Roll No. ☐☐☐☐☐☐☐☐☐☐☐

S. No. of Question Paper : 6645

Unique Paper Code : 32531327   HC

Name of the Paper : **Molecular Biology**

Name of the Course : **B.Sc. (Hons.) Microbiology**

Semester : **III**

Duration : **3 Hours**   Maximum Marks : **75**

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

Question No. 1 is compulsory.

Attempt *five* questions in all.

All questions carry equal marks.

1. (a) Define the following (any *five*) :   5×1=5

     (*i*)   Tm

     (*ii*)   Okazaki fragment

(iii) snRNPs

(iv) Split genes

(v) Polysome

(vi) MAT locus.

(b) What will be the sequence of RNA molecule transcribed from the following DNA template :   2

   5'-ATGCTCGATAGA-3'

(c) Draw the chemical structure of 5' to 3' phosphate sugar back bone of a 5' ACG 3' DNA polynucleotide chain.   5

(d) 20% of the nucleotides in a 200 base pair long DNA molecule are thymines. Find out the percentage of other nucleotides.   3

2. (a) Differentiate between the following (any three) :   3×4=12

(i) B- & Z-DNA

(ii) DNA polymerase I and DNA polymerase III

(iii) Prokaryotic promoter and eukaryotic promoter

(iv) Group-I and Group-II Introns.

(b) Name the enzyme involved in DNA methylation and write the significance of DNA methylation in chromatin structure.   3

3. Write short notes on the following (any three) :   3×5=15

(i) Polyadenylation

(ii) Alternative splicing

(iii) Regulation of sporulation in Bacillus

(iv) Termination of translation in prokaryotes.

4. Write in brief the function of the following (any fifteen) :   15×1=15

(i) DNA Gyrase

(ii) DNA Polymerase α

P.T.O.

(iii) Mut S

(iv) Uracil DNA Glycosylase

(v) Dicer

(vi) TBP

(vii) Kozak sequence

(viii) IF-1

(ix) EF-Tu

(x) Chloramphenicol

(xi) AUG

(xii) ARS

(xiii) β-galactosidase

(xiv) 5' TATAAT 3'

(xv) 5' TTAGGG 3'

(xvi) β clamp

(xvii) 5' splice site.

5. (a) A covalently closed circular DNA of 10,500 base pairs, has 10 negative supercoils. Calculate the Linking Number (Lk).   4

(b) Diagrammatically explain the regulation of Lac operon. 6

(c) Explain the mechanism of DNA replication in Mitochondria.   5

6. (a) How are tRNAs charged with specific amino acids ? Write the steps involved in tRNA charging.   4

(b) Explain the mechanism of repair of a newly synthesized DNA strand carrying mis-incorporated nucleotides.   6

(c) Write about initiation of translation in prokaryotes.   5