

BOTANY

COURSE OUTCOMES

FUNDAMENTALS OF MICROBES AND NON - VASCULAR PLANTS

SEMESTER - I

THEORY

CO#	Course Outcome
CO1	Explain origin of life on the earth. (K3)
CO2	Illustrate diversity among the viruses and prokaryotic organisms and can categorize them. (K3)
CO3	Classify fungi, lichens, algae and bryophytes based on their structure, reproduction and life cycles. (K4)
CO4	Analyze and ascertain the plant disease symptoms due to viruses, bacteria and fungi. (K4)
CO5	Explain the evolutionary trends among amphibians of plant kingdom for their shift to land habitat. (K3)
CO6	Evaluate the ecological and economic value of microbes, thallophytes and bryophytes. (K5)

PRACTICAL

CO#	Course Outcome
CO1	Demonstrate of Gram's staining technique for Bacteria. (K3)
CO2	Illustrate different Viruses (Corona, Gemini and TMV) using electron micrographs/ models. (K3)
CO3	Demonstrate Archaeobacteria and Actinomycetes using permanent slides/ electron micrographs/diagrams. (K3)
CO4	Demonstrate Anabaena and Oscillatoria using permanent/ temporary slides. (K3)
CO5	Classify different bacteria (Cocci, Bacillus, Vibrio and Spirillum) using permanent or temporary slides/ electron micrographs/ diagrams. (K4)
CO6	Demonstrate vegetative, sectional/anatomical and reproductive structures of the following using temporary or permanent slides/ specimens/ mounts. (K3)

SEMESTER – II

BASICS OF VASCULAR PLANTS AND PHYTOGEOGRAPHY

(Pteridophytes, Gymnosperms, Taxonomy of Angiosperms and Phytogeography)

THEORY

CO#	Course Outcome
C01	Classify and compare Pteridophytes and Gymnosperms based on their morphology, anatomy, reproduction and life cycles. (K4)
C02	Justify evolutionary trends in tracheophytes to adapt for land habitat. (K5)
C03	Explain the process of fossilization and compare the characteristics of extinct and extant plants. (K3)(K4)
C04	Illustrate various taxonomical aids for identification of Angiosperms and Analyze the morphology of the most common Angiosperm plants of their localities and recognize their families. (K4)
C05	Evaluate the ecological, ethnic and economic value of different tracheophytes and summarize their goods and services for human welfare. (K5)
C06	Explain different phytogeographical regions of the world and India and can analyze their floristic wealth. (K3)

PRACTICAL

CO#	Course Outcome
C01	Demonstrate the techniques of section cutting, preparing slides, identifying of the material and drawing exact figures. (K3)
C02	Compare and contrast the morphological, anatomical and reproductive features of vascular plants. (K4)
C03	Illustrate the local angiosperms of the families prescribed to their genus and species level and prepare herbarium. (K3)
C04	Develop skills of preparing slides, identifying the given twigs in the lab and drawing figures of plant twigs, flowers and floral diagrams as they are. (K3)
C05	Prepare and preserve specimens of local wild plants using herbarium techniques. (K3)
C06	Chart phytogeographical region of the globe and India. (K3)

SEMESTER - III

PLANT TAXONOMY AND EMBRYOLOGY

THEORY

CO#	Course Outcome
C01	Illustrate the organization of tissues and tissue systems in plants. (K3)
C02	Illustrate and interpret various aspects of embryology. (K3)
C03	Discuss the basic concepts of plant ecology, and evaluate the effects of environmental and biotic factors on plant communities. (K2)
C04	Appraise various qualitative and quantitative parameters to study the population and community ecology. (K5)
C05	Correlate the importance of biodiversity and consequences due to its loss. (K4)
C06	List the endemic/endangered flora and fauna from two biodiversity hot spots in India and assess strategies for their conservation. (K3)

PRACTICAL

CO#	Course Outcome
C01	Explain Tissue organization in root and shoot apices using permanent slides. (K3)
C02	Demonstrate Anomalous secondary growth in stems of Boerhavia and Dracaena. (K3)
C03	Evaluate anther and ovule using permanent slides/photographs and pollen germination and pollen viability. (K5)
C04	Analyze Structure of endosperm (nuclear and cellular) using permanent slides / Photographs. (K4)
C05	Demonstrate Developmental stages of dicot and monocot embryos using permanent slides / photographs. (K3)
C06	Appraise of instruments used to measure microclimatic variables; soil thermometer, maximum and minimum thermometer, anemometer, rain gauze, and lux meter. (K5)

SEMESTER -IV

PLANT PHYSIOLOGY AND METABOLISM

THEORY

CO#	Course Outcome
C01	Articulate the importance of water in plant life and mechanisms for transport of water and solutes in plants. (K3)
C02	Evaluate the role of minerals in plant nutrition and their deficiency symptoms. (K5)
C03	Interpret the role of enzymes in plant metabolism. (K3)
C04	Illustrate the light reactions and carbon assimilation processes responsible for synthesis of food in plants. (K3)
C05	Analyze the biochemical reactions in relation to Nitrogen and lipid metabolisms. (K4)
C06	Evaluate the physiological factors that regulate growth and development in plants and Examine the role of light on flowering and explain physiology of plants under stress conditions. (K5)

PRACTICAL

CO#	Course Outcome
C01	Calculate of stomatal index and stomatal frequency of a mesophyte and a xerophyte. (K3)
C02	Determine the rate of transpiration using Cobalt chloride method / Ganong's potometer (at least for a dicot and a monocot). (K3)
C03	Demonstrate the Effect of Temperature on membrane permeability by colorimetric method. (K3)
C04	Separate of chloroplast pigments using paper chromatography technique. (K4)
C05	Demonstrate of Polyphenol oxidase enzyme activity (Potato tuber or Apple fruit). (K3)
C06	Dissect C3, C4 and CAM leaves to study their anatomy. (K4)

SEMESTER - V

CELL BIOLOGY, GENETICS AND PLANT BREEDING

THEORY

CO#	Course Outcome
C01	Distinguish prokaryotic and eukaryotic cells and design the model of a cell. (K5)
C02	Demonstrate techniques to observe the cell and its components under a microscope. (K3)
C03	Discuss the basics of Mendelian genetics, its variations and interpret inheritance of traits in living beings. (K4)
C04	Illustrate the role of extra-chromosomal genetic material for inheritance of characters. (K3)
C05	Evaluate the structure, function and regulation of genetic material. (K5)
C06	Understand the application of principles and modern techniques in plant breeding. And Explain the procedures of selection and hybridization for improvement of crops. (K3)

PRACTICAL

CO#	Course Outcome
C01	Demonstration of Mitosis in <i>Allium cepa</i> / <i>Aloe vera</i> roots using squash technique; observation of various stages of mitosis in permanent slides. (K3)
C02	Study of structure of DNA and RNA molecules using models. (K4)
C03	Solving problems monohybrid, hybrid, back and test crosses. (K3)
C04	Solving problems on gene interactions (at least one problem for each of the gene interactions in the syllabus). (K3)
C05	Chromosome mapping using 3- point test cross data. (K3)
C06	Demonstration of emasculation, bagging, artificial pollination techniques for hybridization. (K3)

SEMESTER - V

PLANT ECOLOGY AND PHYTOGEOGRAPHY

THEORY

CO#	Course Outcome
C01	Illustrate the ecological factors on plants such as climatic , edaphic and biotic. (K4)
C02	Explain in detail about the concept and components of its productivity and biogeochemical cycle. (K3)
C03	Analyze the impact of human population on ecological system and interaction between plants growing in a community. (K4)
C04	Illustrate the principles and distribution of phytogeography and map photogeographic regions in the world and particularly in India. (K4)
C05	Illustrate biodiversity hotspots – Criteria, Biodiversity hotspots in India. (K4)
C06	Evaluate the loss of biodiversity – causes and conservation (Insitu and Ex – situ conservation). (K5)

PRACTICAL

CO#	Course Outcome
C01	Measure microclimatic variables using soil thermometer, maximum and minimum thermometer, anemometer , rain guaze and lux meter. (K5)
C02	Determine permeability (percolation ; total capacity as well as rate of movement) of different soil samples. (K3)
C03	Determine soil Ph. (K3)
C04	Demonstrate phytoplankton and macrophytes from water bodies. (K3)
C05	Chart the hotspots, phytogeographical regions and distribution of endemic plants in the map of India. (K3)
C06	Demonstrate endangered plants species , critically endangered plant species , vulnerable plant species and monotypic endemic genera of india with the help of photographs , herbarium , floras and Red databook. (K3)

SEMESTER -VI

PLANT TISSUE CULTURE AND BIOTECHNOLOGICAL APPLICATIONS

THEORY

CO#	Course Outcome
C01	Illustrate plant tissue culture research – basic principles of plant tissue callus , meristem, organ, endosperm cultures. (K2)
C02	Discuss restriction endonucleases , cloning vectors , gene cloning. (K2)
C03	Evaluate method of gene transfer – agrobacterium – mediated , direct gene transfer by electroporation , microinjection micro projectile. (K5)
C04	Select the transgenics – selectable marker and reporter genes. (K2)
C05	Explain application of plant genetic engineering – crop improvement , herbicide resistance , insect resistance , virus resistance. (K2)
C06	Give genetic modification – transgenic plants for pest resistant. (K2)

PRACTICAL

CO#	Course Outcome
C01	Prepare MS Medium. (K3)
C02	Demonstrate invitro sterilization methods and inoculation methods using leaf and nodal explants of Tobacco, Datura, Brassica etc. (K2)
C03	Differentiate steps involed in genetic engineering for production of Bt.cotton, Golden rice ,Flaver saver tomato through photographs. (K4)
C04	Show isolation of plasmid DNA. (K2)
C05	Demonstrate restriction digestion and gel electrophoresis of plasmid DNA. (K2)
C06	Distinguish field visit to a lab involed in tissue culture. (K5)