

POST-GRADUATE DEGREE PROGRAMME

Term End Examination — December, 2024

ZOOLOGY

Paper-3B : GENETICS AND MOLECULAR BIOLOGY

Time : 2 hours]

[Full Marks : 50

Weightage of Marks : 80%

Special credit will be given for accuracy and relevance in the answer. Marks will be deducted for incorrect spelling, untidy work and illegible handwriting. The weightage for each question has been indicated in the margin.

1. Answer *two* questions : 9 × 2 = 18
 - a) Describe the solenoid model of chromosome with proper diagram. Explain the importance of such packaging in chromosome. (5 + 2) + 2
 - b) What is bacterial transduction. Briefly describe the Lederberg-Zinder experiment and the findings of this experiment.
 - c) Describe the process of prokaryotic replication with suitable diagram. Mention about the continuous and discontinuous DNA replication and role of different enzymes in this process. 5 + 4
 - d) State the process of initiation of transcription in eukaryotes. Discuss the role of RNA polymerase II and associated factors in this process. 4½ + 4½
2. Answer *three* questions : 6 × 3 = 18
 - a) State briefly the structure and function of spliceosome. Mention the importance of alternative splicing. 4 + 2
 - b) Explain the differences between heterochromatin and euchromatin. State the structural and functional importance of chromosome puff. 3 + 3
 - c) Classify the banding patterns which are used for human karyotyping. State the causes and features of Turner's syndrome. 2 + 4
 - d) Write short notes on —
 - (i) restriction mapping and
 - (ii) DNA foot printing. 3 + 3

- e) Briefly state the experiments which proved that DNA replication is semi-conservative.
- f) Explain the functions of promoter, enhancer and silencer sequences in the process of gene expression regulation.
3. Answer *two* questions : 4 × 2 = 8
- a) Write a short note on human genome project and its outcome.
- b) State how *mRNA* and *tRNA* interact for amino acid synthesis. Use suitable diagram to show it. 2½ + 1½
- c) State different types of DNA damage repair mechanism in brief.
- d) What is *c-DNA* library and how is it formed ? Why is it important in gene cloning ? 3 + 1
4. Answer *two* questions : 3 × 2 = 6
- a) Mention the post-transcriptional modification of *rRNA* in prokaryotes and eukaryotes.
- b) State the properties of genetic code.
- c) State the molecular basis of DNA damage check-points with special mention to the p53, p21 and mdm2 functions.
- d) State the functions of TDY, SOX9 and SRY in sex determination of human.
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