JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT
TEST -2 EXAMINATION- 2023
M.Sc.-I Semester (Microbiology)

COURSE CODE (CREDITS):21MS1MB112 (3) MAX. MARKS: 25
COURSE NAME: Molecular Biology
COURSE INSTRUCTORS: Dr. Anil Kant MAX. TIME: 1 Hour 30 Minutes

Note: (a)All questions are compulsory.
(b)Marks are indicated against each question in square brackets.
(c) The candidate is allowed to make Suitable numeric assumptions wherever required for solving problems

Q. 1

A. Write name of enzyme / protein performing below given functions or key function in *E. coli* replication and transcription. Also mention their enzymatic activity or key features responsible for function.

i) Synthesis of RNA primers ii) Removal of RNA primers iii) γ Complex of DNA pol III iv) ε subunit of DNA pol III v) α subunit of RNA polymerase vi) β and β' subunit of RNA polymerase [6]

B. RNA polymerases do not have proofreading activity. Why mistakes in RNA synthesis of less consequence to the cells? Give two pointed reasons. [1]

Q.2

A. Delucia and John Cairns found that in *E. coli* strain which produces defective DNA pol I, replication of DNA was not affected. But this mutant was extremely sensitive to the ultraviolet light that damaged DNA. Assign reason for both observations. [5x2 = 10]

B. Why does DNA replication occur discontinuously on one strand? Briefly Explain the experiment which proved it.

C. Briefly explain following terms: i) Sense strand and antisense strand, ii) upstream and downstream sequences and their numbering, iii) Primary transcript and mRNA

D. What are the main features and observed consensus sequences in prokaryotic promoters?

E. Write about nature and function of Eukaryotic DNA polymerases α, ε, γ, δ.

Q.3

A. Explain initiation step of DNA replication in *E. coli*? Include main events, enzymes and proteins involved in their catalytic activities. [2x4 = 8]

B. Gene expression during sporulation is controlled by different σ factors. Outline sequence of events, different σ factors and type of gene these transcribe in *B. subtilis*?