

B.Sc. Semester - 5 (CBCS) Examination**Oct/Nov.- 2024 (Old 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) Answer the following. (Any One) (07)
1. Explain the mechanism of DNA replication.
 2. Explain the concept mendelian laws of Inheritance.
- Que.1(B) Answer the following. (Any One) (04)
1. Describe the structure and architecture of a gene in Eukaryotes.
 2. Explain the gene-cistron relationship in Prokaryotes.
- Que.1(C) Answer the following. (Any Three) (03)
1. Who is known as the 'father of genetics'?
 2. State Mendel's Law of Segregation.
 3. What is a Cistron?
 4. Name one model of DNA replication.
 5. What evidence supports DNA as the universal genetic material?
- Que.2(A) Answer the following. (Any Three) (07)
1. Describe the Lac Operon Model.
 2. Explain the mechanism of translational regulation in Prokaryotes.
- Que.2(B) Answer the following. (Any One) (04)
1. Explain the mechanism of transcriptional regulation in Prokaryotes.
 2. Discuss the Genetic code.
- Que.2(C) Answer the following. (Any Three) (03)
1. What is the role of the ribosome in Translation?
 2. Define the Genetic Code.
 3. What is the function of the lac operon in Bacteria?
 4. What type of regulation is controlled by The Trp Operon?
 5. What are Post-transcriptional Modifications.
- Que.3(A) Answer the following. (Any One) (07)
1. Discuss the types of Recombination.
 2. Write the mechanisms of DNA transfer during conjugation in Gram-positive and Gram-negative Bacteria.
- Que.3(B) Answer the following. (Any One) (04)
1. Explain the mechanism of generalized transduction in Bacteria.
 2. Describe the process of Natural Transformation.
- Que.3(C) Answer the following. (Any Three) (03)
1. What is Homologous Recombination?
 2. Name one method used to induce artificial competence in Bacteria.
 3. What type of gene transfer occurs in Transduction?
 4. Which type of recombination involves specific DNA sequences at recombination sites?
 5. What are Transposable Genetic Elements?

- Que.4(A) Answer the following. (Any One) (07)
1. Discuss the types of DNA repair mechanisms.
 2. Explain the phenotypic effects of mutations at the Chromosomal, Gene, and DNA levels.
- Que.4(B) Answer the following. (Any One) (04)
1. Explain the differences between Spontaneous and Induced Mutations.
 2. Describe the role of chemical mutagens in Inducing Mutations.
- Que.4(C) Answer the following. (Any Three) (03)
1. What is a Spontaneous Mutation?
 2. Name one type of DNA repair mechanism.
 3. What is the Ames test used for?
 4. Define phenotypic lag in the context of Mutations.
 5. What is the difference between a Missense and a Nonsense Mutation?
- Que.5(A) Answer the following. (Any One) (07)
1. Discuss the methods and applications of genetic manipulation in Prokaryotes.
 2. Explain the process of Site Directed Mutagenesis.
- Que.5(B) Answer the following. (Any One) (04)
1. Describe the process of inserting DNA molecules into a Vector.
 2. Explain the role of vectors such as pBR322 and BACs in Genetic Engineering.
- Que.5(C) Answer the following. (Any Three) (03)
1. What is the primary aim of Genetic Engineering?
 2. Name one vector used in recombinant DNA technology.
 3. What is the purpose of colony hybridization in detecting Recombinant Molecules?
 4. What is Site-directed Mutagenesis used for?
 5. Give one example of a Molecular Chaperone.
