

This question paper contains 4 printed pages.

Your Roll No.

Sl. No. of Ques. Paper: 128

I

Unique Paper Code : 32231501

Name of Paper : Molecular Biology

Name of Course : B.Sc. (Hons.) Zoology

Semester : V

Duration : 3 hours

Maximum Marks : 75

***(Write your Roll No. on the top immediately
on receipt of this question paper.)***

***Attempt five questions in all, including Q. No. 1 which
is compulsory. Illustrate answers with appropriate
well-labelled diagrams wherever necessary.***

1. (a) Define the following terms (any five):

(i) Nonsense codons

(ii) Polymerase switching

(iii) Enhancers

(iv) Replicator

(v) Base flipping

(vi) Helix pitch

(vii) Exon shuffling.

5

(b) Differentiate between the following (any five):

(i) Nucleotide and Nucleoside

P. T. O.

- (ii) B-DNA and Z-DNA
- (iii) Deamination and Depurination
- (iv) DNA pol α and DNA pol ϵ
- (v) *mi*RNA and *si*RNA
- (vi) Promoter and Operator
- (vii) A-site and P-site. 10
- (c) State the best known contribution of the following scientists:
 - (i) Theodor Svedberg
 - (ii) Robert William Holley
 - (iii) Andrew Z. Fire and Craig C. Mello
 - (iv) Roger Kornberg
 - (v) Phillip A. Sharp. 5
- (d) Give the functions of the following enzymes:
 - (i) Peptidyl transferase
 - (ii) Topoisomerase
 - (iii) Methyl transferase
 - (iv) Primase. 4
- (e) (i) Write the RNA transcript sequence of the following DNA template:
 5'-AGCTGCGCGTAGCTATGGCCCAAGG-3'
- (ii) If 39% of the nucleotides in a DNA fragment are thymidine, calculate the percentage of rest of the three nucleotides in the fragment. $1.5 \times 2 = 3$

- 2. (a) Briefly describe the process of aminoacyl-*t*RNA formation. 5
- (b) With the help of diagram explain the spliceosome-mediated splicing mechanism. 7
- 3. (a) What is Chargaff's rule of nucleotide base-pairing? What features make DNA a highly stable molecule? 4
- (b) Discuss the mechanism of DNA-replication in eukaryotes explaining the role of various enzymes involved. 8
- 4. (a) Give a suitable example of negatively regulated operon in prokaryotes. 6
- (b) Briefly describe the role of various transcription elongation factors in eukaryotes. 6
- 5. (a) Explain the steps involved in 5' mG capping and polyadenylation of an RNA transcript in eukaryotes. 6
- (b) Describe different mechanisms of transcription termination in prokaryotes. 6
- 6. (a) What is wobble hypothesis? List the salient features of the genetic code. 6
- (b) Explain the mechanism of mismatch repair of DNA so as to maintain the cell functionality. 6

7. Write short notes on any *three* of the following:

- (a) RNA polymerases in Eukaryotes
- (b) Attenuation
- (c) Release factors in translation
- (d) Riboswitches
- (e) Alternative splicing.

3×4=12