2024

(FYUGP)

(4th Semester)

BOTANY

(Minor)

Paper Code : BCC/M4

(Genetics)

Full Marks : 75 *Pass Marks* : 40%

Time : 3 hours

(PART : B—DESCRIPTIVE)

(*Marks* : 50)

The figures in the margin indicate full marks for the questions

1. What is pedigree analysis and why is it important in genetics? Explain with appropriate examples. 10

OR

2. Briefly explain Mendel's law of inheritance. 10

3. Discuss in detail the mitochondrial inheritance in yeast. 10

OR

4. Write on the following : 5+5=10
   (a) Inheritance of kappa particles in Paramecium
   (b) Chromosomal inheritance vs. Extra-chromosomal inheritance

5. Explain complete and incomplete linkages with suitable examples. 10

OR

6. Describe the mechanism of crossing-over. What are two-factor and three-factor crosses? 10

7. Comment on the following : 5+5=10
   (a) Role of transposons in mutation
   (b) DNA repair mechanisms

OR

8. Molecular basis of mutations. Explain. 10

9. Write notes on allele frequencies and genotype frequencies with example of each. 10

OR

10. What are the factors that influence the Hardy-Weinberg equilibrium? 10

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(PART : A—OBJECTIVE)

(*Marks* : 25)

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SECTION—I

(*Marks* : 15)

Put a Tick (✓) mark against the correct answer in the brackets provided : 1×15=15

1. The crossing of F_1 to any one of the parents is called

(a) backcross ( )

(b) testcross ( )

(c) F_1 cross ( )

(d) All of the above ( )

2. A specific form of a characteristic that can be inherited is referred to as

(a) gene ( )

(b) chromosome ( )

(c) hybrid ( )

(d) trait ( )

3. If fur color in mice is caused by 'B = black' and 'b = brown', then the genotype for the organism which will have brown fur is (assume black is dominant)

(a) BB ( )

(b) Bb ( )

(c) bb ( )

(d) Either *(a)* or *(b)* ( )

4. Chromatid is

(a) one-half of chromosome ( )

(b) haploid chromosome ( )

(c) complete chromosome ( )

(d) duplicate chromosome ( )

5. Chromosomes other than sex chromosomes are called

(a) autosomes ( )

(b) heterosomes ( )

(c) karyosomes ( )

(d) None of the above ( )

6. Mitochondrial diseases are received from

(a) mother ( )

(b) father ( )

(c) in-laws ( )

(d) environment ( )

7. Accurate mapping of genes can be done using

(a) two-point mapping ( )

(b) three-point mapping ( )

(c) single-gene mapping ( )

(d) None of the above ( )

8. Linkage results in

(a) formation of more dominant phenotype ( )

(b) formation of more wild phenotype ( )

(c) formation of more parental phenotype ( )

(d) None of the above ( )

9. A pair of genes are linked if their recombination frequency in testcross is

(a) 75% ( )

(b) 50% ( )

(c) 100% ( )

(d) lower than 50% ( )

10. Most of the genetic disorders are caused due to

(a) mutation ( )

(b) the gender of an individual ( )

(c) the gross chromosomal abnormalities ( )

(d) All of the above ( )

11. The chromosomal aberrations follows

(a) chromosomal breakage ( )

(b) meiosis ( )

(c) mitosis ( )

(d) necrosis ( )

12. *Cis-trans* complementation testing is used to determine

(a) if two mutations are allelic in nature ( )

(b) if two genes interact with one another ( )

(c) the number of genes influencing the phenotype ( )

(d) to understand dominance/recessive relations with alleles ( )

13. All of the following are the assumptions of Hardy-Weinberg theorem, except

(a) large population ( )

(b) no migration ( )

(c) no mutation ( )

(d) non-random sexual reproduction ( )

14. The chance fluctuation in allelic frequency from one generation to the next, including loss of alleles is

(a) genetic drift ( )

(b) gene flow ( )

(c) inbreeding ( )

(d) polymorphism ( )

15. The idea that evolutionary change is occurring was first proposed by

(a) Ernst Mayr ( )

(b) Louis Buffon ( )

(c) Charles Darwin ( )

(d) Ernst Haeckel ( )

SECTION—II

(*Marks* : 10)

Answer/Write short notes on any *five* of the following : 2×5=10

1. What are penetrance and expressivity?

2. Explain 'polygenic inheritance' with suitable example.

3. How do you prove that transmission of kappa particles occurs in cytoplasmic exchange?

4. Name two organisms where *(a)* chloroplast mutation and *(b)* mitochondrial mutation are found.

5. Difference between crossing-over and linkage

6. Write the significance of crossing-over.

7. Types of mutagens

8. What is chromosomal aberration/abnormality?

9. State Hardy-Weinberg law. Give one example.

10. Define speciation. Give one example.

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