

2025

(NEP—2020)

(3rd Semester)

BOTANY (MAJOR)

(**Genetics and Plant Breeding**)

Full Marks : 75

Time : 3 hours

The figures in the margin indicate full marks for the questions

(**SECTION : A—OBJECTIVE**)

(*Marks : 10*)

Tick (✓) the correct answer in the brackets provided : 1×10=10

1. A phenotypic ratio of 9:3:4 obtained in F₂ indicates

- (a) recessive epistasis ()
- (b) dominant epistasis ()
- (c) dominant and recessive interactions ()
- (d) lethal genes ()

2. The mechanism of crossing over occurs during

- (a) leptotene of prophase I ()
- (b) zygotene of prophase I ()
- (c) pachytene of prophase I ()
- (d) prophase of meiosis II ()

3. In genetic maps, the distance between genes is measured in
- (a) centimetre ()
 - (b) centimorgan ()
 - (c) micrometre ()
 - (d) millimetre ()
4. The visual characteristic that identifies the chromosome set of a species is
- (a) ecotype ()
 - (b) phenotype ()
 - (c) genotype ()
 - (d) karyotype ()
5. A monosomic plant obtained from a diploid plant having 14 chromosomes will have
- (a) 12 chromosomes ()
 - (b) 13 chromosomes ()
 - (c) 14 chromosomes ()
 - (d) 15 chromosomes ()
6. A mutation in which a purine is substituted with a pyrimidine is called
- (a) transversion mutation ()
 - (b) transition mutation ()
 - (c) insertion mutation ()
 - (d) deletion mutation ()
7. Which of the following sex chromosomes is common in both male and female?
- (a) X chromosome ()
 - (b) Y chromosome ()
 - (c) Both X and Y chromosomes ()
 - (d) Neither X nor Y chromosome ()
8. In case of XX-XO sex determination, the unpaired X chromosome determines
- (a) intersex ()
 - (b) feminine sex ()
 - (c) masculine sex ()
 - (d) both feminine and masculine sex ()

9. Generally most hybrids are
- (a) similar to their parents ()
 - (b) inferior to their parents ()
 - (c) superior to their parents ()
 - (d) weaker than their parents ()
10. In hybridization, emasculation involves the removal of
- (a) anther of the female parent ()
 - (b) anther of the male parent ()
 - (c) stigma of the female parent ()
 - (d) stigma of the male parent ()

(SECTION : B—SHORT ANSWERS)

(Marks : 25)

Write notes on *five* of the following, taking at least *one* from each Unit : $5 \times 5 = 25$

UNIT—I

1. Plastid inheritance in *Mirabilis jalapa*
2. Lethal genes

UNIT—II

3. Deletion
4. Trisomy

UNIT—III

5. One gene-one enzyme concept
6. XX-XY sex determination

UNIT—IV

7. Pollination in hybridization
8. Hybrid vigour

(SECTION : C—DESCRIPTIVE)

(Marks : 40)

Answer *four* questions, taking at least *one* from each Unit : 10×4=40

UNIT—I

1. Explain Mendel's laws of inheritance. Support your answer with appropriate examples. 10
2. Write notes on the following : 5+5=10
 - (a) Complementary gene interaction
 - (b) Incomplete linkage with an example

UNIT—II

3. What is a mutagen? Give an account of different types of physical mutagens. 2+8=10
4. Write notes on the following : 5+5=10
 - (a) Chromosome structure
 - (b) Polyploidy

UNIT—III

5. Explain the one gene-one polypeptide hypothesis with relevant examples. 10
6. Write notes on the following : 5+5=10
 - (a) X and Y sex chromosomes
 - (b) One gene-one character

UNIT—IV

7. Explain the concept of pureline selection. Mention its advantages and disadvantages. 6+4=10
8. Write notes on the following : 5+5=10
 - (a) Role of plant breeding in crop improvement
 - (b) Mass selection
