Five-Year Integrated M. Sc. Examination 2024
Semester– III
Paper LS-2-3-1
Fundamental Processes

Time: Three Hours **Full Marks: 60**

Questions are of value as indicated in the margin.
Answer ***Question No.01*** and ***any four*** from the rest.

1. Write short notes on ***any ten*** of the following: (10 x 2 = 20)
   a. Mention any two histone modifications present in a silenced chromatin region
   b. Polyproteins
   c. Coding strand
   d. Rifampicin
   e. Enhancers in higher eukaryotes
   f. RNA interference
   g. Ligase
   h. DNA photolyases
   i. "σ" factor
   j. PCNA
   k. Transversions
   l. Poly(A) polymerase

2. a. How is it proved that DNA replication is semi-conservative? (5)
   b. Had it been conservative, explain what would have been the results. (2)
   c. With a suitable diagram explain briefly ρ – dependent transcription termination in *E. coli*. (3)

3. a. With a suitable diagram briefly explain miRNA synthesis and processing, and its mode of function in an eukaryotic cell. (5+2=7)
   b. Explain in brief with a suitable diagram how telomere extension occurs by telomerase action. (3)

4. a. Explain Wobble hypothesis and its significance. (4+1=5)
   b. Explain termination of chromosome replication in *E. coli* with a suitable diagram. (5)

5. a. With a suitable diagram, explain the events in the initiation of replication at the *E. coli* origin, *oriC*. (5)
   b. With a suitable diagram explain siRNA mediated heterochromatin formation in yeast (*Schizosaccharomyces pombe*). (5)

6. a. Briefly explain translational regulation of eukaryotic mRNA with suitable diagram. (5)
   b. Explain the early steps of methyl-directed mis-match repair in *E. coli* with illustration. (5)

7. a. Briefly describe Ames test and explain how it could be used to compare a highly mutagenic compound to a non-mutagenic compound. (5+2=7)
   b. Briefly discuss high fidelity of DNA replication. (3)
