[This question paper contains 2 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 7219 **L**

Unique Paper Code : 3183010021

Name of the Paper : Advance Molecular Biology and Genetic Engineering (DSE/GE)

Name of the Course : **B.Sc. (H) Biomedical Sciences (NEP-UGCF)**

Semester : VIII

Duration : 2 Hours Maximum Marks : 60

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. Attempt **four** questions in all.
3. Question No. **1** is compulsory.
4. Give illustrations and examples wherever required.
5. Subparts of the questions should be attempted together.

Q1. (a) Briefly explain the following: **(Any 5)** (5X1=5)

(i) Reporter gene
(ii) CAS protein
(iii) Chromatin remodelling
(iv) Immunoprecipitation
(v) Positive gene regulation
(vi) Site-specific recombination

Q1. (b) Justify the following statements as true or false. **(Any 5)** (5X2=10)

(i) DNA replication occurs without any proofreading mechanism.
(ii) P-element is commonly found in maize.
(iii) A mutation in the promoter region of a gene will always affect the amino acid sequence of the encoded protein.
(iv) CRISPR-Cas system is used only in bacteria.
(v) DNA vaccines introduce protein antigens directly into the body.
(vi) Homologous recombination occur between long non-identical DNA sequences.

Q2. (a) Differentiate between the following: **(Any 3)** (3X4=12)

(i) B-DNA Vs Z-DNA
(ii) Type I Vs Type II restriction enzymes
(iii) DNA Pol Vs RNA Pol
(iv) Missense Vs Nonsense mutation

Q2. (b) What are Transgenic animals? (3)

Q3. (a) Provide an overview of major DNA repair mechanisms, emphasizing the nature of damage repaired, key enzymes involved, and their role in preventing mutations. (7)

Q3. (b) Evaluate and contrast conventional restriction cloning with Gibson Assembly in terms of performance, reliability, and relevance in contemporary genetic engineering. (8)

Q4. (a) Describe the key steps involved in recombinant protein production, emphasizing vector design and downstream processing. (7)

Q4. (b) Analyze CRISPR-Cas technology as a genome editing tool. Discuss its ethical concerns. (8)

Q5. (a) Critically analyze how chromatin organization influences gene expression in eukaryotes. Discuss epigenetic modifications in this context. (7)

Q5. (b) Compare Northern blotting and microarray techniques for gene expression analysis. (8)