Progressive Education Society's
Modern College of Arts, Science & Commerce Ganeshkhind, Pune – 16
End Semester Examination
Faculty: Science and Technology

Program: BScGen03 **Semester:V** **SET: A**
Program (Specific): Microbiology **Course Type: DSC**
Class: T.Y.B.Sc. **Max.Marks: 35**
Name of the Course: Genetics
Course Code:24-MB-354 **Time: 2Hr**
Paper: IV

Instructions to the candidate:

1) ***There are 4 sections in the question paper. Write each section on separate page.***
2) ***All Sections are compulsory.***
3) ***Figures to the right indicate full marks.***
4) ***Draw a well labelled diagram wherever necessary.***

SECTION: A

Q1) Tick the right option **(5 marks)**

1) Which of the following best describes the function of DNA polymerase during DNA replication?

a) Synthesizes the RNA strand by adding nucleotides

b) Synthesizes the DNA strand by adding nucleotides

c) Unwinds the DNA double helix

d) Joins Okazaki fragments by adding nucleotides

2) Which of the following best describes the role of the promoter in transcription?

a) To bind RNA polymerase and initiate transcription

b) To terminate the transcription process by binding ter serquence

c) To bind DNA polymerase and start transcription

d) To modify the 5' end of the mRNA

3) The process of translation involves which of the following steps?

a) Replication, priming, and termination

b) Initiation, elongation, termination

c) Splicing, capping, and polyadenylation

d) Initiation, elongation, translocation, and termination

4) Gene linkage refers to:

a) Genes located on different chromosomes and inherited together

b) The process of crossing over of chromosomes

c) Genes located on the same chromosome and inherited together

d) Genes that are not inherited together

5) Which of the following best describes generalized transduction?

a) The transfer of specific bacterial genes via a lysogenic phage

b) The transfer of any bacterial gene via a lytic phage

c) The integration of phage DNA into the bacterial chromosome

d) The transfer of plasmid DNA between bacteria

Q2) Attempt <u>any four</u> from the following (4/6) (4 marks)

1. Define the term 'operon' in the context of gene regulation.
2. Comment on significance of the discovery of bacterial conjugation?
3. Relate: centimorgan and recombination frequency.
4. Discuss the function and significance splicing in eukaryotes.
5. Elaborate the role of P22 phage in generalized transduction.
6. Illustrate the structure of the replication fork during DNA replication.

SECTION: B

Q3) Attempt <u>any four</u> from the following (4/6) (8 marks)

1. Enlist the steps involved in peptide bond formation during elongation of translation.
2. Justify: 'aminoacyl t-RNA synthetase in ensuring the accuracy of protein synthesis'.
3. Describe the discovery of transduction and its significance in microbial genetics.
4. Differentiate between F+, F-, and Hfr strains.
5. Describe the structure of the promoter in prokaryotic cells and its role in transcription initiation.
6. Explain the process of termination in DNA replication with a focus on the role of the Tus protein.

SECTION: C

Q4) Attempt <u>any four</u> from the following (4/6) (8 marks)

1. Outline the key differences between prokaryotic and eukaryotic DNA replication processes.
2. Discuss the role of external factors, such as temperature and growth medium, in bacterial transformation.
3. Analyze the function of the Shine-Dalgarno sequence in prokaryotic translation.
4. Explain the mechanism by which lambda phage mediates specialized transduction

5. Calculate the recombination frequency between two genes if 20 out of 100 progeny show recombination.
6. Describe the role of promoter proximal elements and enhancers in eukaryotic transcription.

SECTION: D

Q5) Attempt <u>any two</u> of the following (2/4) (10 marks)

1. Discuss the process and significance of mapping genes by co-transduction, and provide an example of how this method can be applied to study genetic linkage in bacteria.
2. Compare and contrast prokaryotic and eukaryotic transcription.
3. Analyze the discovery of transformation and its impact on the field of genetics, with particular reference to Frederick Griffith's experiments.
4. Analyze the complete process of prokaryotic DNA replication, including the roles of OriC, DNA polymerases, and other key proteins.