

DEPARTMENT OF BOTANY

Syllabus of Ph.D. Entrance test 2018

Research Methodology:

Computer applications: Networking, Excel, SPSS Programs, Computer modeling, PPT presentation, other Softwares related to respective research field.

data collection and analysis: Execution of the research, observation and collection of data methods of data collection, hypothesis-testing, generalization and interpretation. Tools for searching research topics, ethics in research plagiarism,

Statistical methods in Biology: Mean, Variance, Standard deviation, Standard error, Chi-square and t'-test. ANOVA

physiological solution: Solution, Buffer, pH etc.

Principle of Microscopy: Light microscope, Phase contrast, Electron microscope (SEM & TEM) and fluorescence microscope.

Principles and application of Chromatographic technique: Gel filtration, Ion Exchange, High Pressure Liquid Chromatography (HPLC), Electrophoretic technique and Application.

immunochemical technique: ELISA.

Ecological exercise: Qualitative, quantitative and sampling methods, species diversity –richness and evenness.

Staining & Preservation Techniques: related with lower and higher plants; dry and wet preservation.

DIVERSITY OF MICROBES

Viruses: General characters, Classification based on host, Transmission of viruses, Economic importance of viruses, Mycoplasma: General Characters, Bacteria: General characters, Ultra structure of bacterial cell, Mode of nutrition and reproduction, Archaeobacteria-Habit and forms Cyanobacteria-Salient features of Role of bacteria and cyanobacteria in agriculture, Fungi: General characters, Classification (as per Alexopoulos and Mims, 1979), reproduction, life cycle and economic importance, Lichens: General characters.

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DIVERSITY OF CRYPTOGRAMS

General characters, of algae, Classification of algae, reproduction, life cycle pattern and economic importance, Bryophyta: General characters, Classification, life cycle pattern and economic importance, Pteridophyta: General characters, Classification, reproduction and life cycle.

DIVERSITY OF PHANEROGAMS

Gymnosperms: General characters, classification, reproduction and life cycle, Angiosperms: General characters, taxonomic ranks, types of classification (artificial, natural and phylogenetic) salient features, Bentham & Hooker's system of classification with merits and demerits, binomial nomenclature.

UTILIZATION OF PLANTS

Botanical name, family, method of cultivation and economic importance of Cereals, Pulses, Fiber yielding plants, Oil yielding plants, Timber yielding plants and Medicinal plants.

ECOLOGICAL

Ecology - Definition and Scope, Structure of ecosystem (Abiotic and Biotic), Types of ecosystem, Ecological pyramids and energy flow, Food chain and Food web, Morphological and anatomical adaptations of plants to water stress conditions-Hydrophytes, Xerophytes and halophytes, Pollution: Causes and effects of water, soil and air pollution and their control measures, Afforestation, Deforestation and Chipko movement.

BIO-DIVERSITY

Components, levels & values of biodiversity; present status of global biodiversity; plant diversity in Kashmir Himalaya - present status, socio-economic utility, extent of threat and conservation needs.

CELL BIOLOGY AND GENETICS

Cell and cell organelles, structure, chemical composition, euchromatin, heterochromatin and function of typical chromosome, Cell division- Process and significance of Mitosis and Meiosis, Cell cycle, Genetic Inheritance- Mendelism, Mendel's Laws of inheritance- Explanation and examples of Monohybrid cross, Dihybrid cross, Back cross and Test cross, Gene interaction and epistasis.

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allelic and non allelic), Sex linked inheritance, Haldane gene – hypertrochosis, Chromosomal Aberrations, Human syndromes.

DNA replication, repair and recombination: Unit of replication, enzymes involved in DNA replication and extra chromosomal inheritance, DNA damage and repair mechanisms.

Nature of Gene: Bacterial and Viral Genetics, Pre-DNA Concept, Gene-Protein Relationship.

Gene Expression: Transcription, Overview Mechanism of Transcription in Prokaryotes and Eukaryotes, Transcriptional factors, RNA as Enzyme. Structure and function of Ribosomes, Discovery and Structure of different RNAs involved in Protein Biosynthesis.

Genetic Code and its Elucidation, Central Dogma

Gene Regulation: Gene Regulation in prokaryotes, Lac. Operon, Tryptophan Operon, Lytic and Lysogenic growth pattern in Phage λ .

Gene Regulation in Eukaryotes: Levels of Gene regulation, Role of transcription factors, hormonal regulation, role of DNA methylation, Genomic imprinting, RNA interference.

HISTOLOGY AND ANATOMY

Meristem, Simple Tissues, Complex Tissues, Secretory Tissues, Root, stem and leaf anatomy of dicotyledons and monocotyledons, Secondary and Anomalous secondary growth in dicot and monocot root and stem

PLANT PHYSIOLOGY AND BIOCHEMISTRY

Plant water relations, Mineral nutrition, Growth and development Physiology of flowering and plant movements, phytochrome, Photosynthesis and Photorespiration Respiration Basic biochemistry- Introduction different organic constituents of the cell, Enzymes and Nitrogen metabolism.

Plant hormones: Biosynthesis, storage, breakdown and transport; physiological effects and mechanisms of action.

Stress physiology: Responses of plants to biotic (pathogen and insects) and abiotic (water, temperature and salt) stresses; mechanisms of resistance to biotic stress and tolerance to abiotic stress. Composition, structure and function of biomolecules (carbohydrates, lipids, proteins, nucleic acids and vitamins).

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PLANT PATHOLOGY

Scope and significance of plant pathology, Concept of plant disease, Causes of plant disease, Classification of plant diseases on the basis of causal agents, symptoms and spread (Air, soil and seed, Plant disease diagnosis: Isolation of plant, pathogens, pure culture techniques, Koch's postulates, Seed pathology, Biodegradation of storage food grains and fruits

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