

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT  
TEST -3 EXAMINATION- 2024

B.Tech-IV Semester (Biotechnology)

COURSE CODE (CREDITS): 18B11BT412 (3)

MAX. MARKS: 35

COURSE NAME: Molecular Biology

COURSE INSTRUCTOR: Jitendraa Vashistt

MAX. TIME: 2 Hours

*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 problem.*

Q1a. Identify the template and coding-strand of DNA for an mRNA with transcript sequence of 5'-AUGAGAAUAACAAUGCAAACACUUUUUU-3'. Justify your answer with diagrammatic representation. (2 marks) (CO2)

Q1b. Define the biological significance of -35, -10 and +1 sites in prokaryotic genome organization? Define each of these sites and decipher the general sequence of these sites. (1X3=3 marks) (CO3)

Q2a. Explain how RNA editing produces different isoforms in human tissues? Justify your answer with suitable example. (2 mark) (CO3)

Q2b. Bacterial replication occurs at faster rate; however, in general this process has an extraordinary degree of fidelity. Explain different mechanisms and associated enzymes which prevent errors and proof read the process. (3 mark) (CO3)

Q3. Define the following in brief. (5X2 = 10 marks) (CO5)

- a) 'DNA gyrase enzyme' and its role in antimicrobials
- a) 'Telomerase'; its role in replication and cancer

Q4. In eukaryotic transcription, primary transcript gets modified to form mature mRNA.

- a) Explain, why these modifications are essential? (2 marks) (CO4)
- b) Explain the molecular events of 5' modification of mRNA and its biological significance. (3 marks) (CO4)

Q5. As bacterial genomes are smaller, these can't have the leverage for split genes of eukaryotic genomes. Therefore, many proteins produced simultaneously. Explain the structural machinery to achieve the above mentioned phenomenon of transcription in prokaryotes. Also, explain how this regulatory machinery in bacterial cells controls transcription as negative Inducible & negative repressible? (5 marks) (CO4)

Q6. If a gene need to be transcribed, then there are changes occur in chromatin and associated proteins. Explain the gene regulation with respect to activation and repression of transcription using histone proteins. Also define the role of *cis* and *trans* regulators for the above said process. (5 marks) (CO4)