

2022

ZOOLOGY — HONOURS

Paper : CC – 2

(Molecular Biology)

Full Marks : 50

*The figures in the margin indicate full marks.*

*Candidates are required to give their answers in their own words as far as practicable.*

Answer *question nos. 1 and 2* and *any three* questions from the rest.

1. Answer *any five* questions : 2×5
- (a) What is Klenow fragment?
  - (b) What is Shine-Dalgarno sequence?
  - (c) Why is RNA splicing necessary in eukaryotes?
  - (d) Comment on the role of Sigma factor in transcription initiation.
  - (e) Distinguish between primosome and replisome.
  - (f) State any two functions of poly(A) tail.
  - (g) What is split gene?
  - (h) What is the effect of  $\text{LacI}^{-d}$  mutation?
2. Write short notes on (*any two*) : 5×2
- (a) SOS repair
  - (b) Enhancer and Silencer
  - (c) Western Blotting
  - (d) End replication problem
  - (e) Methyl capping.
3. (a) Which of the following merozygotes will produce  $\beta$ -galactosidase and  $\beta$ -galactoside permease if lactose is absent? Justify your answer with proper illustration.
- (i)  $I^+ O^+ Z^+ Y^- // I^- O^+ Z^+ Y^-$
  - (ii)  $I^+ O^c Z^+ Y^- // I^+ O^+ Z^- Y^+$
  - (iii)  $I^S O^+ Z^- Y^- // I^- O^c Z^+ Y^+$
- (b) With proper illustrations enumerate the role of leader sequence in regulating trp operon. (2+2+2)+4

Please Turn Over

4. (a) Write two distinguishing features of Z DNA and B DNA.  
(b) State Chargaff's rule.  
(c) What is RT-PCR? Narrate the phases of PCR cycle with suitable illustrations. 3+2+(1+4)
5. (a) With labelled diagram elucidate how aminoacylation (charging) of tRNA is achieved.  
(b) "Histone acetylation plays a critical role in epigenetic regulation of a gene." — Explain.  
(c) Transcription–Translation coupling is possible only in Prokaryotes but not in Eukaryotes. – Why? Explain. (2+3)+3+2
6. (a) Describe the rho-independent transcription termination.  
(b) Briefly illustrate the translocation process in translation of prokaryotes. 5+5
7. (a) What is nucleic acid probe? State its importance.  
(b) With the help of an example explain RNA editing.  
(c) Briefly state the miRNA mediated gene silencing mechanism with suitable illustrations. 2½+2½+5
8. (a) What is Wobble Hypothesis?  
(b) What are CpG islands? Why are they significant?  
(c) With an example explain what do you mean by alternative splicing.  
(d) Distinguish between open promotor and closed promotor complex. 2½+2½+2½+2½
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