

QP Code: 23/PT/14/IIIB

POST-GRADUATE COURSE

Term End Examination — June, 2023/December, 2023

ZOOLOGY

Paper-3B : GENETICS AND MOLECULAR BIOLOGY

Time : 2 hours]

[Full Marks : 50

Weightage of Marks : 80%

Special credit will be given for precise and correct answer. Marks will be deducted for spelling mistakes, untidiness and illegible handwriting. The figures in the margin indicate full marks.

1. Answer *two* questions : 9 × 2 = 18
- a) State the events of alternate splicing that lead to sex determination in *Drosophila*. Explain the role of XOL-1 gene in *C. elegans* sex determination. 5 + 4
- b) i) What is centromeric sequence ? Explain its functional importance in chromosomal segregation. 3
- ii) State how the telomeric length is maintained in eukaryotic systems. 3
- iii) Briefly state the function of *Dnmt-1* in genetic imprinting. 3
- c) State the mechanism of transduction in bacteria. Mention the role of plasmids in bacterial reproduction. Briefly discuss the genetic regulation of cell cycle in *S. cerevisiae*. 3 + 2 + 4
- d) i) Mention the types of eukaryotic RNA polymerase and their functions. 3
- ii) State the mechanisms of transcription termination in prokaryotes. 3
- iii) State the role of nuclear pore complex in mRNA transport. 3
- e) i) State the properties of genetic code. 3
- ii) What is RFLP ? Describe the process and its significance. 1 + 5

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2. Answer *three* questions : 6 × 3 = 18
- a) Discuss the process of initiation of translation in prokaryotes with suitable diagram.
- b) Briefly describe the replisome and its function. Explain why topoisomerase is important in replication. 4 + 2
- c) Mention the cell cycle check points. Discuss about the molecular control of DNA damage check point. 2 + 4
- d) Write short notes on : (i) Satellite DNA and (ii) FISH. 3 + 3
- e) What is interrupted mating technique in bacteria ? Explain its significance and relation with bacterial genetic mapping. 2 + 4
- f) Write short notes on : (i) Chronic myelogenous leukemia and (ii) G-banding of human chromosome. 3 + 3
3. Answer *two* questions : 4 × 2 = 8
- a) Discuss about recombinant proteins and their function in DNA repair.
- b) What is chromosomal puff ? Explain its function in relation to gene expression. 1 + 3
- c) Explain the effect of (i) Loss of function of *fox-l* in XX and (ii) Gain of function of *sdc* in XX. 2 + 2
- d) Describe the steps of transcription initiation by RNA polymerase II in eukaryotes.
4. Answer *two* questions : 3 × 2 = 6
- a) What is poly A tail in mRNA ? Mention its significance in cellular environment. 1 + 2
- b) Differentiate between ribosome and ribozyme. State their functional importance. 1½ + 1½
- c) Write briefly on Trisomy 18.
- d) What is c_0t curve ? Why is it important in PCR technique ? 1 + 2
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