

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -3 EXAMINATIONS-2022

B.Tech-IV Semester (Biotechnology)

COURSE CODE (CREDITS): 10B11BT413, (3)

MAX. MARKS: 35

COURSE NAME: Molecular Biology

COURSE INSTRUCTORS: Dr. Jitendraa Vashistt

MAX. TIME: 2 Hours

Note: All questions are compulsory. Marks are indicated against each question in brackets.

Q1. A molecular biologist need to find the gene segment for the following mRNA sequence:

5'-AAGAAUCCCAGUGCAAACGAAAA-3'. What will be the corresponding coding and non-strand sequences present on genomic DNA and what will happen if the above mentioned mRNA sequence gets the reverse orientation? (COIV) (2marks)

Q2. a) In general, the replication in prokaryotes as well in eukaryotes occurs in the direction of 5' to 3' end. Is it possible that the replication process may occur in reverse orientation i.e. 3' to 5' end? Justify your answer with the model prediction of replication in both of the orientations. (COIII) (3 marks)

b) How do we find the replication is semi conservative and semi discontinuous biological process? (COIII) (3 marks)

Q3. A person was suffering from tuberculosis. On examination by clinician, he was advised to use a therapeutic drug which has the ability to stop the transcription of *Mycobacterium tuberculosis*. Identify this drug and also define the molecular event (mechanism) of drug on its molecular target. (COV) (4marks)

Q4. Suppose a gene has the sequence 5'-TACCGTTATGTTCGGGAGTAGTAGGTTATT3' coded an mRNA, however, there was RNA editing occur after the mRNA synthesis which resulted in change of 10 ribonucleotide i.e. C of mRNA into U. (COIV) (2.5X2=5 marks)

a) How would the translational product (polypeptide) of this gene change due to the RNA editing?

b) Is this phenomenon occurring in humans? If yes, then explain this molecular event with generation of different tissue specific patterns of proteins.

P.T.O.

Q5. You have isolated DNA as well as RNA from *E. coli*. However, you will use these samples after one month.

(COI) (2X 2.5= 5 marks)

- a) Among both of the molecules, which may have chances of degradation during the isolation as well as storage? Justify your answer with the structural feature for stability of the both molecules.
- b) How do you ensure that no degradation occur during the storage of both of the nucleic acid samples?

Q6. A bacteria need to initiate the transcription on *lacZ* operon. For that, all the transcription machinery assembled. However, it was found that the correct mRNA not get synthesized as well no specific protein. Explain why this condition occurs with the evaluation/role of each factor of transcription machinery and their interaction with RNA polymerase? (COV) (5 marks)

Q7. When glucose as well as lactose is available in the media, then which of the molecule will be preferentially utilized by *E. coli*? What will be fate of other genes of an operon that participate in the metabolism of other sugar? (COIV) (4 marks)

Q8. A cancer associated protein is highly expressed in a human cell and it need to be regulated using the chromatin remodeling as well as transcription regulators. Define a strategy using the above mentioned molecular events and anti cancer molecules for diminished the expression of protein. (COV) (4 marks)