



Date:

Registration number:

ST. JOSEPH'S COLLEGE (AUTONOMOUS), BENGALURU-27
M.Sc. MICROBIOLOGY - II SEMESTER
SEMESTER EXAMINATION: APRIL 2022
(Examination conducted in July 2022)
MB 8321- MOLECULAR BIOLOGY

Time- 2 ½ hrs

Max Marks-70

This question paper contains **2** printed pages and **4** parts

I. Answer any Five of the Following

5X3=15

1. Draw the structural genes and regulatory regions of the arabinose operon.
2. List the functions of the following: a. eEF-G b. TF II H c. MCM
3. How does the amino acyl tRNA synthetase for Isoleucine not mis-incorporate Valine?
4. Draw the general structure of a prokaryotic gene.
5. List the composition of the *E. coli* RNA pol holoenzyme.
6. Name three DNA polymerases in eukaryotes and list their functions.
7. What is the difference in structure and function between the centromeres and telomeres of a chromosome?

II. Answer any Five of the following

5X5= 25

8. List the steps involved in DNA packaging to achieve a compact chromosome.
9. The following sequence of bases represents the start of a gene on a double stranded DNA, what is the sequence of the transcribed RNA, what is its polarity, and what is the polarity of the DNA?
GCTACGGATTGCTG----- strand 1
CGATGCCTAACGAC-----strand 2
10. Describe how a protein is internalised into the lumen of the mitochondria.
11. How do prokaryotic and eukaryotic ribosomes recognize the 5' end of the messenger RNA?
12. Draw a mature mRNA of a prokaryote and eukaryote. Label all regions.
13. How does acetylation of histone and methylation of DNA affect gene expression?
14. Explain transcriptional elongation in eukaryotes.

III. Answer any Two of the following

2X10=20

15. Retroviruses are single stranded RNA viruses that insert their genomes into host DNA during their life cycle. Explain the mechanism by which retroviruses generate a double stranded DNA for insertion into host genome?

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16. Explain the process of prokaryotic termination of translation and ribosome recycling.
17. Describe the functioning of the Tryptophan operon in the presence and absence of tryptophan.

IV. Answer the following

1X10=10

- 18.a. You have isolated a mutant that makes a temperature sensitive rho molecule; rho functions normally at 30°C not at 40°C. If you grow this strain at both temperatures for a short time and isolate the newly synthesised RNA, what relative size RNA do you expect to find in each case. **5m**

- b. You repeated the experiment and suppose you found same size RNA made in both temperatures. Provide possible explanation for the same. Diagrammatically explain the processes happening in both (a and b) the cases. **5m**