2024

(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)

Put a Tick (✓) mark against the correct answer in the brackets provided : 1×10=10

1. The gene which masks the effect of another gene is called
   (a) lethal gene ( ) *(b)* complement gene ( )
   (c) hypostatic gene ( ) *(d)* epistatic gene ( )
2. The strength of linkage between the two genes is determined by
   (a) the distance between them ( )
   (b) the number of chromosomes in a cell ( )
   (c) the position of centromere ( )
   (d) the frequency of crossing-over ( )
3. The gene interaction occurring between the two alleles of a single locus is known as
   (a) inter-genic ( ) *(b)* intra-genic ( )
   (c) complementary ( ) *(d)* epistatic ( )

4. The terminal end of a linear chromosome is known as

(a) chromatid ( ) (b) centromere ( )

(c) telomere ( ) (d) kinetochore ( )

5. The condition in which entire chromosome set exceeds the diploid level is known as

(a) monoploidy ( ) (b) polyploidy ( )

(c) aneuploidy ( ) (d) hypoploidy ( )

6. Frameshift mutation may occur due to

(a) substitution of pyrimidine with purine ( )

(b) substitution of purine with another purine ( )

(c) substitution of pyrimidine with another pyrimidine ( )

(d) addition or deletion of a base ( )

7. The sex chromosome X is

(a) comparatively smaller than Y ( )

(b) comparatively larger than Y ( )

(c) exactly the same size as Y ( )

(d) almost the same size as Y ( )

8. The conjugated protein haemoglobin (Hb) supports the

(a) one gene-one character hypothesis ( )

(b) one gene-one enzyme hypothesis ( )

(c) one gene-one polypeptide hypothesis ( )

(d) All of the above ( )

9. The tendency of F_1 hybrid to show the quality superior to both parents is

(a) inbreeding depression ( ) (b) dominance ( )

(c) hybrid vigour ( ) (d) hybridization ( )

10. The physiological adaptation of plants to climatic changes such as light, soil, temperature or altitude is known as

(a) adaptation ( ) (b) domestication ( )

(c) introduction ( ) (d) acclimatization ( )

(SECTION : B—SHORT ANSWERS)

(*Marks* : 25)

Answer/Write short notes on *five* of the following, taking at least *one* from each Unit : 5×5=25

UNIT—I

1. Explain Mendel's law of dominance.

2. Differentiate between complete and incomplete linkages.

UNIT—II

3. Chromosome structure

4. Aneuploidy

UNIT—III

5. One gene-one character concept

6. Sex chromosome

UNIT—IV

7. Mass selection

8. Significance of plant breeding in evolution

(SECTION : C—DESCRIPTIVE)

(*Marks* : 50)

Answer *four* of the following, taking *one* from each Unit : 10×4=40

UNIT—I

1. Describe in detail the cytological basis of crossing-over and support your answer with a suitable diagram. 10

2. Write notes on the following : 5+5=10
   (a) Non-Mendelian inheritance giving an example
   (b) Linkage and crossing-over

UNIT—II

3. Describe the different types of structural aberrations that can occur in chromosomes. 10

4. Write notes on the following : 5+5=10
   (a) Karyotype
   (b) Physical mutagens

UNIT—III

5. Explain the sex chromosomal mechanism of sex-determination with appropriate examples. 10

6. Write notes on the following : 5+5=10
   (a) One gene-one enzyme concept
   (b) Concept of sex-determination

UNIT—IV

7. Define hybridization. Give a detailed steps on the procedures of hybridization. 2+8=10

8. Write notes on the following : 5+5=10
   (a) Heterosis
   (b) Pureline selection

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