

Mohan Lal Sukhadia University, Udaipur

Syllabus for Screening Test for the post of ASSISTANT PROFESSOR

BOTANY

1 Algae in diversified habitats (Terrestrial, fresh water, marine); Thallus organization, Cell structure and reproduction; criteria in classification of Algae; Economic Importance of Algae.

2 General characteristic of Fungi, Cell ultra structure, cell wall composition, reproduction, heterothallism, parasexuality, recent trends in classification, economic importance of fungi, mycorrhizae and lichens.

3 Archaeobacteria, eubacteria and cyanobacteria, ultra structure and reproduction, Prions, L-Forms, Virioides, characteristics and ultra structure of virions, Mycoplasma and Phytoplasma - General characteristics and role in causing plant diseases, microbiology of water, air, soil and sewage

4 General account of diseases caused by plant pathogens, molecular basis of host parasite interaction, pathogen attack and defence mechanism, diseases of important field crops of Rajasthan (Red rot of Sugar cane, rust of wheat, covered smut of wheat, loose smut of wheat, green ear disease of maize, leaf smut and smut of jawar ergot and smut of maize, root knot and rot diseases of vegetables); diseases management, role of information technology.

5 General characters, structure, reproduction, evolution and interrelationships in Bryophytes, Pteridophytes and Gymnosperms Evolution of Stele; Heterospory and seed habit, principles of palaeobotany.

6 Taxonomic hierarchy, principles of nomenclature, Taxonomic tools, important systems of classification (Bentham and Hooker, Engler and Prantl, Hutchinson and Takhtaran) Role of morphology, anatomy, embryology, palynology, cytology, phytochemistry, genome analysis and nucleic acid hybridization in taxonomy, taxonomy of some selected families of Rajasthan (Leguminosae, Cucurbitaceae, Asteraceae, Asclepiadaceae, Solanaceae, Euphorbiaceae and Poaceae), phylogeny of Angiosperms.

7 General concept of plant morphology - origin and evolution of flower. primitive living angiosperms, floral stamens, open carpels, organization of root and shoot apical meristems.

8 Development of male and female gametophytes, pollination, floral pistil interaction, fertilization, endosperm development and embryogenesis, seed development and fruit formation, polyembryony, apomixis, embryo culture, biochemistry and molecular biology of fruit maturation.

9 Basic concepts of ecology, ecological factors affecting plant growth, community characteristics, community classification, continuum concept, ecological niche, plant succession in various habitats, concept of climax.

Structure and function of ecosystem, energy flow and biogeochemical cycles (N,P,C,S), primary production, principles of limiting factors, plant indicators, major biomes of the world.

10 Environmental pollution-Air, Water, Soil, Green House effect, Ozone layer depletion, Acid Rain, Concept of biodiversity with special reference to India, Hot spots, strategies for conservation of Flora and Fauna, Bio monitoring, Environmental Impact Assessment.

11 Plant civilization, centres of origin, gene diversity, utilization, cultivation and improvement of plants of food (rice, wheat, maize, pulses, green gram, moth and beans) Oil seeds (mustard and ground nut), drugs (Rauwolfia, Ephedra, papaver, Atropa, Cinchona), Fibre _ Cotton, jute and coir and plants of industrial value _ Tobacco, sugarcane, tea and coffee, Ethnobotany unexploited plants of potential economic value with special reference to Rajasthan, plants as a source of renewable energy.

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

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

14 Photosynthesis - Pigments, photophosphorylation, path of carbon in photosynthesis, photorespiration, photosynthesis in C4 plants, CAM.

15 Nitrogen metabolism - amino acid metabolism and protein synthesis.

16 Respiration - Glycolysis, TC A cycle, Glycogen breakdown, inter conversion of hexoses and pentoses.

17 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 rhythms and biological clock, secondary metabolites, plant responses to biotic and abiotic stresses.

18 Signal transduction : overview, receptors and G-proteins, specific signaling mechanism in bacteria and proteins.

19 Fat metabolism.

20 Ultra structure of prokaryotic and eukaryotic cells, cell membrane structure and function, cell organelles- structure and functions, Nuclear - 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.

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

22 Techniques in cell biology-insitu hybridization FISH, GISH, Light, confocal, electron microscopy, genetic code, transcription and translation, operon model, RNA polymerase, reverse transcriptase.

23 Genetic Recombination and genetic mapping : Independent assortment and crossing over, molecular mechanism of recombination, chromosome mapping, linkage groups.

24 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.

25 Biotechnology : Basic concepts, principles and scope, plant cell and tissue culture, concept of totipotency, organogenesis and adventive embryogenesis, somatic hybridization - protoplast isolation, fusion and culture; application of plant tissue culture clonal propagation; artificial seeds, production of hybrids and somaclones, hybrids, gene transfer by micro injection; production of secondary metabolites.

26 Recombination DNA Technology : Gene cloning, principles and techniques, construction of genomic/c DNA libraries, DNA synthesis and sequencing, polymerase chain reaction, DNA finger printing.

27 Genetic engineering of plants : Aims, strategies for development of transgenics, Agrobacterium, intellectual property rights and possible ecological risks and ethical concerns, microbial genetic manipulation, genomics and proteomics, Bioactive compounds.

28 Electron microscopy, phase contrast, fixation and staining, HPLC, electrophoresis, ELISA.

29 Principles and practices of statistical methods in biological research, samples and population, 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 :100
3. Number of Questions : 100
4. Duration of Paper : Two Hours
5. All questions carry equal marks
6. There will be Negative Marking

