

**SKUCET–2015: SYLLABUS**  
**TEST No– 04: BOTANY**

**SECTION:A**

Paper - I: Microbial Diversity, Cryptogams and Gymnosperms

1. Origin and evolution of Life - an outline.
2. Viruses: Structure, replication and transmission; plant diseases caused by viruses and their control.
3. Bacteria: Structure, nutrition, reproduction and economic importance. An outline Of Plant diseases of important crop plants caused by bacteria and their control.
4. Brief account of Archaeobacteria, Chlamydia, Actinomycetes and Mycoplasma.
5. Cyanobacteria: Cell structure, thallus organisation and their prospecting (uses) — Biofertilizers
6. Algae: General account, thallus organisation, structure, reproduction, classification and economic importance.
7. Structure, reproduction, life history and systematic position of Qedogonium, Ectocarpus and Polysiphonia.
8. Fungi: General characters, classification and economic importance.
9. Structure, reproduction and life history of Albugo, Penicillium, Puccinia, Alternaria,. General account of plant diseases caused by Fungi and their control.
10. Lichens: Structure and reproduction; ecological and economic importance.
11. Bryophytes: General characters, classification and alternation of generations.
12. Structure, reproduction, life history and systematic position of Marchantia, Anthoceros and Polytrichum. Evolution of Sporophyte in Bryophytes.
13. Pteridophytes: General characters, classification, alternation of generations and evolution of sporophyte.
14. Structure, reproduction, life history and systematic position of Rhynia, Lycopodium, Equisetum.
15. Evolution of stele, heterospory and seed habit in Pteridophytes.
16. Gymnosperms: General characters, structure, reproduction and classification.
17. Morphology of vegetative and reproductive parts, systemic position, life history of Pinus and Gnetum
18. Distribution and economic importance; endangered Gymnosperms.
19. Palaeobotany: Introduction, Fossils and fossilization; Geological time scale; Importance of fossils. Bennettiales: General account

**SECTION:B**

Anatomy, Embryology, Taxonomy and Medicinal Botany

1. Meristems: Types, histological organisation of shoot and root apices and theories.
2. Tissues and Tissue Systems: Simple and complex.
3. Leaf: Ontogeny, diversity of internal structure; stomata and epidermal outgrowths.
4. Stem and root: Vascular cambium - Formation and function. Anomalous secondary growth-General account. Stem - Achyranthes, Boerhavia, Bignonia, Dracaena; Root — Beta
5. Wood structure: General account. Study of local timbers — Teak (*Tectona grandis*), Rosewood, (*Dalbergia latefolia*), Red sanders, (*Pterocarpus santalinus*) Nallamaddi (*Terminalia tomentosa* (*T. alata*)), Yegisa (*Pterocarpus marsupium*) and Neem (*Azadirachta indica*).
6. Introduction: History and importance of Embryology. Anther structure, Microsporogenesis and development of male gametophyte.
7. Ovule structure and types; Megasporogenesis; types and development of female gametophyte
8. Pollination - Types; Pollen - pistil interaction. Fertilization.
9. Endosperm - Development and types. Embryo - development and types; Polyembryony and Apomixis - an outline.
10. Palynology: Principles and applications.
11. Introduction: Principles of plant systematics, Systematics vs Taxonomy, Types of classification: Artificial, Natural and Phylogenetic.
12. Systems of classification: Salient features and comparative account of Bentham & Hooker and Engler & Prantle. An introduction to Angiosperm Phylogeny Group (APG).
13. Current concepts in Angiosperm Taxonomy: Embryology in relation to taxonomy, Cytotaxonomy, Chemotaxonomy and Numerical Taxonomy.

14. Nomenclature and Taxonomic resources: An introduction to ICBN, Vienna code - a brief account. Herbarium: Concept, techniques and applications.
15. Systematic study and economic importance of plants belonging to the following families: Annonaceae, Capparaceae, Rutaceae, Fabaceae (Faboideae/papilionoideae, Caesalpinioideae, Mimosoideae), Cucurbitaceae, Apiaceae, Asteraceae, Asclepiadaceae, Lamiaceae, Amaranthaceae, Euphorbiaceae, Orchidaceae and Poaceae.
16. SEthnomedicine: Scope, interdisciplinary nature, distinction of Ethnomedicine from Folklore Medicine. Outlines of Ayurveda, Sidda, Unani and Homeopathic systems of traditional medicine. Role of AYUSH, NMPB, CIMAP and CDRI.
17. Plants in primary health care: Common medicinal plants—Tippateega (*Tinospora cordifolia*), tulasi (*Oscimum sanctum*), pippallu (*Piper longum*), Karaka (*Terminalia chebula*), Kalabanda (*Aloe vera*), Turmeric (*Curcuma longa*).
18. Traditional medicine vs Modern medicine: Study of select plant examples used in traditional medicine as resource (active principles, structure, usage and pharmacological action) of modern medicine: Aswagandha (*Withania somnifera*), Sarpagandha (*Rauwolfia serpentina*), Nela usiri (*Phyllanthus amarus*), Amla (*Phyllanthus emblica*) and Brahmi (*Bacopa monnieri*).
19. Pharmacognosy: Introduction and scope. Adulteration of plant crude drugs and methods of identification - some examples. Indian Pharmacopoeia.
20. Plant crude drugs: Types, methods of collection, processing and storage practices. Evaluation of crude drugs.

#### SECTION: C

#### **Paper— III : Cell Biology, Genetics, Ecology and Biodiversity**

**(Total Hours of Teaching: 90 @ 3 h I Week)**

1. Plant cell envelopes: Ultra structure of cell wall, molecular organisation of cell membranes.
  2. Nucleus: Ultrastructure, Nucleic acids - Structure and replication of DNA; types and functions of RNA.
  3. Chromosomes: Morphology, organisation of DNA in a chromosome, Euchromatin and Heterochromatin. Ka ryotype.
  4. Special types of chromosomes: Lampbrush, polytene and B - chromosomes.
  5. Cell division: Cell cycle and its regulation; (mitosis, meiosis for practical observation)
  6. Mendelism: Laws of inheritance. Genetic interactions - Epistasis, complementary, supplementary and inhibitory genes.
  7. Linkage and crossing over: A brief account, construction of genetic maps - 2 point and 3 point test cross data.
  8. Mutations: Chromosomal aberrations - structural and numerical changes; Gene mutations, transposable elements.
  9. Gene Expression: Organisation of gene, transcription, translation, mechanism and regulation of gene expression in prokaryotes (Lac. and Trp Operons).
  10. Extra nuclear genome: Mitochondrial and plastid DNA, plasmids.
  11. Concept and components of Ecosystem. Energy flow, food chains, food webs, ecological pyramids,
  12. Plants and environment: Ecological factors - Climatic (light and temperature), edaphic. Ecological adaptations of plants.
  13. Population ecology: Natality, mortality, growth curves, ecotypes, ecads.
  14. Community ecology: Frequency, density, cover, life forms, biological spectrum, ecological succession (Hydrosere, Xerosere).
  15. Production ecology: Concepts of productivity, GPP, NPP, CR (Community Respiration) and secondary production, P/R ratio and Ecosystems.
- Biodiversity: Concepts, Convention on Biodiversity - Earth Summit. Types of biodiversity.
16. Levels, threats and value of Biodiversity.
  17. Hot spots of India — Endemism, North Eastern Himalayas, Western Ghats.
  18. Agro-biodiversity: Vavilov centres of crop plants.
  19. Principles of conservation: IUCN threat-categories, RED data book - threatened & endangered plants of India. Role of organisations in the conservation of Biodiversity - IUCN, UNEP, WWF, NBPGR, NBD.

1. Detailed study on flora of a local fresh water or aquaculture pond.
2. Geographical spotting of certain endemic and endangered plant species of AP.
3. Minimum of two field visits to local areas of ecological / conservation of biodiversity importance (Sacred grove/ Reserved forest! Botanical garden / Zoo Park! Lake etc.).

**Paper -IV: Physiology, Tissue Culture, Biotechnology,**

**Seed Technology and Horticulture**

**(Total Hours of Teaching: 90 @ 3 h | Week)**

1. Water Relations: Diffusion, Imbibition, Osmosis; water, osmotic and pressure potentials; ascent of sap; transpiration; Stomatal structure and movements.
2. Mineral Nutrition: Essential macro and micro mineral nutrients and their role; symptoms of mineral deficiency; absorption of mineral ions; passive and active processes.
3. Enzymes: Nomenclature, characteristics, mechanism and regulation of enzyme action, enzyme kinetics, factors regulating enzyme action.
4. Photosynthesis: Photosynthetic pigments, absorption and action spectra; Red drop and Emerson enhancement effect; concept of two photosystems; mechanism of photosynthetic electron transport and evolution of oxygen; photophosphorylation; Carbon assimilation pathways: C<sub>3</sub>, C<sub>4</sub> and CAM; photorespiration.
5. Translocation of organic substances: Mechanism of phloem transport; source-sink relationships.
6. Respiration: Aerobic and Anaerobic; Glycolysis, Krebs cycle; electron transport system, mechanism of oxidative phosphorylation, pentose phosphate pathway.
7. Nitrogen Metabolism: Biological nitrogen fixation, nitrate reduction, ammonia assimilation, protein synthesis.
8. Lipid Metabolism: Structure and functions of lipids; conversion of lipids to carbohydrates,  $\beta$ -oxidation.
9. Growth and Development: Definition, phases and kinetics of growth. Physiological effects of phytohormones - auxins, gibberellins, cytokinins, ABA, ethylene and brassinosteroids; Physiology of flowering and photoperiodism, role of phytochrome in flowering.
10. Stress Physiology: Concept and plant responses to water, salt and temperature stresses.
11. Tissue culture: Introduction, sterilization procedures, culture media - composition and preparation; explants.
12. Callus culture; cell and protoplast culture, Somatic hybrids and cybrids.
13. Applications of tissue culture: Production of pathogen free plants and somaclonal variants, production of stress resistance plants, secondary metabolites and synthetic seeds.
14. Biotechnology: Introduction, history and scope.
15. rDNA technology: Vectors and gene cloning and transgenic plants.
16. Seed: Seed dormancy; causes and methods of breaking dormancy.
17. Seed storage: Seed banks, factors affecting seed viability, genetic erosion. Seed production technology; seed testing and certification.
18. Horticulture techniques: Introduction, Cultivation of ornamental and vegetable crops, Bonsai and landscaping
19. Floriculture: Introduction. Importance of green house, polyhouse, mist chamber, shade nets; Micro irrigation systems. Floriculture potential and its trade in India
20. Vegetative Propagation of plants: Stem, root and leaf cuttings. Layering and bud grafting. Role of plant growth regulators in horticulture.

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