Seat No./Enrollment No.: _____

GUJARAT TECHNOLOGICAL UNIVERSITY
BACHELOR OF ENGINEERING – SEMESTER 5 – EXAMINATION – SUMMER 2026

Subject Code: 3150401 **Date: 25/05/2026**

Subject Name: Advanced Molecular Biology

Time: 02:30 PM TO 05:00 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.**

Q.1	**(a)**	Differentiate between inducible and constitutive operons.	**03**
	(b)	Explain EMSA technique for DNA-protein interaction study.	**04**
	(c)	Explain regulation of transcription in prokaryotes with reference to lac operon.	**07**
Q.2	**(a)**	What is phagemid, cosmid and shuttle vector?	**03**
	(b)	Explain types of restriction enzymes.	**04**
	(c)	Explain PCR and its variants with applications.	**07**
		OR	
Q.2	**(c)**	Explain construction and screening of genomic and cDNA libraries.	**07**
Q.3	**(a)**	Define gene therapy.	**03**
	(b)	Explain construction of siRNA vectors.	**04**
	(c)	Explain gene targeting and knock-out mice production.	**07**
		OR	
Q.3	**(a)**	What is CRISPR-Cas system?	**03**
	(b)	Discuss transgenic animal models.	**04**
	(c)	Discuss ethical and biomedical applications of genome editing technologies.	**07**
Q.4	**(a)**	What is RFLP?	**03**
	(b)	Discuss principles of DNA fingerprinting.	**04**
	(c)	Explain marker-assisted selection and its significance in plant breeding.	**07**
		OR	
Q.4	**(a)**	Define RAPD marker.	**03**
	(b)	Discuss molecular diagnostics of pathogens.	**04**
	(c)	Discuss gene mapping and QTL analysis.	**07**
Q.5	**(a)**	Define Conjugation.	**03**
	(b)	Explain homologous recombination.	**04**
	(c)	Discuss recombination and its importance in gene variation.	**07**
		OR	
Q.5	**(a)**	What is transduction?	**03**

(b) Discuss structure and function of transposons. **04**

(c) Discuss methods of horizontal gene transfer in microorganisms. **07**

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