

Enrollment No./Seat No.:

GUJARAT TECHNOLOGICAL UNIVERSITY
Bachelor of Engineering - SEMESTER - V EXAMINATION - WINTER 2025

Subject Code: 3150401

Date: 19-11-2025

Subject Name: Advanced Molecular Biology

Time: 10:30 AM TO 01:00 PM

Total Marks: 70

Instructions

- 1. Attempt all questions.**
- 2. Make suitable assumptions wherever necessary.**
- 3. Figures to the right indicate full marks.**
- 4. Simple and non-programmable scientific calculators are allowed.**

	Marks
Q.1 (a) Define operon and differentiate between inducible and repressible operons.	03
(b) Describe the role of miRNA in gene regulation.	04
(c) Discuss RNA interference (RNAi) in gene regulation.	07
Q.2 (a) What is a transposon?	03
(b) Explain site-specific recombination and homologous recombination.	04
(c) Differentiate between generalized and specialized transduction.	07
OR	
(c) Explain in detail the mechanism and significance of conjugation.	07
Q.3 (a) Define restriction endonuclease and state its biological role.	03
(b) Compare YAC and BAC vectors.	04
(c) Discuss the general requirements for performing a genetic engineering experiment.	07
OR	
(a) What are sticky and blunt ends?	03
(b) Describe transformation and transfection methods.	04
(c) Describe the principle and applications of PCR and its variants.	07
Q.4 (a) What is the role of siRNA in gene silencing?	03
(b) Differentiate between gene knockout and knock-in.	04
(c) Discuss the use of CRISPR-Cas9 system in genome editing with examples.	07
OR	
(a) Give the Definition of transgenic organism.	03
(b) Describe the process of transgenic mouse development.	04
(c) Describe the molecular mechanism of siRNA-mediated gene silencing.	07
Q.5 (a) Define QTL mapping in plant variety development Program.	03

- (b)** Explain the principle of RFLP analysis. **04**
- (c)** Describe different types of molecular markers used in mapping studies. **07**

OR

- (a)** What is marker-assisted selection? **03**
- (b)** Differentiate between SSR and AFLP markers. **04**
- (c)** Discuss the importance of marker-assisted selection in crop improvement. **07**
