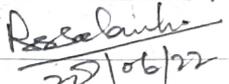
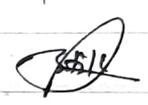
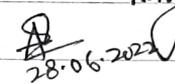
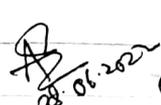
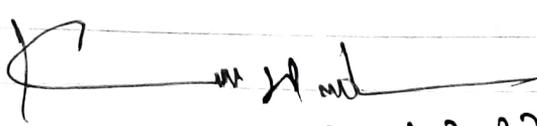


माननीय कुलसचिव के पत्रांक RMP/537/2022
 दिनांक 14.06.2022 के संदर्भ में आज दिनांक 28.06.2022
 को वनस्पति विज्ञान विभाग, धर्मशाला महाविद्यालय
 अलीगढ़ में अध्ययन समिति (Board of Studies) की
 बैठक हुई जिसमें विषय विशेषज्ञ के रूप में प्रो. अमर
 अहमद खान (AMU, Aligarh) मृत रूप में प्रो. जोर शंकर
 मौर्य (रूपम लॉ पीठ दिल्ली, रीटिअर एड.) वर्तमान रूप में
 सम्मिलित हुए। इस बैठक में उपस्थित सदस्यों ने इस प्रकार है:-

1. डॉ. कमल सिंह संयोजक
 2. डॉ. अबरार अहमद खान सदस्य
 3. डॉ. जोर शंकर मौर्य "
 4. डॉ. राजेंद्र सिंह शौलंकी "
 5. डॉ. मुकेश कुमार मारहाण "
 6. डॉ. आरितिक कुमार वर्मा "
 7. डॉ. रेशा आर्य "
 8. डॉ. रीमा आनंद "
- 
 28.6.22

 28/06/22

 28/6/2022

 28.06.2022

इस बैठक में परास्नातक (वनस्पति विज्ञान)
 के पाठ्यक्रम को अनुमोदित किया गया तथा यह
 भी निर्णय लिया गया कि स्नातक (वनस्पति विज्ञान)
 का पाठ्यक्रम भी जल्द ही तैयार कर ~~दिया~~
 अध्ययन समिति की अगली बैठक में अनुमोदित
 कर दिया जायेगा।


 28.06.2022
 RMP


 28.06.2022
 RMP

सेवा में

दिनांक : 28.06.2022

माननीय कुलसचिव

आर० एम० पी० एस० राज्य विश्वविद्यालय

अलीगढ़

विषय : वनस्पति विज्ञान विषय की Board of Studies की बैठक के सम्पन्न होने के सम्बन्ध में

महोदय,

आपके पत्रांक RMPS/537/2022, दिनांक 14.06.2022 के सन्दर्भ में आज दिनांक 28.06.2022 को वनस्पति विज्ञान विषय की Board of Studies की एक बैठक धर्म समाज महाविद्यालय, अलीगढ़ में संपन्न हुई। जिसमें सभी सदस्य/विषय विशेषज्ञ उपस्थित रहे। विषय विशेषज्ञ के रूप में Prof. A. A. Khan (AMU, Aligarh) मूर्त रूप से एवं Prof. J. N. Maurya (MJP University, Rohilkhand) वर्चुअल रूप से (google meet ID: 777-500-111) से उपस्थित हुए। इस बैठक में परास्नातक पाठ्यक्रम के सोलह (16) प्रश्नपत्रों, चार (4) प्रेक्टिकल्स एवं दो (2) मेजर प्रोजेक्ट्स में विभाजित किया गया। उपरोक्त पाठ्यक्रम चार सैमिस्टर में पूर्ण होगा तथा कुल मिलाकर 100 क्रेडिट का होगा। जिसकी पूर्ण Detail आगे मास्टर प्लान में दिया हुआ है।

इस बैठक में निम्नलिखित सदस्य/विषय विशेषज्ञ उपस्थित रहे।

1. Dr. Mukesh K Bhardwaj, Dept. of Botany, D S College, Aligarh

2. Dr. Seema Anand, Dept. of Botany, SV College, Aligarh

3. Dr. Astik Kumar Buts, Dept. of Botany, D S College, Aligarh

4. Dr. Rekha Arya, Dept. of Botany, Sri Tikaram Girls College, Aligarh

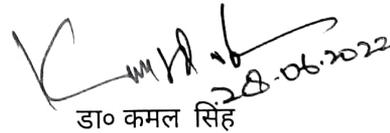
5. Dr. Rajendra Singh Solanki, Dept. of Botany, Ganjdundwara College, Ganjdundwara

6. Prof. Abrar Ahmad Khan, Dept. of Botany, AMU, Aligarh

7. Dr. J N Maurya, Dept. of Botany, MJP Rohilkhand university, bareilly

8. Dr. Kamal Singh, Dept. of Botany, D S College, Aligarh

उपरोक्त सभी सदस्यों/विषय विशेषज्ञों द्वारा तैयार किए गए परास्नातक (वनस्पति विज्ञान) के पाठ्यक्रम को अनुमोदित किया जाता है। ये पाठ्यक्रम आवश्यक कार्यवाही हेतु आपके समक्ष प्रस्तुत है।


डा० कमल सिंह

संयोजक, अध्ययन परिषद्

वनस्पति विज्ञान विभाग

धर्म समाज महाविद्यालय, अलीगढ़

PROPOSED PLAN FOR CREDIT DISTRIBUTION FOR MSc BOTANY

Year	Name of Degree	Semester	Paper	Maximum Marks			Credits	Sem Credits	Total Credits
				External	Internal	Total			
1	Master in Science (Bachelor in Research, if left after 4 th year)	1	BOT101: Biology of Viruses, Bacteria and Fungi	75	25	100	4	24	52
			BOT102: Biology of Algae and Bryophytes	75	25	100	4		
			BOT103: Pteridophytes, Gymnosperms and Palaeobotany	75	25	100	4		
			BOT 104: Morphology and Taxonomy of Angiosperms	75	25	100	4		
			Practicals based on BOT101- BOT104	75	25	100	4		
			Minor course	75	25	100	4		
		2	BOT201: Cell Biology of the Plants	75	25	100	4	28	
			BOT202: Genetics, Cytogenetics and Plant Breeding	75	25	100	4		
			BOT203: Plant Physiology and metabolism	75	25	100	4		
			BOT204: Plant Molecular Biology/ BOT204a: Stress Biology of the Plants	75	25	100	4		
			Practicals based on BOT201- BOT204	75	25	100	4		
			Excursion/survey of taxonomically or Ecologically important sites/ visit to Industry, Laboratory/ Review of	75	25	100	8		

		Literature							
2	Master in Science	3	BOT301:Plant Anatomy and Development	75	25	100	4	20	48
			BOT302:Reproduction in Flowering Plants	75	25	100	4		
			BOT303:Ecology and Environment/ BOT303a:Plants and Society	75	25	100	4		
			BOT304:Plant resource utilization/ BOT304aPlant Propagation and Nursery Management	75	25	100	4		
			Practicals based on BOT301- BOT304	75	25	100	4		
		4	BOT401:Plant Pathology	75	25	100	4	28	
			BOT402:Biostatistics, Computer applications and Bioinformatics/ BOT402a:Advance Plant Physiology and Biochemistry	75	25	100	4		
			BOT403:Plant Biotechnology/ BOT403a: Environmental Science	75	25	100	4		
			BOT404:Tools and Techniques in Plant Biology/ BOT404a:Plant Tissue Culture	75	25	100	4		
			Practicals based on BOT401- BOT404	75	25	100	4		
			Research Project	75	25	100	8		

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Master of Science (Botany)
First Semester

Paper 101
Biology of Viruses, Bacteria and Fungi

UNIT -1

Viruses: Brief history of plant viruses and their origin; Nomenclature and classification of plant virus and their strains; morphology and ultrastructure of plant viruses. Modern concept of organic viruses, viroids, virusoids, satellite viruses and Prions. Replication and transmission of plant viruses and economic importance.

UNIT -2

General Characters of Bacteria, Bacterial classification, Salient features of major bacterial groups according to Bergey's Manual of Systematic Bacteriology. Bacterial Culture: Types of culture media, isolation of pure cultures, enrichment culture techniques, maintenance and preservation of bacterial cultures.

UNIT-3

Ultra-structure and mode of nutrition of bacteria. Cell Signaling in Bacteria: two component system, quorum sensing, chemotaxis. Nitrogen metabolism: ammonification, nitrification, denitrification and nitrogen fixation. Nif genes: functions and regulation. Genome organization and reproduction in bacteria. Conjugation, Transformation and Transduction.

UNIT-4

General Characters and Principles of important systems of classification. Study of the Myxomycetes, Mastigomycotina, Zygomycotina, Ascomycotina, Basidiomycotina and Deuteromycotina with reference to: Classification, Range of structure and organization of vegetative and reproductive bodies; Ultrastructure; Method of reproduction; Variation in life-cycle; Economic importance; Heterokaryosis, Parasexuality, Heterothallism, Hormonal control of sexual reproduction in fungi. General account of lichens with special reference to: Habitat, Structure and organization of lichens, Method of reproduction. Physiological relationship of mycobiont and phycobiont, Economic importance of lichens; Mycorrhizae: Types and significance


A collection of handwritten signatures and initials in black ink, including a large signature, the name 'RANG', and several other scribbled marks.

Master of Science (Botany)
First Semester

Paper 102
Biology of Algae and Bryophytes

UNIT 1

Phycology: Algae in diversified habitats, thallus organization, cell ultrastructure, reproduction (vegetative, asexual and sexual), Classification of algae, Pigmentation, reserve food and flagellation. Life cycle patterns in algae. Economic importance of algae (Fertilizers, food, feed and Industry).

UNIT 2

Classification, salient features of Cyanophyta, Chlorophyta, Xanthophyta, Bacillariophyta, Pheophyta and Rhodophyta. Life cycles of some important genera belonging to these classes: *Anabaena*, *Oedogonium*, *Chara*, *Vaucheria*, *Pinnularia*, *Sargasssum*, *Dictyota*, *Batrachospermum* and *Polysiphonia*,

UNIT 3

Criteria and recent trends in the classification of Bryophytes; Origin and evolution and distribution of bryophytes; Ecological significance and economic importance of Bryophytes. Diversity in Bryophytes: Habit and Habitat; Developmental morphology and organization of gametophyte and sporophyte bodies.

UNIT 4

Comparative study of morphology, anatomy, life history, classification and phylogeny of the following groups: Marchantiales, Jungermaniales, Anthocerotales, Sphagnales, Funariales and Polytrichales.'

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- Middle left: A signature that appears to be "P. H. S.".
- Middle right: "A. C. S." above "Resubh." with a horizontal line underneath.
- Bottom left: "R. S." above a signature.
- Bottom right: A signature that appears to be "S. S.".

Master of Science (Botany)
First Semester

Paper 103
Pteridophytes, Gymnosperms and Palaeobotany

UNIT 1

Classification and origin of Pteridophytes; Morphology, anatomy and reproduction; Stejar theory; Telome theory. Heterospory: Occurrence, causes and significance; Origin of seed habit.

UNIT 2

Comparative study of morphology, anatomy, life history, classification and phylogeny of Psilopsida, Lycopsidea, Sphenopsida and Pteropsida.

UNIT 3

Gymnosperms: General Characters; Evolution of Gymnosperms; Diversity in their morphology and anatomy. Classification and distribution in India.

UNIT 4

Structure and reproduction in Cycadales and Ginkgoales; General Account of Cycadeoidales and Cordaitales; Pteridospermales- Leginopteridaceae, Medullosaceae and Glossopteridaceae; Structure and reproduction in Coniferales, Ephedrales, Welwetschiales and Gnetales.

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Master of Science (Botany)
First Semester

Paper 104
Morphology and Taxonomy of Angiosperms

UNIT 1

Morphology of angiosperms; Modifications of root, stems and leaf; Life cycle of an angiosperm plant. Origin and Evolution of Angiosperms.

UNIT 2

Principles of Systematics, relevance and role of Systematics. Approaches to classification, Phenetic, Phylogenetic and cladistics; Relative merits and demerits of major systems of classification viz. Linnaeus, Bentham and Hooker, Engler and Prantl, Hutchinson, Cronquist, and Thakhtajan; APG system.

UNIT 3

Herbarium and Botanical Gardens. ICN (History, Principles and Applications), Protologue and Botanic literature (Monographs, Icones, Floras and Taxonomic literature). Modern tools and evidence of taxonomy viz: Morphology and Anatomy, palynology, embryology, cytology, phytochemistry, genome analysis and nucleic acid hybridization. Serotaxonomy and numerical taxonomy.

UNIT 4

Taxonomic features, systematic phylogeny and economic importance of families:
Dicotyledons: Ranunculaceae, Magnoliaceae, Papaveraceae, Caryophyllaceae, Malvaceae, Asteraceae, Rosaceae, Rutaceae, Anacardiaceae, Convolvulaceae, Solanaceae, Apocynaceae, Fabaceae, Myrtaceae, Asclepiadaceae, Boraginaceae, Scrophluriceae, Bignoniaceae, Pedaliaceae, Acanthaceae, Verbaenaceae, Lamiaceae, Polygonaceae, Piparaceae, Euphorbiaceae, Moraceae, Euphorbiaceae.
Monocotyledons: Orchidaceae, Araceae and Arecaceae, Zingiberaceae, Cyperaceae, Poaceae, Musaceae, Liliaceae

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Master of Science (Botany)
Second Semester

Paper 202
Genetics, Cytogenetics and Plant Breeding

UNIT 1

Mendelian and Non-Mendelian Inheritance: Meiosis; Chromosome theory of inheritance; Mendelian laws; Gene interactions; Organelle inheritance. Eukaryotic Genome: Evolution, structure and organization; Gene regulation. Recombination in Eukaryotes: Linkage and crossing over: basic concepts, linkage maps, correlation of genetic and physical maps, molecular markers and construction of linkage maps; Molecular mechanism of recombination; QTL mapping.

UNIT 2

Mutation: Basic concept, spontaneous and induced mutations, allele theory, physical and chemical mutagens; Molecular basis of mutations; Transposons and their use in mutagenesis and gene tagging in plant systems; Oncogenes and cancer. Concepts in: Developmental genetics; Behavioral genetics; Population genetics and Quantitative genetics, Epigenetics and histone code.

UNIT 3

Cytogenetics: Chromosome: Structure and nomenclature, centromere and telomere; Sex determination: mechanisms, sex chromosomes; Chromosomal aberrations: Duplications, deficiencies/deletions, inversions, interchanges/translocations; Role of chromosomal aberrations in crop evolution; Ploidy changes: Haploids, polyploids and aneuploids; Genome analysis in crop plants; Molecular Cytogenetics: FISH, GISH, FIBER-FISH, Flow Cytogenetics, Flow karyotyping, Applications of molecular cytogenetics

UNIT 4

Reproduction and breeding systems in plants. Recombination, genetic control and manipulation of breeding systems including male sterility and apomixis. Selection and breeding strategies for self-pollinated, cross-pollinated and clonally propagated crop plants, breeding for crop quality, biotic and abiotic stresses, gene pyramiding for multi-trait incorporation; map-based cloning, synteny, MAS (marker assisted selection), tagging of agronomically important traits


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Master of Science (Botany)
Second Semester

Paper 203
Plant Physiology and metabolism

UNIT 1

Plant water relations and mineral nutrition: Absorption, translocation and loss of water, regulation of opening and closing of stomata; Guttation; criteria of essentiality of mineral nutrients, role of essential elements, mechanism of ion transport, deficiency diseases.

Enzymology. Properties of enzymes, nomenclature and classification, mechanism of enzyme action, regulatory and active sites, K_m and its significance, enzyme inhibition, isozymes.

UNIT 2

Photosynthesis: Light harvesting complexes of higher plants, light reactions of photosynthesis, photosynthetic carbon reduction pathway; Hatch-Slack pathway: mechanism of stomatal opening, Crassulacean acid metabolism.

Respiration: Glycolysis, TCA cycle, mitochondrial electron transport and oxidative phosphorylation, alternate oxidases; fermentation, respiratory quotient, photorespiration

UNIT 3

Nitrogen metabolism: Biological nitrogen fixation, nitrate assimilation, ammonia assimilation, amino acid biosynthesis

Lipid metabolism: General account of storage (triacyl glycerol and waxes) and (b) structural (glycerophospholipids and sterols) lipids, fatty acids and triacylglycerols, their structure, synthesis and degradation-alpha and beta Oxidation and glyoxalate cycle.

UNIT 4

Growth regulators: Biosynthesis, mechanism of action (including hormone receptors and signal transduction) and physiological roles of phytohormones (auxins, gibberellins, cytokinins, ethylene, abscisic acid, brassinosteroids).

Sensory photobiology: Photochemical and biochemical properties of phytochromes, cryptochromes and phototropins, vernalization, photoperiodism and biological clock.

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Master of Science (Botany)
Second Semester

Paper 204
Plant Molecular Biology

UNIT 1

Historical and General Aspects, Important discoveries on the genetic material; Relationship between genotype and phenotype Gene mapping in Prokaryotes and Eukaryotes.

UNIT 2

DNA Replication: Biochemical and genetic tools to study replication; DNA polymerases and accessory proteins; Proteins at the replication origin and the replication fork; Concept of replicon; Linear replicons and their maintenance; Control of replication of chromosomes and extrachromosomal elements; Telomeres. Maintenance of Genomic Flexibility and Integrity: Mechanisms of homologous and site-specific recombinations; DNA repair and retrieval systems; Transposons and retro-transposons.

UNIT 3

Regulation of Transcription: Discovery of RNA; Promoters and other control elements; RNA polymerases and accessory factors; Transcription factors in Prokaryotes and Eukaryotes; Transcriptional controls; Concept of operons; Controls at transcription termination. Bacteriophages as Models for Gene Regulation: Bacteriophage lambda; Lysogenic and lytic cycles; gene expression circuits; Bacteriophage T4 and T7; Temporal control of gene expression in bacteriophages.

UNIT 4

Translation and its Mechanism: Initiation, elongation and termination of translation and the accessory proteins; Structural and functional studies on ribosome; Ribosomal RNAs; Ribosomal proteins; Mapping the decoding and peptidyl transferase sites of ribosome; Accuracy during translation. Transfer RNAs and Genetic Code: Biogenesis, structure and function of transfer RNAs; Suppressor mutations; Post-translational control; Genetic code and its characteristics; Wobble phenomenon; Codon bias.

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Master of Science (Botany)
Second Semester

Paper 204a
Stress Biology of the Plants

UNIT 1

Stress environment: Abiotic factors (Water, temperature, light, pH, salinity and nutrient concentration); Stress habitats (physico-chemical characterization, species diversity and population dynamics)

UNIT 2

Stress damages: Cell structure, proteins, nucleic acids, lipids and membranes, physiological process, protein synthesis; Mechanism of adaptations: Role of carbohydrates, proteins, nucleic acids and lipids, pigment involvements, signal transduction

UNIT 3

Abiotic Stress: Light, temperature, water and salts; acclimation of physiological processes under abiotic stresses.

UNIT 4

Biotic Stress: Major biotic stresses to plants, tolerance and adaptation mechanisms at biochemical and molecular level (HR, SAR and ISR).

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Master of Science (Botany)
Third Semester

Paper 301
Plant Anatomy and Development

UNIT 1

Cell wall nature, formation, growth of cell wall, microscopic and submicroscopic structure and functions

UNIT 2

Shoot structure and development; organization of the shoot apical meristem (SAM) and vascular tissue differentiation, plastochron, origin of leaves and branches.

Root structure and development; organization of the root apical meristem (RAM), cell fates and lineages vascular tissue differentiation, origin of lateral roots and root hairs in dicots and monocots

UNIT 3

Vascular cambium: origin, structure and function; formation of secondary body, formation of secondary phloem and xylem in relation to environmental factors

UNIT 4

Secretory ducts and laticifers resin ducts of primary body and secondary body, gum ducts, Kinoveins. Leaf growth and differentiation, phyllotaxy, structure and differentiation of epidermis (with special reference to stomata and trichomes), mesophyll.

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Master of Science (Botany)

Third Semester

Paper 302

Reproduction in Flowering Plants

UNIT 1

Male gametophyte Microsporogenesis, tapetum and its roles, pollen development, pollen embryos Female gametophyte Ovule development, megasporogenesis, organization of the embryo sac, types of embryo sacs

UNIT 2

Pollination mechanisms and vectors, pollen germination and pollen tube growth structure of the pistil; pollen-stigma interactions, pollen allergy

UNIT 3

Double fertilization, in vitro fertilization- Intra-ovarian pollination and fertilization, factors affecting in vitro fertilization and applications, Embryogeny in dicotyledons and monocotyledons, Apomixis, Floral biology

UNIT 4

Endosperm development, Polyembryony origin, classification, causes and practical value of polyembryony Latent life (dormancy)- types of dormancy and importance, overcoming seed dormancy Reproduction- vegetative options and sexual reproduction

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Master of Science (Botany)
Third Semester

Paper 303
Ecology and Environment

UNIT 1

Climate, soil and vegetation patterns of the world: Life zones and major vegetation and soil types of the world. Introduction to vegetation sampling methods quadrat methods, line transect and plot less method

Vegetation organization: Concept of species, population and community; Concepts of community and continuum, analysis of communities (analytical and synthetic characters), indices of diversity (Simpson's index and Shannon's index), interspecific association, ordination, concept of ecological niche and habitat.

UNIT 2 Ecosystem organization: Structure and functions, primary production (methods of measurement, global pattern, controlling factors); energy dynamics (trophic organization, energy flow pathways, ecological efficiencies); Ecosystem succession. Biological diversity: Concept and levels, role of biodiversity in ecosystem functions and stability, island biogeography, extinction, IUCN categories of threat, distribution and global patterns of terrestrial biodiversity, hotspots, inventory

UNIT 3 Ecosystem stability: Concept (resistance and resilience), ecological perturbation (natural and anthropogenic) and their impact on plants and ecosystem, ecology of plant invasion. Ecological management: Concept, sustainable development, sustainability indicators and ecosystem restoration.

UNIT 4

Pollution: Introduction to environment: Brief idea of hydrosphere, lithosphere, biosphere and atmosphere (troposphere, stratosphere, mesosphere, ionosphere and exosphere). Brief idea of air pollutants (Primary and Secondary air pollutants). Control of air pollution, water pollution, soil pollution and noise pollution.

Environmental Changes: Global warming, green house gases, Consequences of global warming (sea level rise, human health, effect on agriculture and temperature rise. Ozone depletion(Ozone hole), Chlorofluorocarbon cycle, consequences of ozone depletion. wildlife management: conservation of habitats species preservation, introduction of exotic species.

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Master of Science (Botany)
Third Semester

Paper 303a
Plants and Society

UNIT 1

Early plants and their role in earth's history: Origin of plants; plants as geoengineers of early atmosphere; role of early plants in biogeochemical cycles, evidences and counter arguments

Plants and earth's early landscape: Evolution of trees; first forests and their role in global climate change; where and how the first grasslands formed, plants and water bodies

UNIT 2

Taming of wild plants by man: Beginning of Agriculture- when, where and how; Story of transforming wild plants to modern day crops; Role of plants in evolution of human civilization; Influence of plants on language, religious and cultural practices, folklore, fine arts etc and vice-versa

Plants in trade and human migrations: plants/ plant groups that affected human settlements such as wheat, rice, sugarcane, spices, tea, cotton, potato, rubber, narcotic plants etc.

UNIT 3

Genetically Modified Plants: Plants with genes from other plants/organisms; contentious issues, apprehensions and fears- myths or reality; market forces vs scientific logics; Who decides who decides?

UNIT 4

Plants of future and future of plants: Super domestication, synthetic plants, Novel uses of plants, New crop plants- permaculture, edible weeds; Vertical agriculture Plants as candidates for colonization of other planets, plants in bioterrorism and biosecurity

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Master of Science (Botany)
Third Semester

Paper 304
Plant resource utilization

UNIT 1

World centres of primary diversity of domesticated plants, plant introductions, secondary centres. Introduction to Ethnobotany. Origin, evolution, botany, cultivation and uses of Cereal Crops ; Fibre Crop; Medicinal and aromatic plants.

UNIT 2

Distribution, botany, cultivation and uses of Vegetable oil yielding crops, Fire and timber wood Diagnostic features of wood and uses of Babul (*Acacia nilotica*), Mango (*Mangifera indica*), Sissoo (*Dalbergia sissoo*), Teak (*Tectona grandis*), Sal (*Shorea robusta*), Chir (*Pinus roxburghii*), Deodar (*Cedrus deodara*) Kail (*Pinus wallichiana*) and Rose wood (*Dalbergia latifolia*).

UNIT 3

Strategies for plant conservation (ex-situ and In-situ conservation): principles and practices, botanical gardens, Field gene banks, seed banks, in vitro repositories, cryobanks. general account of the activities of Botanical Survey of India (BSI), Indian Council of Agricultural Research (ICAR), Council of Scientific & Industrial Research (CSIR), and the Department of Biotechnology (DBT), NBPGR (National Bureau of Plant genetic Resources) for plant conservation.

UNIT 4

Plant biodiversity and its status in India. Green revolution: benefits and adverse consequences.

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Master of Science (Botany)
Third Semester

Paper 304a
Plant Propagation and Nursery Management

UNIT 1

Introduction to plant nursery: Plant nursery: Definition, importance and selection of nursery site; Different types of nurseries –on the basis of duration, plants produced, structure used; Basic facilities for a nursery; layout and components of a good nursery; Introduction to Green House: Structure, function and clean-up methodologies; Plant propagation structures in brief. Bureau of Indian Standards (BIS-2008) related to nursery.

UNIT 2

Necessities for nursery: Introduction to the nursery beds, their types, preparation, and utility to raise different types of plants; Types of Growing media, Plant Bio-regulators, nursery tools and implements, and containers for plant nursery; Introduction to the biology of plant propagation; Introduction to the seeds and other vegetative material used to raise nursery; Outlines of vegetative propagation techniques to produce planting material; Sowing and harvesting methods of seeds and planting material; Hydroponics and aeroponics.

UNIT 3

General Management of nursery: Seasonal activities and routine operations in a nursery; Nursery management – watering, weeding and nutrients (manure and fertilizers); pests and diseases; Common possible errors in nursery activities

UNIT 4

Nursery and economy: Economics of nursery development, pricing and record maintenance; Online nursery information and sales systems.

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Master of Science (Botany)
Fourth Semester

Paper 401
Plant Pathology

UNIT 1

Concept of Plant disease; Identification of Plant Diseases; Koch's postulates, Types of Plant diseases; Symptoms caused by fungi, bacteria, viruses and nematodes. Economic importance of plant diseases in relation to agriculture.

UNIT 2

Plant Diseases: Causal organism, symptoms and management of following diseases: Early and Late blight of potato, Black rust of Wheat, Mosaic disease of tobacco, Yellow vein mosaic of Bhindi, Citrus canker, Bacterial blight of Rice, Ear-cockle disease of wheat and root knot disease of nematode.

UNIT 3.

Roles of enzymes, growth regulators and toxins in pathogenesis; Effect of infection on physiology of plants (photosynthesis, translocation, respiration, membrane permeability, transcription and translation). Disease resistance mechanism in plants, preformed substances and structures, induced structures and biochemical defense. Gene for gene concept, breeding for resistant varieties.

UNIT 4

Broad principles of plant disease management: Disease forecasting, Integrated pest management (IPM), Regulatory and physical measures of disease management, Management of diseases by cultural practices, cropping sequences, organic amendments. Biological and chemical control of diseases.

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The initials "BY" written vertically.
The word "aaa" written horizontally.
A signature that appears to be "Peebanh" written diagonally.
A signature that appears to be "A." written vertically.
A signature that appears to be "Bh" inside a circle.

Master of Science (Botany)
Fourth Semester

Paper 402a
Advance Plant Physiology and Biochemistry

UNIT 1

Mineral nutrients: Scope of plant nutrition; essential elements and their classification; beneficial elements; factors influencing the availability of nutrient; function of mineral elements in plant; deficiency symptoms and diseases in plants; mineral toxicity and metabolism.

Nutrient acquisition: Structure and composition of biological membranes; transport of solute across membrane: passive transport (diffusion and facilitated diffusion) and active transport- primary active transport and secondary active transport- symport and antiport; membrane transport proteins (ion channels, transporters or carriers and pumps) and specific anion channels (aquaporins).

UNIT 2

Signal transduction: Overview, receptors and G-proteins; phospholipid signalling; role of cyclic nucleotides; calcium-calmodulin cascade; diversity in protein kinases and phosphatases; and sucrose sensing mechanism.

Growth regulators: Biosynthesis and physiological roles of salicylic acid, polyamines and jasmonates; role of plant growth regulators in water balance, photosynthate partitioning and potato tuberization; and use of natural and synthetic growth regulators in fruit set, chemical ripening, malting and latex flow.

UNIT 3

Regulatory metabolism of photosynthesis and respiration: Structure of photosynthesis antennae pigments, its role in light harvesting and protection against active oxygen species, regulation of Rubisco, chloroplast dimorphism and variation in C4 photosynthesis pathway, regulation of glycolysis and pentose phosphate pathway, Citric acid cycle in biosynthesis of carbohydrates.

N-metabolism: Biochemistry of N-fixation and nitrate assimilation and its incorporation into amino acids via ammonium assimilation. S-metabolism: Sulphate assimilation and incorporation into important metabolites (cysteine, methionine, PCs and GSH), significance of ATP-sulfurylase. N and S metabolites: Role in antioxidant defence system of plants.

UNIT 4

Stress physiology: Introduction, water stress and related issues, chilling injury, high temperature, salt and heavy metal stress, heat shock proteins, effect of UV radiation on plants, basic concept of biotic (insects and pathogens) stress, systemic acquired resistance (SAR) in response to pathogens.

Secondary metabolites: Introduction, occurrence, biosynthesis and significance of alkaloids (Amino acid and purine derivatives), phenols (simple phenols, phenol carboxylic acid, phenyl propanes, flavon derivatives), terpenoids (Hemi terpenes, mono terpenes, sesqui terpenes) and cutin, suberin and waxes.


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Master of Science (Botany)
Fourth Semester

Paper 403
Plant Biotechnology

UNIT 1

Plant tissue culture – history; concepts of cell differentiation and totipotency; pathways for in vitro regeneration: organogenesis, somatic and gametic embryogenesis; protoplast isolation, culture and regeneration; somatic hybridization; Applications: micro-propagation, meristem culture, embryo rescue, synseed production, somaclonal and androclonal variations, cryopreservation and germplasm storage.

UNIT 2

Principles and methods of genetic transformation: Introduction; direct gene transfer methods: particle bombardment, electroporation, PEG-mediated and floral-dip; marker and reporter genes; Agrobacterium biology and biotechnology; plant Agrobacterium interactions; chloroplast transformation.

UNIT 3

Applications of genetic transformation – case studies on use of transgenic technology for basic studies and crop/plant improvement

UNIT 4

phenotypic, genetic and molecular analysis of transgenic plants; factors influencing transgene expression levels; transgene silencing; marker-free transgenics; genome editing for crop improvement; environmental, social and legal issues.

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Master of Science (Botany)
Fourth Semester

Paper 404
Tools and Techniques in Plant Biology

UNIT 1

Instrumentation in Biology; Centrifugation: Principle and applications of Centrifugation; differential and density gradient Centrifugation; Chromatography: Principle and applications of chromatography; adsorption, Ion exchange, gel permeation and affinity. Spectrophotometer: Principle, applications of Spectrophotometer.

UNIT 2

Microscopy and Histological techniques in Biology 2.1. Microscopy: Principle, and applications of different types of microscopes Light, Phase Contrast, Electron: SEM and TEM; Microtome: Types and applications. Collection & preservation of Plant tissues - fixation, embedding, Sectioning, Staining, Identification of deferent components.

UNIT 3

Molecular Biology and Recombinant DNA methods: Isolation and purification of RNA , DNA (genomic and plasmid) and proteins, different separation methods. Analysis of RNA, DNA and proteins by one and two dimensional gel electrophoresis.

Molecular cloning of DNA or RNA fragments in bacterial and eukaryotic systems. Polymerase Chain Reaction (PCR); Blotting; Expression of recombinant proteins using bacterial and plant vectors; genomic and cDNA libraries, phage, cosmid, BAC and YAC vectors.

In vitro mutagenesis and deletion techniques, gene silencing; Protein sequencing methods; DNA sequencing methods, strategies for genome sequencing. Methods for analysis of gene expression at RNA and protein level, large scale expression, such as micro array based techniques Isolation, RFLP, RAPD and AFLP techniques

UNIT 4

Radiolabeling techniques: Detection and measurement of different types of radioisotopes normally used in biology, incorporation of radioisotopes in biological tissues and cells, molecular imaging of radioactive material, safety guidelines.

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Master of Science (Botany)
Fourth Semester

Paper 404a
Plant cell and Tissue Culture

UNIT 1

Historical perspectives; Principles of plant tissue culture: Organization of laboratory, media composition and preparation, aseptic manipulation

UNIT 2

Cell culture and cell cloning, Cellular totipotency: Process and mechanism; Somatic embryogenesis: Induction and controlling factors; Organogenesis: Process and controlling factors

UNIT 3

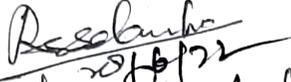
Haploids: Androgenic and gynogenic; obtention and promises; Somatic hybridization: Isolation, culture and fusion of protoplasts: regeneration of hybrids and cybrids; Clonal propagation: Micropropagation; Somaclonal and gametoclonal variation and their selection

UNIT 4

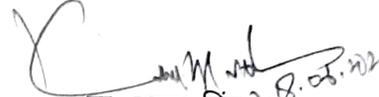
Transgenic plants: Method of transformation, selection, identification, molecular analysis for confirmation and application; Germplasm conservation and synthetic seed technology; Industrial application: Suspension culture, hairy root culture and bioreactors

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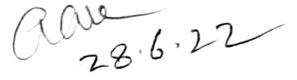
सभी Board of Studies के सदस्य उपरोक्त पाठ्यक्रम से सहमत हैं।


28/06/22
Dr. Rajendra Singh Chauhan


28/06/2022
[Dr. Anshu Kumar Buts]


28.06.2022
डा० कमल सिंह

संयोजक, अध्वयन परिषद्
वनस्पति विज्ञान विभाग
धर्म समाज महाविद्यालय, अलीगढ़


28.6.22

Prof. Anurag A. Chauhan
28/6/2022


28.06.2022
Dr. Seema Chandra


Dr. M.K. Bhardwaj