

**2 0 2 3**

( 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

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