

Syllabus of BOTANY for Ph.D. Admission Test (PAT)

Unit I: Cytology and Genetics

Cytology

- Ultra Structure of Plant cell, organelles
- Biomolecules: Carbohydrates, fatty acids, nucleic acids, proteins
- Cell cycle

Genetics

- Mendelism, Interaction of genes, Multiple alleles
- Sex determination, Sex linked inheritance, Sex limited and Sex influenced phenotypes
- Haploids, Aneuploids and Euploids
- Gene mutation
- Chromosomal aberrations
- Population genetics
- Quantitative genetics

Unit II: Bacteria and Cyanobacteria

Bacteria

- Archaeobacteria & Eubacteria, Cell structure
- Reproduction, Nitrogen fixation
- Economic importance

Cyanobacteria

- Salient features
- Economic importance

Unit III: Viruses and Fungi

Viruses

- Salient features, Structure & chemical nature, Multiplication, Transmission, Diseases caused by viruses in plants

Fungi

- Salient features and classification
- Reproduction in fungi
- Fungal diseases of Bihar

Unit IV: Biology of Algae, Bryophyta, Pteridophyta, Gymnosperms

Algae

- Salient features and Classification of Algae
- Economic importance of Algae

Bryophyta

- Salient features and classification of Bryophytes
- Economic importance

Pteridophytes

- Salient features and Classification of Pteridophytes
- Heterospory and seed habit, stele, soral evolution in Pteridophytes

Gymnosperms

- Salient features and Classification of Gymnosperms
- Economic importance of Gymnosperm

Fossils

- Types of fossils and process of fossilization

Unit V: Angiosperms: Taxonomy, Anatomy & Embryology

Taxonomy

- Systems of Angiosperm classification

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- Features of ICBN, Rule of priority, Valid publication, Author citation, retention and rejection of names
- Alpha, Beta and Omega taxonomy
- Importance of Botanical gardens & Herbaria

Anatomy

- Tissues, Meristem, Cambium
- Anomalous secondary growth

Embryology

- Reproduction in angiosperms
- Apomixis, Polyembryony

Unit VI: Plant physiology and metabolism

- Principles of thermodynamics
- Water relations
- Photosynthesis
- Respiration
- Growth hormones
- Enzymes
- Nitrogen metabolism
- Signal transduction

Unit VII: Ecology

- Introduction to ecology
- Ecosystem: Structure and function
- Global warming.
- Environmental pollutants of air, water, and soil.
- Environmental issues, Green house gases, global warming & ozone layer depletion
- Biodiversity: A general account and conservation strategies, IUCN, hot spots

Unit VIII: Plant Resource utilization and Economic botany

- Origin, evolution, cultivation and use of-
 - o Food, forage and fodder crops
 - o Fibre crops
 - o Medicinal plants
 - o Vegetables and oil yielding plants
 - o Important fire wood and timber yielding plant. Non-wood products (Gums, dyes, resins, paper pulp, tanners)
- Principles of conservation – *In situ* conservation, International efforts and Indian initiatives, Sanctuaries, National parks, Biosphere reserves, Mangroves
- Conservation of wild biodiversity, *Ex situ* conservation- Principles and practices, Botanical gardens, Gene Banks, *In situ* repository, Cryopreservation

Unit IX: Molecular Biology and Genetic Engineering

Molecular Biology

- Structure and replication of DNA, types of RNA
- Chromosome
- Transcription and Translation
- Genetic code
- Gene structure and function
- DNA – damage and repair

Genetic engineering

- General principles and applications, Restriction endonucleases, Gene library, Cloning vectors
- Electrophoresis for DNA and protein

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- Blotting techniques, Polymerase chain reaction. DNA fingerprinting. DNA sequencing
- Gene transfer in bacteria (E.coli) and higher plants.

Unit X: Plant Tissue Culture and Biostatistics

Plant Tissue Culture

- Introduction- Cell, Tissue, Organ and Protoplast culture
- Nutrient medium, sterilization of explants, problems in tissue culture
- Applications of tissue culture technique

Biostatistics

- Measurement of Central tendency – Mean, mode and median
- Probability, definition, distribution, drawing inference from data
- Types of errors, P-value, ANOVA
- Correlation & regression, common errors in regression, comparing regression correlation

Prof 27/5/19
 University Professor & Head
 University Department of Botany
 B. R. A. Bihar University
 Muzaffarpur

Prof 27/5/19

M. Narain
 27-5-19

Prof
 27-5-19

Pratik
 27.5.19

Prasad
 27-5-19

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