

B.Sc. Semester - 5 (Remedial) (CBCS) Examination
March/April-2026 (NEW COURSE)
Molecular Biology and Bio-Engineering(Core)

Time: 2:30 Hours**Marks:70****Instructions:**

1. All questions are compulsory.
2. Figures to the right indicate marks.

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- Que.1(A) Objective type questions. (04)
1. The principle of segregation and the principle of independent assortment were proposed by _____.
 2. Morgan demonstrated the phenomenon of _____ using *Drosophila melanogaster*.
 3. In bacteria, the most common mode of DNA replication is _____ model.
 4. The process by which information in DNA is used to regulate gene expression is called _____.
- Que.1(B) Answer in brief (Any 1 out of 2) (03)
1. State the significance of Mendel's dihybrid cross in understanding inheritance.
 2. Differentiate between genetic structure unit and genetic function unit.
- Que.1(C) Write a note on (Any 1 out of 2) (07)
1. Describe Morgan's experiment on linkage in *Drosophila* and its impact on genetics.
 2. Explain the rolling circle model of DNA replication in bacteria with a suitable diagram.
- Que.2(A) Objective type questions. (04)
1. The triplet nature of the genetic code was first demonstrated by _____.
 2. The enzyme responsible for RNA synthesis during transcription is _____.
 3. In the lac operon, the inducer molecule is _____.
 4. Proteins that bind to DNA and regulate gene expression are called _____.
- Que.2(B) Answer in brief (Any 1 out of 2) (03)
1. Mention any two features of the genetic code.
 2. Differentiate between transcriptional control and post-transcriptional control.
- Que.2(C) Write a note on (Any 1 out of 2) (07)
1. Explain the lac operon model of gene regulation in prokaryotes.
 2. Describe the process of translation and post-translational modifications of proteins.
- Que.3(A) Objective type questions. (04)
1. The uptake of naked DNA by a bacterial cell from its environment is called _____.
 2. In generalized transduction, DNA fragments are transferred from one bacterium to another by _____.
 3. The F-factor (fertility factor) is essential for _____ in bacteria.
 4. DNA sequences that can move from one site in the genome to another are called _____.
- Que.3(B) Answer in brief (Any 1 out of 2) (03)
1. Differentiate between homologous recombination and site-specific recombination.
 2. What is meant by bacterial competence? Give one example of a naturally competent bacterium.
- Que.3(C) Write a note on (Any 1 out of 2) (07)
1. Explain the mechanism of bacterial conjugation in Gram-negative bacteria.
 2. Describe the process of generalized and specialized transduction with suitable examples.

- Que.4(A) Objective type questions. (04)
1. A mutation that arises without exposure to any external agent is called _____.
 2. A _____ mutation results in a complete loss of gene function.
 3. The test commonly used to detect mutagenic potential of chemicals is _____.
 4. The DNA repair mechanism that directly reverses thymine dimers using visible light is called _____.
- Que.4(B) Answer in brief (Any 1 out of 2) (03)
1. Define phenotypic lag and phenomic lag with examples.
 2. Differentiate between mismatch repair and excision repair mechanisms
- Que.4(C) Write a note on (Any 1 out of 2) (07)
1. Explain the different types of mutations with suitable examples.
 2. Describe the SOS repair mechanism in bacteria
- Que.5(A) Objective type questions. (04)
1. The enzyme used to join DNA fragments is _____.
 2. The vector pBR322 contains genes for resistance to _____ and _____.
 3. A DNA molecule used to carry foreign DNA into a host organism is called a _____.
 4. The technique used to distinguish recombinant colonies from non-recombinant colonies by color is _____.
- Que.5(B) Answer in brief (Any 1 out of 2) (03)
1. Differentiate between adaptors and linkers with examples.
 2. Write two salient features of an ideal vector used in gene cloning.
- Que.5(C) Write a note on (Any 1 out of 2) (07)
1. Describe the types, recognition sequences, and cleavage patterns of restriction endonucleases.
 2. Explain the principle and steps of cDNA library preparation.
