|| Jai Sri Gurudev||

Sri Adichunchanagiri First Grade College

Channarayapatna-573116

DEPARTMENT OF BOTANY

LESSON PLAN FOR THE ACADEMIC YEAR 2023-24

Programme: B.Sc (NEP)

Course/Paper Name: BOTANY (**Plant Physiology and Plant Biochemistry) – Paper I**

Semester: 6th

Total Hours:60

Sl. No	Month & Year	Sowmya C.V	Sowmya C. V	Practical's
1	March-April 2023-24	**UNIT 1 :Plant water relations:** Importance of Water as a solvent, Diffusion, osmosis, imbibition, osmotic pressure, osmotic potential, turgor pressure, wall pressure, water potential and its components. Mechanism of water absorption, Factors affecting water absorption. Transpiration. Types and process. Mechanism of guard cell movement. K+ ion mechanism. Antitranspirants. Mechanism of ascent of sap: Vital and physical force theories. Phloem Transport: Transport of organic solutes. Path of transport, vein loading and unloading. Transcellular hypothesis, mass flow hypothesis. Mineral nutrition: A brief account of Micro and macro nutrients.	**UNIT 2 :Photosynthesis**: Photosynthetic Pigments (Chl a, b, xanthophylls, carotene); Photosystem I and II, reaction center, antenna molecules; Electron transport and mechanism of ATP synthesis; C3, C4 and CAM pathways of carbon fixation reactions; Photorespiration. **Respiration:** Glycolysis, anaerobic respiration, TCA cycle; Oxidative phosphorylation, Glyoxylate, Oxidative Pentose Phosphate Pathway.	**Practical No. Experiments** 1. Experiment to demonstrate the phenomenon of exosmosis and endosmosis. 2. To determine the osmotic pressure of the cell sap by plasmolytic method. 3. To demonstrate root pressure / transpiration pull in plants. 4. To compare the rate of transpiration from dorsiventral leaf by cobalt chloride paper method.
2	May-june 2023-24	**UNIT 3: Definition and classification of plant growth regulators**- Hormones. Site of synthesis, biosynthesis pathway and metabolism and influence on plant growth development of individual group of hormone- Auxins, Gibberlins, cytokinins, ABA, ethylene. Synthetic growth regulators- classification, their effect on plant growth and development. Practical utility of hormones in agriculture and horticulture. **Sensory Photobiology:** Biological clocks, photoperiodism, function & structure of phytochromes, phototropin & cryptochromes. Senescence, Aging & Cell Death	UNIT 4 **:Nitrogen metabolism**: Biological nitrogen fixation; Nitrate and ammonia assimilation. Proteins and amino acids: classification, structure - primary, secondary, tertiary and quaternary. Enzymes- classification, kinetics and mechanism of action. Vitamins - classification, distribution, structure, production, function. Lipid Metabolism: classification, structure, biosynthesis of fatty acids and functions. Secondary plant products: structure, biosynthesis and distribution of terpenes, phenolics and nitrogen containing compounds.	5. To demonstrate that oxygen is liberated in the process of photosynthesis. 6. Separation of photosynthetic pigments by paper chromatography and measure their Rf values. 7. To separate the chloroplast pigments by separating funnel. (Demonstration only) 8. To demonstrate that CO2 is evolved during anaerobic

		(PCD and Autophagosis). Plant Movements.		respiration by gas flow method. 9. Study of Phototrophism. 10. Demonstration of Starch in the leaf. 11. Determination of stomatal index, Area of stomatal aperture and stomatal frequency 12. Biochemical test for Starch, Protein, Reducing Sugars and Lipids. 13. Estimation of diurnal fluctuation using CAM plants. 14. Industrial visit.

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LESSON PLAN FOR THE ACADEMIC YEAR 2023-24

Programme: B.Sc (NEP)

Course/Paper Name: BOTANY (**Plant Biotechnology) – Paper II**

Semester: 6th

Total Hours:60

Sl.No	Month & Year	Sowmya C.V	Sowmya C. V	Practicals
1	March-April 2023-24	**Unit 1:** **Historical perspective**; Composition of media; Nutrient and hormone requirements (role of vitamins and hormones); Totipotency; Organogenesis; Embryogenesis (somatic and zygotic); Protoplast isolation, culture and fusion; Tissue culture applications (micropropagation, androgenesis, virus elimination, secondary metabolite production, haploids, triploids and cybrids; Cryopreservation; Germplasm Conservation).	**Unit 3:** Methods of gene transfer- Agrobacterium-mediated, Direct gene transfer by Electroporation, Microinjection, Micro projectile bombardment; Selection of transgenics– selectable marker and reporter genes (Luciferase, GUS, GFP). Pest resistant (Bt-cotton); herbicide resistant plants (RoundUp Ready soybean); Transgenic crops with improved quality traits (FlavrSavr tomato, Golden rice); Improved horticultural varieties (Moondust carnations); Role of transgenics in bioremediation (Superbug); edible vaccines; Industrial enzymes (Aspergillase, Protease, Lipase); Biosafety concerns.	1. (a) Preparation of MS medium. 2. (b) Demonstration of in vitro sterilization and inoculation methods using leaf and nodal explants of Tobacco/Datura/Brassica etc. 3. Study of anther, embryo and endosperm culture, micropropagation, somatic embryogenesis & Preparation of Artificial/Synthetic seeds. 4. Isolation of protoplasts – Mechanical isolatioin. 5. Study and description of binary vectors by using photographs. 6. Study of methods of gene transfer through photographs: Agrobacterium-mediated, direct gene transfer by electroporation, microinjection, micro projectile bombardment. 7. Study of steps of genetic engineering for production of Bt

				cotton, Golden rice, FlavrSavr tomato through photographs. 8. Isolation of DNA. 9. Isolation and spectrophotometric quantification of DNA. 10. Separation of DNA using agarose gel
2	May-June 2023-24	**Unit : 4** Introduction to Bioinformatics-Definition, history, scope and applications. Opportunities in Bioinformatics. Introduction to Genomics, Proteomics, Metabolomics and Pharmacogenomics.Biological databases: Nucleotide databases, Protein databases. Genome databases. Organization of data in NCBI, DDBJ, EBI, PDB, SwissPROT and software used	**Unit2:** Restriction Endonucleases (History, Types I-IV, biological role and application); Restriction Mapping (Linear and Circular); Cloning Vectors: Prokaryotic (pUC 18 and pUC19, pBR322, Ti plasmid, BAC); Lambda phage, M13 phagemid, Cosmid, Shuttle vector; Eukaryotic Vectors (YAC and briefly PAC, MAC, HAC).Gene Cloning (Recombinant DNA, Bacterial Transformation and selection of recombinant clones, PCR-mediated gene cloning) Gene Construct; construction of genomic and cDNA libraries, screening DNA libraries to obtain gene of interest by genetic selection; complementation, colony hybridization; Probes-oligonucleotide, heterologous, PCR;	electrophoresis and gel documentation. 11-12. Study of databases of NCBI, DDBJ, EMBL, PDB 13. Charts/ Photographs related to Biotechnology. 14. Visit to Biotech Labs in nearby places.