This question paper contains 4 printed pages]

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

S. No. of Question Paper : **5715**

Unique Paper Code : **2532013501**

Name of the Course : **Microbiology**

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

Semester : **V, (Part-III)**

Duration : **3 Hours** Maximum Marks : **90**

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

Attempt any *five* questions.

All questions carry equal marks.

Attempt *all* the parts of a question together.

1. Define the following (any *nine*) : 9×2=18

   (*i*) Processivity

   (*ii*) Replisome

   (*iii*) Ribozyme

   (*iv*) Transcription unit

P.T.O.

(*v*) Operon

(*vi*) Concatenation

(*vii*) Pribnow box

(*viii*) Hyperchromicity

(*ix*) Writhe of DNA

(*x*) Linker DNA.

2. (*a*) Differentiate between the following (any *three*) : 3×5=15

(*i*) Topoisomerase I and II

(*ii*) Prokaryotic and eukaryotic *m*RNA

(*iii*) B-DNA and Z-DNA

(*iv*) RNA polymerase of prokaryotes and eukaryotes.

(*b*) Write the functions of the following (any *three*) : 1×3=3

(*i*) DNA Ligase

(*ii*) Primase

(*iii*) Helicase

(*iv*) Sliding clamp.

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

(*i*) Organization of eukaryotic DNA

(*ii*) General transcription factors in eukaryotes

(*iii*) Structure and function of *t*RNA

(*iv*) Termination of transcription in prokaryotes.

(*b*) What are the mechanisms of regulating DNA replication in prokaryotes? 3

4. (*a*) Why is the fidelity of DNA replication important, and how is it maintained? 6

(*b*) Write the significance of cot curves. Discuss the method of cot curve analysis of DNA. 6

(*c*) Briefly explain the importance of enhancers and silencers in gene regulation. 6

5. (*a*) Describe the events that occur at the origin of replication during the initiation of DNA replication in *Saccharomyces cerevisiae* cells. 6

(*b*) What is the linking number ? Calculate the linking number of a covalently closed circular DNA with 5880 base pairs having 10 negative supercoils. 4

(*c*) What do you understand by the promoter strength ? What are the factors that determine promoter strength ? 4

(*d*) Write the mode of action of any *one* inhibitor each of prokaryotic and eukaryotic transcription. 4

6. (*a*) Discuss any *two* modes of replication of circular DNA. 6

(*b*) Describe the contribution of the following scientists (any *three*) : 6

(*i*) Tsuneko Okazaki

(*ii*) Arthur Kornberg

(*iii*) John Cairns

(*iv*) Thomas Cech.

(*c*) What is telomerase ? Write its significance and diagrammatically explain its mechanism of action. 6