2023

(CBCS)

(5th Semester)

BOTANY

SEVENTH PAPER

(Cytogenetics, Plant Breeding and Bioinformatics)

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. Linker DNA is associated with

(a) H1 proteins ( )

(b) H2 proteins ( )

(c) H3 proteins ( )

(d) H4 proteins ( )

2. A chromosome with the centromere located at the centre resulting in two equal arms is known as

(a) acrocentric chromosome ( )

(b) acentric chromosome ( )

(c) metacentric chromosome ( )

(d) submetacentric chromosome ( )

3. A type of aneuploidy where there is loss of two chromosomes $(2n-1-1)$ from a non-homologous pair is called

(a) double monosomy ( )

(b) nullisomy ( )

(c) monoploidy ( )

(d) trisomy ( )

4. An organism having more than two sets of chromosomes derived from different species is known as an

(a) autopolyploid ( )

(b) allopolyploid ( )

(c) autotriploid ( )

(d) autotetraploid ( )

5. In genetic maps, map distance is measured in

(a) micrometer ( )

(b) millimeter ( )

(c) centimeter ( )

(d) centimorgan ( )

6. The inheritance of kappa particles in *Paramecium* is an example of inheritance through

(a) nuclear genes ( )

(b) plastids ( )

(c) mitochondria ( )

(d) endosymbionts ( )

7. If the base adenine is substituted with thymine, this type of mutation is a

(a) transversion mutation ( )

(b) transition mutation ( )

(c) frameshift mutation ( )

(d) None of the above ( )

8. The tendency of F_1 hybrid to show qualities superior to both parents is

(a) inbreeding depression ( )

(b) dominance ( )

(c) hybrid vigor ( )

(d) hybridization ( )

9. The first protein database was created by

(a) Margaret Dayhoff ( )

(b) Paulien Hogeweg ( )

(c) David Lipman ( )

(d) William Pearson ( )

10. BLASTn is a search tool that compares

(a) DNA query against a protein database ( )

(b) DNA query against a DNA database ( )

(c) protein query against a DNA database ( )

(d) protein query against a protein database ( )

(SECTION : B—SHORT ANSWERS)

(*Marks* : 15)

Write notes on the following : 3×5=15

UNIT—I

1. Duplication

OR

2. Microtubule

UNIT—II

3. Segmental allopolyploidy

OR

4. Monosomics

UNIT—III

5. Multiple allelism

OR

6. Suppressor gene

UNIT—IV

7. Pure-line selection

OR

8. Transition mutation

UNIT—V

9. Gene bank

OR

10. FASTA

(SECTION : C—DESCRIPTIVE)

(*Marks* : 50)

Answer the following questions : 10×5=50

UNIT—I

1. Define chromosome. Write notes on the structure and chemical composition of chromosome. 10

OR

2. Write short notes on the following : 5+5=10

(a) Types of inversion

(b) Translocation

UNIT—II

3. What is aneuploidy? Explain monosomy with suitable examples. 2+8=10

OR

4. Briefly describe the following : 5+5=10

(a) Autopolyploidy

(b) Sources of chromosomal anomalies

UNIT—III

5. Define karyotype. Describe the uses of karyotype in systematics and evolution studies. 10

OR

6. Briefly describe the following : 5+5=10

(a) Kappa particles in *Paramecium*

(b) Self-sterility in plants

UNIT—IV

7. Define hybridization. Describe in detail the steps involved in hybridization. 2+8=10

OR

8. Write short notes on the following : 5+5=10

(a) Any two physical mutagens

(b) Frameshift mutation

UNIT—V

9. What is a biological database? Give an account on the biological databases available for DNA data. 2+8=10

OR

10. Write short notes on the following : 5+5=10

(a) BLAST

(b) Significance of bioinformatics

★ ★ ★