

2021

BIOCHEMISTRY — GENERAL

Paper : GE/CC-4

(Gene Organization, Expression and Regulation)

Full Marks : 50

The figures in the margin indicate full marks.

*Candidates are required to give their answers in their own words
as far as practicable.*

1. Answer **any five** questions from the following : 2×5
- (a) Which amino acid residue is in abundance in histones? Which histone is not part of the nucleosome?
 - (b) Define Shine Dalgarno sequence.
 - (c) DNA replication is a semidiscontinuous process. —Justify your answer.
 - (d) Name two inhibitors of protein synthesis.
 - (e) How do you define recombination?
 - (f) Define *cis* acting elements and *trans* acting elements.
 - (g) Name the components of replisome. State its function.
 - (h) Transcription initiation requires formation of an open complex. —Explain.

Unit - I

Answer **any two** questions.

2. (a) Briefly discuss about the events at replication fork.
(b) Why DNA replication is called semiconservative mode?
(c) What are the basic properties of DNA polymerase of prokaryote and eukaryote? 3+3+4
3. (a) Distinguish the role of Pol I and Pol III in DNA replication.
(b) Describe briefly the Meselson-Stahl experiment demonstrating that DNA replication is semiconservative in nature.
(c) What is the role of helicase in replication? 3+5+2
4. (a) Explain Holliday model of recombination with diagram.
(b) What is homologous genetic recombination?
(c) Describe how Rec A, Rec BC protein is involved in recombination. 3+3+4

Please Turn Over

5. (a) What is the biochemical basis of mutation?
 (b) Differentiate between base excision and nucleotide excision repair.
 (c) What is meant by mismatch repair? Explain with diagram. 3+4+3

Unit - II

Answer *any two* questions.

6. (a) Mention different RNA polymerases in prokaryote and eukaryote and describe their function.
 (b) How does termination of transcription occur?
 (c) With the help of a suitably labelled schematic diagram explain how post transcriptional processing of mRNA occurs in eukaryotes. 3+3+4
7. (a) What is meant by RNA splicing? How rRNA and tRNA are processed in eukaryote?
 (b) Differentiate between open promoter and closed promoter complex.
 (c) Why genetic code is said to be redundant? 4+3+3
8. (a) What is an operon? Name and mention the functions of the positive and negative regulators of the lac operon.
 (b) Describe how trp operon is controlled by attenuation.
 (c) How protein synthesis is initiated in prokaryotes? 4+3+3
9. (a) What type of products would you expect with the following partial heterozygotes of *E. coli* for lac operon in presence or absence of lactose and why?
 (i) $I - P - O C Z + Y + / I + P + O + Z - Y -$
 (ii) $I S P + O + Z + Y - / I - P + O C Z - Y +$
 (b) What is meant by polycistronic mRNA? Distinguish between positive and negative regulator with example. 5+2+3
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