Tundu disease of wheat, Karnal bunt of wheat, rust & smut of maize, ergot of bajra, false smut of rice and flag smut of wheat
Fruits & Vegetables: Early & late blight of potato, White rust of crucifers, Powdery mildew of cucurbits, downy mildew of cucurbits, Anthracnose & leaf spot of mango, black tip of mango, downy mildew of grapes, disease of litchi, leaf spot & bunchy top of banana
Pulses: Wilt of arhar, powdery mildew of pea, rust of beans, blight of gram and leaf spot of moong

Unit V

Important diseases of the following crops with special reference to symptom etiology and control measures
Oil seeds: Wilt & blight of linseed, Leaf spot of sesamum
Fibre crop: Wilt of cotton, angular leaf spot of cotton, stem rot of jute
Spices & condiments: Stem galls of coriander, leaf spot of turmeric, smut of onion, die back of chilli, mosaic of garlic & leaf curl of chilli
Sugarcane: Wilt of sugarcane, whip smut of sugarcane, grassy shoot disease of sugarcane, red rot of sugarcane
Tea, Coffee & Tobacco: Blister blight of tea, leaf rust of coffee & leaf blight of tobacco

M-Bot-403: Practical-IV (Based on M-Bot-401 & 402) [6 Credits]

M-Bot-404: Project Dissertation & Viva [6 Credits]