

Chhindwara University, Chhindwara (M.P.)

Third. Botany

SYLLABUS OF M.A./M.Com./M.Sc./M.H.Sc. PREVIOUS/FINAL OR SEMESTER -----

Name of Paper	Title of paper	Max. Marks			Minimum Marks			Total Marks
		Theory	CCE	Practical	Theory	CCE	Practical	
Paper - I	Plant Physiology	40	10	50	15	04	20	
- II	Biochemistry of Plants	40	10	I	15	04	20	
- III	Molecular Biology of Plants and Plant breeding	40	10	50	15	04	20	
- IV	Conservation and Utilization of Plant resources	40	10	50	15	04	20	

Board of Studies :

- I. Chairman - Dr. S.K. Chitrak Mishra
- II. Subject Expert -
 1. Dr. H.K. Verma - Jun
 2. Nikhil Kumar
 - 3.
 - 4.
 - 5.
 - 6.
 - 7.

CHHINDWARA UNIVERSITY, CHHINDWARA (M.P.)

SYLLABUS PRESCRIBED FOR THE DEGREE OF MASTER OF SCIENCE IN BOTANY
(Academic Session 2020 – 2021 & Onwards)

THIRD SEMESTER

Paper 1 – Plant Physiology

M.M. 40

Unit – 1

Principles of thermodynamics, free energy and chemical potential, redox reactions, Structure and functions of ATP. Plant-Water relations, mechanism of water transport through xylem. Transpiration, Physiology of stomata and factors affecting transpiration. Phloem transport, Phloem loading and unloading, Role of P-protein. Passive and active solute transport.

Unit – 2

Plants and Inorganic Nutrients- macronutrients and micronutrients. Mineral deficiency. Hydroponics. Nutrient uptake. Root-microbe interaction in facilitating nutrient uptake, Membrane transport proteins. Biological nitrogen fixation, nodule formation, Nitrogen and Sulphur metabolism.

Unit – 3

Photochemistry and photosynthesis: General concept and historical background, Evolution of photosynthetic apparatus, Photosynthetic pigments and light harvesting complexes, Photo-oxidation of water, Mechanism of electron and proton transport. Carbon assimilation – Calvin cycle, C4 cycle, CAM pathway, C4 syndrome. Photorespiration and its significance, Biosynthesis of starch and sucrose. Physiological and ecological considerations.

Unit – 4

Respiration: Glycolysis, TCA cycle, Electron transport and ATP synthesis, Pentose phosphate pathway, Glyoxylate cycle, Alternate oxidase system. Fatty acid biosynthesis, oxidation of fats. Major fermentation pathways from pyruvate.
Plant growth regulators and elicitors: Auxin, Gibberellins, Cytokinin, Ethylene, Abscisic acid, Brassinosteroids, Polyamines, Jasmonic acid and Salicylic acid.

Unit – 5

Sensory Photobiology: Flowering process, Photoperiodism and vernalization. Phytochrome and Cryptochrome. Blue-Light Responses and Morphogenesis
Fruit development and Seed Dormancy. Senescence and Programmed Cell Death.
Stress physiology: Biotic stress and Abiotic stress (Drought stress, Heat stress, Chilling stress, Salinity stress, Oxygen deficiency).

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THIRD SEMESTER

Paper 2 – Biochemistry of Plants

M.M. 40

Unit – 1

Biochemistry: Definition, history and importance. Structure, Classification and biological importance of Monosaccharides, Disaccharides and oligosaccharides. Polysaccharides and derivatives of carbohydrates.

Structure, Classification and biological importance of saturated and unsaturated fatty acids. Esters of fatty acids, Phospholipids, Sphingolipids, Glycerophospholipids, Triglycerides, Cholesterol, Steroids and Isoprenoids.

Unit – 2

Structure and chemistry of essential and non-essential amino acids. Primary, secondary, tertiary and quaternary structure of Proteins. Structure and synthesis of Nitrogenous bases – Purines and Pyrimidines, Nucleosides and Nucleotides. Structure and chemistry of antibiotics & pigments and Vitamins as coenzymes.

Unit – 3

Classification, Nomenclature and characteristics of enzymes. Concept of Holoenzyme, Apoenzyme, Coenzyme and Cofactors. Mode and Mechanisms of enzyme action. Enzyme kinetics- Michaelis Menton equation. Regulation of enzyme action. Enzyme inhibition and kinetics, Allosteric enzyme. Isoenzymes. Ribozymes. Factors affecting enzyme activity.

Unit – 4

Biomembranes, composition and structure, Transport across membranes, Passive: Gated ion channels, Transporters, Aquaporins, Active: ATPases - Na^+/K^+ pumps and their metabolic significance,

Signal transduction- Calcium-Calmodulin cascade. G-proteins and Cyclic AMP as Second Messenger, Signal transduction in plants- Receptor system, Protein kinases, Phospho-lipid and Calcium based signaling. Two component sensor regulator system in bacteria and plants.

Unit – 5

Chromatographic technique, Paper and TLC, Gel filtration, Ion exchange, HPLC, SDS_PAGE, Isoelectric focusing, Western and Southern blotting, Protein sequencing, Mass spectrometry, MALDI, TOF and MS.

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THIRD SEMESTER

Paper 3 – Molecular Biology and Plant Breeding

M.M. 40

UNIT –1

Structure and functions of DNA. Forms of DNA. Nuclear DNA content C- value paradox, *cot* curve, and its significance, Restriction Mapping. Multigene families and their evolution. DNA replication, enzymes involved in replication. DNA polymerase.

UNIT –2

Modern concept of gene- cistron, muton, recon, replicon, overlapping genes, Split genes, pseudogenes, Transposons and Retroposons. Gene fine structure, cis and trans position test. Genetics recombination in Bacteria and Virus (Genetic transformation, conjugation, transduction, Recombination in Phage).

UNIT-3

Structure and function of different types of RNA, Transcription in Prokaryotes and eukaryotes, RNA polymerase and RNA processing,- capping, introns and exons their significance, splicing, polyadenilation. RNA transport. Genetic code, Aminoacylation of t-RNA. Translation in Prokaryotes and eukaryotes–Ribosome structure and function, initiation complex, elongation, and termination. Translation factors. Post translation modification of protein, protein sorting. Targeting of protein to organelles.

UNIT-4

Regulation of gene expression in Prokaryotes- Concept of Operon, Prinbow box and TATA box model, *lac* opreron, *trp* opreron and attenuation. Gene expression in λ Phage (Lysis-Lysogeny decision). Regulation of gene expression in eukaryotes. Eukaryotic transcription factors and structural motifs. Post transcriptional regulation of gene expression by RNA interference. Protein synthesis inhibitors.

UNIT-5

Gene mutations: spontaneous and induced. Molecular basis of mutation. Frameshift and tautomerism. Physical & chemical mutagens. Inherited human diseases are caused by mutations. Mechanism of DNA damage and repair, Photorepair, Excision or dark repair, SOS-Inducible Repair.

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THIRD SEMESTER

Paper 4 - Conservation and Utilization of Plant Resources

M.M. 40

UNIT – 1

Plant biodiversity concept in relation to plant resources and their utilization status in India. Innovation for meeting world food demand plants used as avenue trees, for shades, pollution control and aesthetics.

UNIT – 2

Sustainable Development, Utilization, of Resources from forest, Grassland, Aquatic Habitats, Food, Fodder, Forage, Timber and non wood forest products. Threats to quality and quantity of resources due to over exploitation. Speciation, and Extinction IUCN categories of threat. Distribution and Global Pattern terrestrial biodiversity, Hot spots, inventory.

UNIT – 3

Strategies for conservation of resources Social forestry, Principle of conservation, In situ conservation, Sanctuaries, National Parks, Biosphere reserves, for wild life conservation, For forest ranges Soil and Water. Exsitu conservation, Botanical Garden, Field gene bank, Seed Banks, in vitro repositories, Cryo banks,

UNIT – 4

Green revolution benefits and adverse consequences. General account of activities of Botanical survey of India (BSI) National Bureau of plant genetic resources (NBPGR), Indian council of Agricultural research (ICAR), Council of Scientific and Industrial Research (CSIR), The Department of Biotechnology (DBT).

UNIT – 5

Resource Monitoring Remote sensing Concepts and tools, Satellite remote sensing, basics sensors, Visual and digital interpretation EMR bands and their application, Indian remote sensing Program Thematic mapping of resources Application of Remote sensing.

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M. Sc. Botany Semester III

Practical Scheme for Practical - 1

(Based on Paper I and II)

M.M. - 50

1. Exercise based on Physiology	-	10
2. Exercise based on Biochemistry and metabolism	-	10
3. Exercise based on Photosynthesis or Respiration	-	05
4. Biochemical tests for Biomolecules	-	05
5. Spots 1 to 5	-	10
6. Viva voce	-	05
7. Sessional	-	05

M. M. - 50

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Chhindwara University, Chhindwara

M. Sc. Botany Semester III

Practical Scheme for Practical - 2

(Based on Paper III and IV)

M.M.-50

1. Exercise based on Molecular Biology	-	10
2. Exercise based on Plant Breeding	-	05
3. Exercise based on Ecology of Food/ Forage/ Fodder/ Medicinal Plants	-	05
4. A Report on Field Survey of Local Plant Resources	-	10
5. Spots 1 to 5	-	10
6. Viva voce	-	05
7. Sessional	-	05

M. M. 50

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