

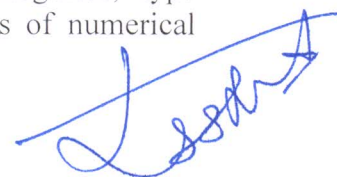
# Syllabus for M.Sc Entrance in Botany 2014

## **M.Sc Botany**

**Note:** The syllabus prescribed for the entrance test has been divided into fifteen units. Each unit carries a weightage of four marks. Paper setters are required to set four multiple choice type questions with only one correct or most appropriate answer separately for each unit, giving uniform representation to the whole syllabus contained therein.

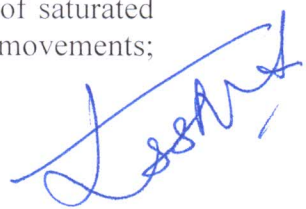
## **Units**

1. Structure of viruses with special reference to TMV, lytic and lysogenic cycles in viruses; structure, reproduction and role of Cyanobacteria in biotechnology with special reference to *Nostoc*. Structure and life history of *Phytophthora*, *Rhizopus*, *Morchella*., *Puccinia* and *Alternaria*. Thallus structure and life history of *Chlorella*, *Volvox*, *Oedogonium*, *Chara*. *Vaucheria*, *Ectocarpus* and *Batrachospermum*.
2. Bryophytes--origin and evolution of sporophyte, apogamy and apospory; structure and reproduction in *Marchantia*, *Anthoceros* and *Polytrichum*. Morphology, anatomy and reproduction in *Rhynia*, *Lycopodium*, *Equisetum* and *Marsilea*. Heterospory, and stelar evolution in Pteridophytes.
3. Structure and functions of cell wall and plasma membrane, golgi apparatus, endoplasmic reticulum, chloroplast, mitochondria and ribosomes, fluid mosaic model of plasma membrane, ultrastructure of nuclear membrane. Morphology of chromosomes; satellite chromosomes, nucleolus, organization of chromosomes with special reference to nucleosome model; mitosis and meiosis; chromosome alterations--origin, meiotic behavior and genetic consequences of deletions, duplications, inversions and translocations, transposable elements (maize and *Drosophila*); DNA damage and repair.
4. Mendel's laws of inheritance, allelic and non-allelic interactions; dominance (3:1), epistasis (13:3, 12:3:1) duplicate (15:1) and complementary (9:7) genes with suitable examples and problems, structure and functions of mitochondrial and plastid DNA, plasmids- structure and functions. DNA structure and mechanism of replication, major enzymes involved in replication and their roles, satellite and repetitive DNA; gene expression--- concept and structure of gene, lac operon (Operon model) and regulation of gene expression; mechanism of transcription, enzymatic machinery involved and its role.
5. Translation- concept of genetic code, structure and functions of ribosomes, tRNA and mRNA in translation, activation of amino acids, mechanism of translation (initiation, elongation and termination). Tools and techniques of recombinant DNA technology, essential features of cloning vectors (Plasmids, Cosmids and Phages), genomic and cDNA library, organization of Ti plasmid of *Agrobacterium* and its role in gene transfer technology.
6. Plant Taxonomy--components, scope and need; plant identification keys; principles of International Code of Botanical nomenclature (ICBN); taxonomic categories; type concept. Role of cytology and phyto-chemistry in taxonomy; principals of numerical



taxonomy; artificial, natural and phylogenetic classification (a brief overview only); salient features of classification systems proposed by Bentham and Hooker, and Takhtajan.

7. Morphology of angiosperms (vegetative and reproductive features), origin of angiosperms (monophyletic versus polyphyletic); character evaluation of primitive angiosperms with special reference to *Magnolia* and *Ranunculus*; convergent evolution with examples from flowering plants. Diagnostic taxonomic features of Ranunculaceae, Brassicaceae, Malvaceae, Papilionaceae, Rosaceae, Asteraceae, Solanaceae, Lamiaceae, Liliaceae, Iridaceae and Poaceae.
8. Organization of the root apical meristem, differentiation of primary and secondary tissues and their roles; structural modification of root system for storage, support, respiration, propagation and microbial interaction. Shoot apical meristem and its histological organization; vascularization of primary shoot in monocotyledons and dicotyledons; cambium and its functions.
9. Formation of secondary xylem; general account of wood structure; formation of growth rings, sapwood and heart wood; secondary phloem-- structure-function relationships; periderm; anomalous secondary growth in *Dracena*; anatomy of monocotyledon (wheat, maize) and dicotyledonous (*Nymphaea* and sunflower) leaf. General characters of gymnosperms; Sporne's system of classification (criteria and salient features); morphology, anatomy and reproduction in *Cycas*, *Pinus* and *Ephedra*.
10. Structure of flower; functions of anther and pistil, development of male and female gametophytes; pollination mechanisms; plant-pollinator interactions; pollen-pistil interaction, self incompatibility; double fertilization; development of embryo and endosperm (in *Capsella* and *Poa*); fruit development, seed appendages and seed dispersal mechanisms
11. Importance of water to plant life, physical properties of water, diffusion, osmosis, imbibition, water transport through xylem, physiology of stomata, evidences and mechanism of phloem transport, source sink relationship; essential macro and micro nutrient elements, criteria of essentiality, role of nutrients, ion uptake, mineral deficiency symptoms. Differentiation and morphogenesis (elementary idea), phases of growth, physiology of dormancy, seed germination, factors regulating seed germination
12. Photosynthetic pigments, absorption and action spectra, enhancement effect, concept of two photosystems, Z-scheme, photophosphorylation, Photorespiration, C<sub>3</sub>, C<sub>4</sub> and CAM pathways. Aerobic and anaerobic respiration, Krebs cycle, electron transport mechanism, oxidative phosphorylation (chemi-osmotic mechanism).
13. Discovery and nomenclature of enzymes, characteristics of enzymes concept of holoenzyme, apoenzyme, coenzyme and cofactors, mechanism of enzyme action; biology of nitrogen fixation, ammonium assimilation, biosynthesis and degradation of saturated fatty acids ( $\beta$ -oxidation). Photoperiodism, vernalization, tropic and nastic movements;





physiological effects of auxins, gibberellins, cytokinins, abscisic acid and ethylene; photomorphogenesis, discovery and physiological role of phytochromes and cryptochromes

14. Plants and environment--- atmosphere (gaseous composition), water (water cycle); light (global radiation, photosynthetically active radiation), temperature, soil (development, soil profile, physico-chemical properties). Morphological, anatomical and physiological adaptation of plants to water, temperature, light, wind, fire and salinity; population ecology---primary and secondary characters of population, regulation, inter- and intra-population interaction.
15. Community ecology---community characteristics (analytic and synthetic); ecological succession (Hydrosere and Xerosere); Ecosystems: structure, abiotic and biotic components, food chains, food webs, ecological pyramids, energy flow, biogeochemical cycles of carbon, nitrogen and phosphorus.

Morphology, cultivation and economic importance of rice, wheat, and maize, types of plant fibres, extraction, processing and uses of cotton and jute; types of vegetable oil, extraction, processing and uses of groundnut and mustard; distribution status, cultivation, part used, uses/abuses of medicinal plants viz. *Podophyllum*, *Atropa* and *Artemisia*.

\* \* \* \* \*

