2019

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 other three*** questions from the rests.

1. Answer ***any five*** from the following : 2×5

(a) What is beta-clamp?

(b) What is Guide RNA? State its importance.

(c) If two double-stranded DNA molecules have 28% and 64% G-C content respectively, which one will have a higher T_m value and why?

(d) State the utility of nitrocellulose membrane in any blot technique.

(e) Mention the specific roles of IF1 and IF3 in prokaryotic transcription.

(f) What is the fundamental difference between DNA polymerase and Taq DNA polymerase?

(g) What is Gratuitous Inducer? Give an example.

(h) What are CpG islands? Why are they significant?

2. Write short notes on (***any two***) : 5×2

(a) Epigenetic regulation

(b) Poly A tailing of Pre-mRNA

(c) Attenuation in Trp operon

(d) Goldberg-Hogness Box

(e) Replisome and its components

(f) Degeneracy of Genetic code.

3. (a) Briefly describe the rolling circle model of DNA replication.

(b) Describe the spliceosome mediated RNA splicing mechanism of pre-mRNA with proper diagram.

(c) State the roles of helicase and SSB protein in prokaryotic DNA replication. 3+3+(2+2)

4. (a) Briefly state the RecBCD system in *E. coli*.
   (b) What is split gene?
   (c) State the role of photolyase in DNA repairing mechanism.
   (d) Mention the role of miRNA in gene silencing. 4+2+2+2

5. (a) Comment on the role of IF1, IF2 and IF3 in bacterial translation.
   (b) What is DNMT? Mention its role in DNA methylation.
   (c) Compare A, B and Z-DNA. 4+(1+2)+3

6. (a) Comment on Okazaki fragments and its importance in replication process.
   (b) Describe EF-T_U and EF-T_S cycle in prokaryotic translation process.
   (c) What are Amber, Ochre and Opal? 3+4+3

7. (a) Comment on the roles of RecA and LexA in DNA repair.
   (b) 'Lac repressor is an allosteric protein.'– Justify.
   (c) Why the O^c mutation in *E. coli* Lac operon is epistatic to the I^S mutation? (2+2)+3+3

8. (a) Write the principle of southern blotting and its uses.
   (b) Enumerate the roles of Silencer and Repressor in eukaryotic transcription regulation.
   (c) Which of the following merozygotes will produce β-galactosidase and β-galactoside permease if lactose is absent? Justify your answer with proper illustration :
      (i) $i^+O^+Z^+Y^-$ / $i^-O^+Z^+Y^-$
      (ii) $i^+O^cZ^-Y^+$ / $i^+O^+Z^-Y^+$ 3+(1½+1½)+4