

FIVE YEAR INTEGRATED M.Sc. EXAMINATION, 2023
SEMESTER - III
Paper LS-2-3-1
(Life Science: Fundamental Processes)

Time: 3 hours

Full Marks: 60

Questions are of value as indicated in the margin.

Question No. 1 is compulsory.

1. Answer **any ten** of the following: 10x2=20

- a. Differentiate between Shine-Dalgarno and Kozak sequences.
- b. What do you mean by degeneracy of the genetic code?
- c. Distinguish between exons and introns.
- d. Mention the importance of alternative splicing.
- e. Describe in brief the structure of mature mRNA.
- f. What is the origin of replication?
- g. What are histones?
- h. Name the inducer of *lac* operon. How does it induce the operon?
- i. What is the function of a repressor protein? Give an example.
- j. Differentiate between prokaryotic and eukaryotic RNA polymerases.
- k. Distinguish between structural genes and regulatory genes.
- l. What is the function of Rho factor?

Answer **any two** from Question 2 to 4. 2x5=10

2. Why is DNA replication semi-conservative and semi-discontinuous in nature? (2.5+2.5)=5
3. Describe the process of tRNA activation.
4. With proper reasoning, explain the status of *trp* operon in *E. coli* when the bacteria are grown in a medium containing (2.5+2.5)=5
 - (a) High levels of tryptophan
 - (b) Low levels of tryptophan

Answer **any three** from Question 5 to 9. 3x10=30

5. Describe the sequential events of initiation of protein synthesis in prokaryotes. Differentiate between prokaryotic and eukaryotic translation mechanisms. 5+5=10
6. What is RNA splicing? Elucidate the process of splicing by utilizing sets of GU-AG introns. Add a note on the significance of this process. 2+6+2=10
7. What are basal transcription factors? Elaborate the process of transcription initiation by RNA polymerase II in eukaryotes. How do the RNA polymerases catalyze the polymerization reaction? 2+6+2=10
8. What is a promoter? State the salient features of bacterial promoters. What do you mean by enhancers? Mention the different types of eukaryotic activators. 1+3+2+4=10
9. Explain the function of CAP in *E. coli*. How does it activated? What are *O1*, *O2* and *O3*? What is a super repressor? 3+3+2+2=10
