

**III B. Sc - SEMESTER- V: BOTANY SYLLABUS**  
**THEORY PAPER – V**

**Paper-V: Cell Biology, Genetics and Plant Breeding**

Total hours of teaching 60 hrs @ 3 hrs per week

**UNIT – I Cell Biology:**

**(12hrs)**

1. Cell, the unit of life- Cell theory, Prokaryotic and eukaryotic cells; Eukaryotic cell components.
2. Ultra structure and functions of cell wall and cell membranes.
3. Chromosomes: morphology, organization of DNA in a chromosome (nucleosome model), Euchromatin and heterochromatin.

**UNIT – II Genetic Material:**

**(12hrs)**

1. DNA as the genetic material: Griffith's and Avery's transformation experiment, Hershey – Chase bacteriophage experiment.
2. DNA structure (Watson & Crick model) and replication of DNA (semi-conservative)
3. Types of RNA (mRNA, tRNA, rRNA), their structure and function.

**UNIT – III Mendelian Inheritance:**

**(12 hrs)**

1. Mendel's laws of Inheritance (Mono- and Di- hybrid crosses); backcross and test cross.
2. Chromosome theory of Inheritance.
3. Linkage: concept, complete and incomplete linkage, coupling and repulsion; linkage maps based on two and three factor crosses.
4. Crossing Over: concept & significance.

**UNIT – IV Plant Breeding:**

**(12 hrs)**

1. Introduction and Objectives of plant breeding.
2. Methods of crop improvement: Procedure, advantages and limitations of Introduction, Selection, and Hybridization (outlines only).

**UNIT – V Breeding, Crop Improvement and Biotechnology:**

**(12 hrs)**

1. Role of mutations in crop improvement.
2. Role of somaclonal variations in crop improvement.
3. Molecular breeding – use of DNA markers in plant breeding and crop improvement (RAPD, RFLP).

### **III B. Sc - BOTANY SYLLABUS SEMESTER- V**

#### **Practical Paper-V: CELL BIOLOGY, GENETICS AND PLANT BREEDING**

Total hours of teaching 30hrs @ 2hrs per week

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#### **Suggested Laboratory Exercises:**

1. Study of the structure of cell organelles through photomicrographs.
2. Study of structure of plant cell through temporary mounts.
3. Study of various stages of mitosis using cytological preparation of Onion root tips.
4. Study of DNA packing by micrographs.

5. Study of effect of temperature & organic solvent on permeability of cell membrane.
6. Numerical problems solving Mendel' Laws of inheritance
7. Chromosome mapping using 3 point test cross data.
8. Hybridization techniques – emasculation, bagging (for demonstration only).
9. Field visit to a plant breeding research station.
10. Calorimetric estimation of DNA by diphenylamine method.

**III B. Sc – SEMESTER- V, BOTANY PRACTICAL MODEL PAPER  
PAPER-V: CELL BIOLOGY, GENETICS AND PLANT BREEDING**

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1. Perform the Experiment A .Perform squash on onion root tip, prepare the slide, identify at least one division stage. Write the procedure and draw the diagram of reported stage.

1 x 15 = 15marks

2. Give the experimental protocol of the experiments **B**

1 x 10 = 10 marks

3. Solving numerical problems on Mendelian inheritance **C,D**

2x 7 1/2 = 15 marks

4. Record & Viva

= 10 marks

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50 marks