

# RAJASTHAN PRE MEDICAL TEST 2008

## Syllabus

### BOTANY

---

---

#### UNIT I

##### **Classification of Plant Kingdom and Plant Studies**

Branches of Botany. Brief history of classification of Plant Kingdom. Artificial, natural and phylogenetic types of classifications. Binomial nomenclature (guidelines, merits and demerits). **Systems of classification:** Two Kingdoms (brief description with emphasis on criteria and demerits). Five Kingdoms (brief description with emphasis on criteria, merits and demerits). Three Domains classification. Descriptive features of each kingdom (Monera including Archaeobacteria, Cyanobacteria, Protista, Fungi, Lichens, Plantae Viruses, Prions, Viroids).

Salient features of Algae, Fungi, Bryophyta, Pteridophyta, Gymnosperms and Angiosperms. Distribution, general features, systematic position and life history of the following taxa:- **Algae:** *Ulothrix*; **Fungi:** *Albugo*; **Bryophyta:** *Riccia*; **Pteridophyta:** *Pteridium*; **Gymnosperm:** *Cycas*; **Angiosperm:** *Capsella*

#### UNIT II

##### **Plant Morphology**

Morphological structures of root, stem and leaf and their structural and functional modifications. **Inflorescence:** Racemose, Cymose (different sub-types), Special types (Cyathium, Verticillaster, Hypanthodium). Morphological characters of flower. Different types of fruits and seeds. Defense mechanism in plants.

#### UNIT III

##### **Plant Taxonomy**

Classification of angiosperms up to series level (Bentham and Hooker's System), merits and demerits. Taxonomical description of the following families: Brassicaceae, Malvaceae, Leguminosae, Rubiaceae, Asteraceae (Compositae), Liliaceae, Poaceae, Botanical gardens and herbaria.

#### UNIT IV

##### **Plant Anatomy**

**Tissue and tissue systems:** Meristematic tissues (classification based on origin, position and plane of division, Permanent tissues (Simple and complex types). Tissue systems (epidermal, ground and vascular). Anatomy of monocot and dicot root, stem and leaf. Normal and abnormal secondary growth of stem and root.

## UNIT V

### **Embryology of Angiosperms**

Methods of reproduction, Development of male and female gametophytes. Ovule (types and development). Pollination (types and agents). Double fertilization. Incompatibility. Development of embryo, endosperm, seed and fruit. Parthenogenesis, parthenocarpy and apomixis.

## UNIT VI

### **Plant Physiology**

Water relations (imbibition, diffusion, osmosis, plasmolysis, permeability, water potential), absorption and movement – active (osmotic and non-osmotic) and passive. Theories of water absorption . Mechanism and factors affecting transpiration. Mechanism of opening and closing of stomata. Guttation. Macro and micro nutrients (role and deficiency symptoms). Mechanism of minerals absorption. Nitrogen cycle. Biological nitrogen fixation. **Photosynthesis:** Plastids, Photosynthetic pigments, Light reaction, cyclic and non-cyclic photophosphorylation. C3, C4 and CAM pathways, Photorespiration. Factors affecting photosynthesis. **Respiration:** Glycolysis, Krebs' cycle, Electron transport system and oxidative phosphorylation, Pentose Phosphate Pathway, Respiratory quotient, Compensation point, Anaerobic respiration, Fermentation, Factors affecting respiration. Plant growth regulators (phytohormones). Seed dormancy. Senescence, Fruit ripening, Abscission. Plant movements. Photoperiodism and vernalisation.

## UNIT VII

### **Cytology**

Cell theory. Ultra structure of Prokaryotic and eukaryotic cell. Cell wall and cell membrane. Membrane transport. Cellular movements (endocytosis and exocytosis), Discoveries of cell organelles. Ultra structure of cell organelles and their functions. Cell cycle and its regulation, Cytoskeleton. **Cell division:** Amitosis, Mitosis and Meiosis – their significance. Differences between animal and plant cell structure and division. **Organization of nucleus:** Nuclear membrane, Nucleoplasm, Nucleolus, ultra-structure of chromosomes. Karyotype analysis.

## Unit VIII

### **Molecular Biology and Bioinformatics**

Biological, chemical and physical nature of hereditary materials. Characteristics, molecular structure and types of genetic materials (DNA and RNA). Nature and function of extra nuclear DNA. DNA replication. Genetic code. Regulation of Gene expression in prokaryotes. Biosynthesis of Protein. PCR technology. Molecular markers. Applications of molecular techniques (RFLP, RAPD, AFLP, Southern, Northern and Western blotting). **Bioinformatics:** Biological data bases (DNA and Protein), Sequence formats. Applications of Bioinformatics in medical sciences with special reference to drug designing.

## UNIT IX

### **Plant Biotechnology**

Plant tissue culture and applications, Protoplast and somatic hybridization. Cybrid. Virus free plants. Haploid culture. Scope of plant tissue culture in production of secondary metabolites. Methods of gene transfer in plants. Reporter and Marker genes. Genetically Modified Plants (GMPs), their ecological implications and ethical issues. Applications of Microbial biotechnology in medical sciences.

## UNIT X

### **Plants and Human Welfare**

Potential uses of medicinal plants for human welfare (*Curcuma longa*, *Ferula asafoetida*, *Rauwolfia serpentina*, *Cinchona officinalis*, *Papaver somniferum*, *Withania somnifera*, *Commiphora wightii*, *Centella asiatica*, *Momordica charantia*, *Chlorophytum* spp, *Ephedra* spp. Economic importance of Bacteria, Cyanobacteria, Algae, Fungi, and Mycorrhiza. Causal organism, symptoms and control of plant diseases caused by Bacteria, Fungi, Viruses and Mycoplasma with special reference to Rajasthan. Applications of Plant secondary metabolites (Alkaloids, Flavonoids). **Plant breeding:** Objectives, Hybridization, Polyploidy, Mutations, Heterosis, Germplasm conservation.

---

## Sample questions RPMT (Botany)

1. **Consumer decomposer protist with multinucleated condition is-**
  - a. Slime moulds
  - b. Cellular slime moulds
  - c. Acellular slime moulds
  - d. Phyrcium (c)
  
2. **Non fertile stamen characters are found in which family-**
  - a. Papilionatae/*Arachis*
  - b. Malvaceae/*Hibiscus*
  - c. Caesalpinoideae/*Casia*
  - d. Cruciferae/*Iberis* (c)
  
3. **The fruit of Lotus is-**
  - a. Capsule
  - b. Tetra of Berry
  - c. Berry
  - d. Tetra of Achenes (b)
  
4. **Dicot root is-**
  - a. Exarch, Centripetal
  - b. Endarch, Centrifugal
  - c. Exarch, Centrifugal
  - d. Endarch, Centripetal (a)
  
5. **Correct sequence of embryo sac development is-**
  - a. Archegonium – Megasporophyte – Embryo sac
  - b. Archegonium – Megaspore – Embryo sac
  - c. Archegonium – Megaspore mother cell – Embryo sac
  - d. Archegonium - Megaspore mother cell – Megaspore – Embryo sac (d)
  
6. **Mitochondria are found in-**
  - a. Gymnosperms
  - b. Only in aerobic organisms
  - c. Obligate anaerobic organisms
  - d. Obligate anaerobic and aerobic organisms (b)

**7. What is euchromatin-**

- a. Chromatin with low activity and highly stained
  - b. Chromatin with high activity and lightly stained
  - c. Chromatin with high activity and highly stained
  - d. Chromatin with low activity and lightly stained
- (b)

**8. Nucleic enzyme are able to-**

- a. Break all types of bond
  - b. Remove apical nucleotide
  - c. Break phosphodiester bond
  - d. Break disulphide bond
- (d)

**9. Which of the following is not correctly matched-**

- a. Myeloma – Antibody which form tumour cells
  - b. Plasmid – Small segment of extra chromosomal DNA in bacteria
  - c. Interferone – An enzyme which restricted to DNA regulation
  - d. Cosmid – A disease causing agent which carried large DNA segment in host cell
- (c)

**10. Polypeptide-P antidiabetic agent is first discovered from-**

- a. Centella
  - b. Momordica
  - c. Rauwolfia
  - d. Withania
- (b)