RAJASTHAN PUBLIC SERVICE COMMISSION, AJMER
SYLLABUS FOR COMPETITIVE EXAMINATION FOR THE POST OF LECTURER IN BOTANY FOR COLLEGE EDUCATION DEPARTMENT

PAPER-II

1. Plant-water relation, membrane transport and translocation of water and solutes.

2. Enzymes - Classification, mechanism of action, role in metabolism, enzyme, kinetics, regulation of enzyme activity, active sites, coenzymes, Activators and inhibitors, isozymes.

3. Photosynthesis - Pigments, photophosphorylation, Mechanism of photosynthesis, photorespiration, photosynthesis in C4 plants, CAM.

4. Nitrogen metabolism - amino acid metabolism and protein synthesis. Fatty acid metabolism. Signal transduction: overview receptors and G-proteins, specific signaling mechanism in bacteria and proteins.

5. Respiration - Glycolysis, TCA cycle, Oxidative phosphorylation, Glycogen breakdown, inter conversion of hexoses and pentoses.

6. Seed dormancy and germination, hormonal regulation of growth and development. Physiological effects and mechanism of action of auxins, gibberellins, cytokinins, ethylene, abscisic acid and jasmonic acid, plant rythms and biological clock, secondary metabolites, plant responses to biotic and abiotic stresses. Physiology of flowering- Photoperiodism and Vernalization.

7. Ultra structure of prokaryotic and eukaryotic cells, cell membrane structure and function, cell organelles- structure and functions, Nucleus - structure, nuclear pores, DNA Structure - A,B and Z forms, replication, damage and repair, transcription, splicing and nucleolus, cells cycle, structure of chromatin and its organization, specialized types of chromosomes, banding patterns, chromosomal aberration and polyploidy.

8. Genetics of eukaryote and prokaryote organelles, mapping of bacteriophage genome, genetic transformation, conjugation and transduction in bacteria, genetics of mitochondria and cytoplasmic male sterility.

9. Techniques in cell biology-*in situ* hybridization FISH, GISH, genetic code, transcription and translation, operon model, RNA polymerase. Genetic mapping : Independent assortment and crossing over, molecular mechanism of recombination, chromosome mapping, linkage groups. Molecular basis of spontaneous and induced mutation and their role in evolution, principles of plant breeding important conventional methods of self and cross pollinated and vegetatively propagated crops, mutation breeding.

10   Basic concepts, principles and scope of Biotechnology, plant cell and tissue culture, concept of totipotency, micropropagation by organogenesis and adventitious shoot bud differentiation, axillary bud proliferation and embryogenesis, somatic hybridization - protoplast isolation, fusion and culture; artificial seeds, production of hybrids and somaclones, hybrids, production of secondary metabolites and bioactive compounds.

11   Recombination DNA Technology : Restriction enzymes, reverse transcriptase. Gene cloning, principles and techniques, construction of genomic/s, DNA libraries, DNA synthesis and sequencing, polymerase chain reaction, DNA finger printing.Genetic engineering of plants : Aims, strategies for development of transgenics, *Agrobacterium* and microinjection mediated gene transfer in plants, intellectual property rights and possible ecological risks and ethical concerns, microbial genetic manipulation. Structural and functional genomics, microarray, genome sequencing projects (with special reference to rice, wheat, chick pea and tomato) and proteomics.

12   Principles and practices of statistical methods in biological research, samples and population, Data collection and processing, Basic statistics (averages, statistics of dispersion, coefficient of variation, standard error and deviation); confidence limits, probability, Distribution (Binomial, Poisson and Normal) Tests of statistical significance, simple correlation and regression, Analysis of variance.

Note :-   **Pattern of Question Paper**

1. **Objective type paper**
2. **Maximum Marks : 75**
3. **Number of Questions : 150**
4. **Duration of Paper : Three Hours**
5. **All questions carry equal marks.**
6. **There will be Negative Marking.**