This question paper contains 4+1 printed pages]

Your Roll No. .....

5865

B.Sc. (Hons.) Botany/Zoology/Microbiology/

Anthropology/Biochemistry—(III Sem.) **B**

Paper MBHT 301—Molecular Biology-I

Time : 3 *Hours* *Maximum Marks* : 75

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

Answer *five* questions in all, including

Question No. 1, which is compulsory.

1. (*a*) Fill in the blanks (Attempt any *five*) :

(*i*) Linking number is the sum of..... and..... .

(*ii*) A gene sequence of 1500 base pairs codes for a polypeptide chain of.....number of amino acids.

(*iii*) Okazaki fragments are joined by the enzyme ..... .

P.T.O.

(*iv*) Separation of two strands of DNA by heat is known as ..... .

(*v*) DNA synthesis occurs during.....phase of cell cycle.

(*vi*) .....cells contain single copy of each chromosome. 5

(*b*) Match the items of Column A with that of Column B : 5

Column A	Column B
(*i*) Poly A tail	(*a*) Single Stranded DNA
(*ii*) ϕ *x*174	(*b*) Nucleosome
(*iii*) TMV	(*c*) Transfer RNA
(*iv*) H1 histone	(*d*) Messenger RNA
(*v*) Clover Leaf model	(*e*) Single stranded RNA
	(*f*) Double stranded RNA

(*c*) Briefly answer the following questions (Attempt any *five*) : 5

(*i*) If a template DNA has a sequence AATTGCA, what would be the sequence of its *m*RNA ?

(*ii*) Why does DNA replication occur only in 5' → 3' direction ?

(*iii*) How does depurination bring about replication error ?

(*iv*) What are nonsense codons ?

(*v*) Name the bond that links nitrogenous base to sugar in a nucleotide.

(*vi*) What is transition ?

2. (*a*) Describe the experiment carried out by Messelson and Stahl and explain its significance. 9

(*b*) How does telomerase help in replicating the ends of DNA molecule ? 6

P.T.O.

3. (*a*) Differentiate between any *three* of the following :

(*i*) Topoisomerase Type I and Topoisomerase Type II.

(*ii*) B-DNA and Z-DNA.

(*iii*) DNA polymerase I and DNA polymerase III.

(*iv*) Euchromatin and Heterochromatin. 9

(*b*) *E.coli* DNA has 30% Guanine, what would be the percentage of Adenine, Thymine and Cytosine ? 3

(*c*) Given are two DNA sequences. State which one will have higher T_m value and why :

I	II
GGCCTTGC	AAGTTCTG
CCGGAACG	TTCAAGAC

3

4. (*a*) What is gene density ? Why is it low in eukaryotes as compared to that in prokaryotes ? 7

(*b*) Explain any *two* experiments that helped in deciphering the genetic code. 8

5. (*a*) Explain with suitable diagrams the different levels of DNA packaging in metaphase chromosome. 9

(*b*) Illustrate with the help of diagrams only, any *two* models of replication of circular DNA (No description required). 6

6. (*a*) Briefly describe the salient features of Watson and Crick model of DNA. 9

(*b*) Describe the secondary and tertiary structure of *t*RNA. 6

7. (*a*) Discuss Griffith's transformation experiment and give its implications. 9

(*b*) Describe any *two* repair mechanisms for excision of thymine dimers. 6