

SVUCET-2015: SYLLABUS

TEST No: 05: 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 *Oedogonium*, *Ectocarpus* and *Polyisiphonia*.
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 latifolia*), 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. **Ethnomedicine:** 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 / 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. Karyotype.
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.

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: C₃, C₄ 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, β -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. **DNA 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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