

**Syllabus of Botany for Ph.D. Admission Test (PAT)**

PAPER II

**Unit I: Phycology, Bryophyte, Pteridophytes, Gymnosperms, Fossils.**

- Salient features and classification of Algae ( As per F,E, Fritsch, 1935)
- Reproduction, Life cycle pattern in algae
- Economic importance of Algae –

**Bryophyte**

- Salient features and classification of Bryophytes ( As per N, S, Parihar)
- Reproduction & Life cycle pattern in bryophytes
- Economic importance.
- Conducting tissues in Bryophytes.

**Pteridophytes**

- Salient features and classification of Pteridophytes.
- Heterospory and seed habit, stellar evolution, soral evolution in Pteridophytes.

**Gymnosperms**

- Salient features and classification of Gymnosperms
- Economic importance of Gymnosperm.

**Fossils**

- Types of fossils and process of fossilization

**Unit II: Microbiology Mycology and Plant pathology**

**Bacteria**

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

**Cyanobacteria**

- Salient features
- Economic importance
- Phytoplasm

**Viruses**

**Viruses**

- Salient features, Structure & chemical nature, Multiplication, Transmission.
- Diseases caused by viruses in Plants, Economic importance.

### **Mycology ( Fungi)**

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

### **Plant Pathology**

- Classification of plant disease and appearance of symptoms due to different microbes
- Role of enzyme and toxin in Pathogenesis.
- Mycotoxin

## **Unit III: Angiosperms: Taxonomy, Anatomy & Embryology**

### **Taxonomy**

- Systems of Angiosperm classification with merits and demerits.
- Binomial system and International code of Botanical nomenclature (ICBN).
- Alpha, Beta and Omega taxonomy
- Importance of Botanical gardens & Herbaria
- Experimental taxonomy, cytotaxonomy, Palynitaxonomy.

### **Anatomy**

- Tissues, Meristem, Cambium
- Epidermis special reference to stomata
- Anomalous secondary growth.

### **Embryology.**

- Reproduction in angiosperms.
- Microsporogenesis & male gametophyte.
- Megasporogenesis & female gametophyte (embryo Sac).
- Apomixes, Polyembryony.

## **Unit IV: Plant physiology and Biochemistry**

- Water relations
- Mineral nutrition

- Photosynthesis
- Respiration
- Growth hormones
- Enzymes
- Nitrogen metabolism
- Signal transduction

## **Unit V: Plant Tissue Culture and Biostatistics**

### **Plant Tissue Culture**

- Introduction- Cell, Tissue, Organ and Protoculture.
- Nutrient medium sterilization of explants problems in tissue culture
- Applications of tissue culture technique.
- Role of tissue culture in crop improvement.

### **Biostatistics**

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

## **Unit VI: Ethnobotany and Biodiversity**

### **Ethnobotany**

- Medical and paramedical use of plants in aboriginal of proliferate societies in the world.
- Use of local biodiversity by aboriginal people of sustenance.

### **Biodiversity**

- Biodiversity: A general account and conservation strategies, IUCN hot spots.
- Genetic species and ecosystems diversity
- Patterns of loss of Biodiversity, Red lists Red data Book and Green book.
- Repercussions of loss biodiversity including tissue climate change .
- *In situ* and *ex situ* conservation.

## **Unit VII: Cell Biology and genetics**

### **Cell Biology**

- Ultra structure of Plant cell & organelles.
- Biomolecules: Carbohydrates, fatty acids, nucleic acids, proteins.
- Cell cycle, Cell division

### **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 VIII: Ecology**

- Introduction to ecology
- Ecosystem : Structure and function
- Morphological and anatomical adaptations of plants to water stress conditions
- Global warming
- Environmental pollutants of air, water, and soil.
- Environmental issues, Green house gases, global warming & ozone layer depletion

## **Unit IX: Molecular Biology and Genetic Engineering**

### **Molecular Biology**

- Organization of DNA, Nucleic acids as hereditary material
- Packaging of DNA in Prokaryotes and Eukaryotes
- Structure and replication of DNA, types of RNA
- Transcription and Translation
- Genetic code
- Regulation of gene expression. Prokaryotes and Eukaryotes.
- DNA\_damage and repair



### Unit X: Genetic engineering

- General principles and applications, Restrictions endonucleases, Gene library, cloning vectors
- Electrophoresis for DNA and protein.
- Application of DNA technology
- Bottting techniques, Polymerases chain reaction. DNA fingerprinting
- Methoelology and its applications. DNA sequencing
- Gene transfer in bacteria (E. coil) and higher plants
- Intellectual properties rights, biøethics and patenting

DC  
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