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Reg. No. : .....

Name : .....

Second Semester M.Sc. Degree Examination, September 2024

Botany

BO 223 : CELL BIOLOGY, GENETICS AND EVOLUTION

(2019 Admission Onwards)

Time : 3 Hours Max. Marks : 75

Instruction : Draw diagrams and illustrate with examples wherever necessary.

I. Answer the following questions.

1. What is Lamarckism?
2. Define a muton.
3. What is the Ames test used for?
4. Define 'genetic load.'
5. Name the two common population events responsible for genetic drift.
6. What is apoptosis?
7. What is the function of cadherin protein?
8. Explain the role of laminins.
9. What are the functions of miRNA?
10. What causes Blooms syndrome?

(10 × 1 = 10 Marks)

P.T.O.

II. Answer the following questions in not more than **50** words.

11. (a) What is the difference between macroevolution and microevolution?

OR

(b) Explain the role of CDKs in cell division.

12. (a) Describe Goitrous cretinism.

OR

(b) What made one-gene-one-enzyme hypothesis wrong?

13. (a) What are retrotransposons? Give examples.

OR

(b) Briefly describe house-keeping genes.

14. (a) Explain the significance of karyotyping to study human genetics.

OR

(b) What is signal hypothesis? What are the common characters of signal sequences?

15. (a) 'Linked genes violate the law of independent assortment'. Substantiate the statement.

OR

(b) Differentiate between gene frequency and genotype frequency.

(5 × 2 = 10 Marks)

III. Answer the following questions in not more than **150** words.

16. (a) Neo-Darwinism is generally used to describe any integration of Charles Darwin's theory of evolution by natural selection with Gregor Mendel's theory of genetics. Substantiate.

OR

(b) Describe the structure and organization of the telomere.

17. (a) Explain the structure and organization of the chloroplast genome.

OR

(b) Write a brief account on numerical chromosomal aberrations.

18. (a) Explain molecular mechanism of programmed cell death.

OR

(b) Explain the salient features of the genetic code.

19. (a) Describe the structure, formation and functions of 5' cap and 3' tail of eukaryotic mRNA.

OR

(b) Explain the symptoms and genetic cause of inborn errors of metabolism, phenylketonuria and alkaptonuria.

20. (a) Describe parental imprinting, giving suitable examples and explain the mechanism involved.

OR

(b) Give examples for the exceptions in the standard genetic code, discovered in recent times.

21. (a) Compare the structure and composition of eukaryotic and prokaryotic RNA polymerases.

OR

(b) Explain the etiology of any two human diseases developed due to defects of DNA repair system.

22. (a) What is pseudoallelism? Give the characteristic features of and an example for pseudoallelism.

OR

(b) Describe the chemical structure and organization of plasma membrane.

(7 × 5 = 35 Marks)

IV. Answer the following in not more than **250** words.

23. (a) Most sexually reproducing organisms have two sexes, *male and female*, determined by a diversity of mechanisms. Explain.

OR

(b) Compare and contrast between prokaryotic and eukaryotic DNA replication process.

24. (a) What is cytoskeleton? Describe the composition, structure and functions of cytoskeleton.

OR

(b) What is Hardy-Weinberg equilibrium? Under what conditions does Hardy-Weinberg equilibrium exist and break?

(2 × 10 = 20 Marks)