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Roll No. | | | | | | | | | | | |

S. No. of Question Paper : **1053**

Unique Paper Code : **6792013501**

Name of the Paper : **Molecular Biology I**

Name of the Course : **B.Sc. (Biological Sciences)**

Semester : **V**

Duration : **2 Hours** Maximum Marks : **60**

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

Attempt any *four* questions. *All* questions carry equal marks. Q. No. **1** is compulsory.

1. (*a*) Mention the given statements are True or False :

(*i*) Replication in *E. coli* takes place bidirectionally.

(*ii*) Template in replication is in the direction of 5' to 3'.

(*iii*) Free 3' end of the primer is called the primer terminus.

(*iv*) Tautomeric forms are required for the correct hydrogen bonding between the base pairs in DNA.

(*v*) Cells maintain DNA in an underwound state to fecilitate its compaction by coiling.

(*vi*) Underwinding leads to the positive supercoiling.

P.T.O.

(*vii*) Solenoidal supercoiling involves tight left-handed turns.

(*viii*) In interphase of cell cycle, the chromosomal material, chromatin, is condensed and segregated.

(*ix*) Beads-on-a-string arrangements are complexes of histones and DNA.

(*x*) Histone H3 binds to the linker DNA.

(*b*) Define the following (any *two*) :

(*i*) Intercalating agents

(*ii*) Base excision repair

(*iii*) Nucleotide excision repair. 10,5

2. (*a*) Differentiate the following :

(*i*) A-DNA and Z-DNA

(*ii*) DNA polymerase I and DNA polymerase III

(*iii*) Origin of replication in prokaryotes and eukaryotes.

(*b*) Define linking number and find out the linking number of a closed circular DNA molecule of 4200 bp. Suppose four turns are removed from it, what will be the ΔLk and Specific linking difference ? 9,6

3. (*a*) Explain the double-strand break repair model of homologous recombination.

(*b*) Write a note on the enzymes and proteins required for homologous recombination and their roles.

(*c*) How site-specific recombination is different from Homologous recombination ? 7,6,2

4. (*a*) Explain Ames test and its significance.

(*b*) Write a note on types of mutations.

(*c*) Explain DNA damage caused by hydrolysis, alkylation, oxidation and radiation. 5,4,6

5. (*a*) Explain the elongation phase of the replication in *E. coli*.

(*b*) Explain the experimentation to prove that DNA replication is semi-conservative in nature.

(*c*) Explain an experiment to prove that DNA is a genetic material. 7,4,4

6. (*a*) Write the difference between simple transposon and complex transposon.

(*b*) Write a note on Direct transposition and Replicative transposition.

(*c*) Write the role of any *three* inhibitors : Ciprofloxacin, 5-FU, Mitomycin C, Quinolones. 2,7,6