

SYLLABUS FOR COMPUTER BASED RECRUITMENT TEST (CBRT)
FOR THE POST OF ASSISTANT PROFESSOR IN GOVERNMENT COLLEGE
(BOTANY)
UNDER
DIRECTORATE OF HIGHER EDUCATION
(Advt No. 11 Year 2023)

I. General English including Grammar - 05 marks

II. General Knowledge, Current Affairs and Events of National and International Importance - 10 marks

III. Logical Reasoning and Analytical Ability - 10 marks

IV. Core: - 50 marks

Plant Physiology

- Nitrogen metabolism: Nitrogen nutrition, organic nitrogen, nitrogen fixation in legumes, nitrate and ammonia assimilation: Sulfur metabolism and amino acid synthesis. Inter relationship between photosynthesis, respiration and nitrogen metabolism.
- Photosynthesis: Light reaction: Radiant energy, photosynthetic apparatus, pigments and their biosynthesis; light harvesting complex; light absorption and composition and characteristics of two photosystems, photosynthetic electron transport, Mehler reaction,
- Dark reaction: Carbon dioxide fixation in C₃, C₄ and CAM plants
- Respiration: Aerobic and anaerobic respiration;
- Enzymes: Structure and classification; mechanism of action; allosteric enzymes, isozymes, co-enzymes and vitamins;
- Phytohormones: their synthesis, distribution; and physiological effects. Molecular mechanism of action.

Plant Molecular Biology Syllabus:

- DNA: Structure of nucleotides, Bonding, double helix and other helices. Factors affecting DNA structure.
- Molecular Biology of DNA Replication: Enzymes involved in replication, DNA replication is semi-conservative, Meselson-Stahl expt., a Primosome complex,
- 4. Transcriptions: Enzymes in transcriptions; Basic features of transcription, Initiation elongation and termination, promoters and enhancers;
- Regulation of Gene Expression: I, expression of lac operon,
- RNA Molecules and RNA Processing: Processing of messenger RNA, transfer RNA, ribosomal RNA,
- The Genetic Code and Translation: Molecular relation between Genotype & Phenotype,

The Genetic Code, Factors involved in initiation, elongations and termination of translation,

Plant Genetic Engineering

- Restriction and modification of DNA: Basic principle of genetic engineering; restriction enzyme, cutting and joining the DNA; Vectors: plasmids, Bacteriophage and cosmid, single and double standard vectors;
- Agrobacterium-mediated gene transfer: Biology and molecular basis of Agrobacterium mediated plant transformation Direct gene transfer methods,
- General organisation of nuclear, mitochondrial and chloroplast genome;
- Gene silencing in plants: RNAi, Antisense.
- Application of plant genetic engineering for traits such as herbicide resistance, insect resistance, virus and abiotic stress resistance; improvement of crop yield and quality, manipulation of fruit ripening, Golden rice.
- Genetic Engineering and public Concerns:

Algae, Microbiology and Pathology Syllabus:

- Algae, classification and economic importance
- **Mycological Dimensions of Plants:** Plants and fungi interaction through the window of evolution; present knowledge of fungal biodiversity, phylogeny and classification; fungal plant ecology and fungal endophytes; forms, structure and functions of Fungi; Modern fungal systematics, Morphology and molecular-based taxonomy;
- **Study of different groups of fungi with suitable native examples:** Slime moulds, Chytridiomycota; Oomycota; Glomeromycota; Zygomycota; Ascomycota and Basidiomycota; Straminopile fungi. Study of economic importance of fungi;
- **Tropical Plant Pathology:** Diseases of plants in the tropics and their systematic studies using modern techniques. Symptomatology in fungal, bacterial, viral and mycoplasma diseases of plants; Physiology of host-pathogen interaction; Control of crop diseases
- **Taxonomic Methods and Classification of Angiosperms Syllabus**
- Plant taxonomy: Scope and importance; Conservation priorities, bioprospecting
- International Code of Plant Nomenclature: Taxonomic characters other than morphology: Characters from anatomy, embryology, palynology, chromosomes, secondary metabolites, proteins, nucleic acids in taxonomy.
- Phytogeography: Basic terminologies and their understanding; endemism – types and causes; vicariance; phytogeography and applications; floristic regions of the world (Takhtajan).
- Phylogeny and Classification of Angiosperms: Fossil angiosperms and their ecology. APG III system of classification of angiosperms; characteristics and phylogeny of clades: Orders – Amborellales, Nymphaeales, Austrobaileyales, Chloranthales; Clades (Magnoliids), (Monocots (Commelinids)), Order Ceratophyllales, (eudicots (core eudicots (rosids (malvids, fabids)) (asterids (campanulids, lamids)

Cytogenetics and Plant Breeding Syllabus

- Cell division and Cell cycle: Mitosis and Meiosis,
- Morphology of eukaryotic chromosomes: Chromosome number, size and general morphology; Karyotype; Chromosomes banding patterns; Specialized chromosomes;
- Molecular organization of Eukaryotic chromosomes: Chemical composition, chromosome structure; Organization of chromatin fibres; Molecular structure of Centromere and telomere.
- Molecular mechanisms to mutation and DNA repair: mechanism of DNA repair.
- Introduction to Plant Breeding: Objectives and achievements; Pattern of evolution in crop plants; Plant introduction - Purpose of plant introduction; some important achievements of plant introduction; Domestication and acclimatization; Germplasm collections.
- Heterosis and inbreeding depression: Inbreeding depression; Effects of inbreeding; Degrees of inbreeding depression; Homozygous and Heterozygous balance; Heterosis in cross and self-pollinated plants; Genetic basis of heterosis and inbreeding depression; Dominance hypothesis; Over-dominance hypothesis; Physiological basis of heterosis; Commercial applications.

Advanced Ecology Syllabus

- Ecology of climate change and development (ECCD): Climate change-the current picture after COP-20;
- Tropical Soil Ecology (TSE): Classification and characteristics of tropical soils; Soils as a biological habitat, tropical Soil biodiversity; soil erosion and soil fertility management.
- Landscape and plant ecology (LE): Historical development, Applications of landscape ecology, Definitions and terminology in LE, Pattern, heterogeneity, patches, Scale and hierarchy on landscapes; Change and long temporal scales; Causes of pattern; Landform and landscape position; Land use- Social and cultural landscapes; The role of disturbance on landscapes-Spatial dynamics of disturbance, Disturbance, equilibrium, and scaled landscapes, Principles of plant ecology, plant communities, ecotones, edge effect; Forest landscape succession-Succession as a spatial process , Modeling landscape succession and management, biodiversity and landscape management, Landscape restoration, Landscape management: Natural variability, scientific uncertainty, and sustainability; Case studies from India-habitat fragmentation in western ghats, in mining areas etc.
- Environmental impact assessment (EIA): History of EIA, EIA, EIS, EMP; EIA laws and regulations, projects requiring EIA in India; EIA methodology-Checklist, overlay, modeling, Network, Matrix, computer assisted; EIA software packages and tools; Biological impact assessment; preparing EIA reports, public hearing procedures; EIA case studies from India; Study of EIA manuals.

Note:

Duration for C.B.R.T : 90 Minutes

Maximum Marks for C.B.R.T : 75 Marks