

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT  
TEST -3 EXAMINATION- Dec. 2023

M.Sc-I Semester (Microbiology)

COURSE CODE (CREDITS):21MSMB112 (3)

MAX. MARKS: 35

COURSE NAME: Molecular Biology

COURSE INSTRUCTORS: Dr Anil Kant

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 problems

**Q1 Briefly answer four of following questions**

[2x4 =8]

1. What is the function of the Shine-Dalgarno sequence in prokaryotic mRNAs? How was it proved?
2. Why is f-met-tRNA able to start protein synthesis at initiation codon AUG, whereas normal met-tRNA adds methionine at internal sites against codon AUG?
3. What do you understand by the sense and antisense strand of a gene?
4. Why inhibitors of protein synthesis are so important to study. Mention two points?
5. How given antibiotics/toxin affect protein synthesis i) Paromycin ii) Diphtheria toxin, iii) cycloheximide iv) Streptomycin
6. Write about i) intron signals ii) polyadenylation and termination signals eukaryotes.
7. Write about the key features of eukaryotic promoters derived by RNA polymerase II.

**Q.2 Do any three two of following**

[3.0x3 =9]

- a. Describe initiation and elongation steps of transcription in prokaryotes in detail. Draw suitable diagram
- b. Briefly describe 'rho' dependent termination and rho independent termination of transcription in *E. coli*.
- c. Describe different types of RNA polymerases found in eukaryotes. Include location, type of genes transcribed and sensitivity towards  $\alpha$ -amanitin.
- d. Describe structural organization of prokaryotic and eukaryotic ribosomes in detail.

**Q.3 Do any three two of following**

[4.0x2 =8]

- a. Give a description of mechanism, enzyme and proteins involved in following RNA processing in eukaryotic cells. a) Capping at 5' end b) Addition of a poly(A) tail
- b. Describe the splicing mechanism of tRNA considering the example of yeast tRNA
- c. Discuss the mechanism of splicing of, rRNA intron of protozoan *Tetrahymena thermophila*.

[5x2 = 10]

- a. Discuss detailed mechanisms of aminoacyl-tRNA formation. Explain how aminoacyl synthetases are selective for their corresponding amino acids and tRNA (second genetic code) with great fidelity.
- b. What is the function of each of the following components of the protein-synthesizing apparatus: a) aminoacyl-tRNA synthetase, b) release factor 1,2 and RRF, c) peptidyl transferase, d) initiation factors IF1, IF2, and IF3 e) elongation factors Ts, Tu and G?