

Enrolment No./Seat No_____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER-IV EXAMINATION – SUMMER 2025

Subject Code:3140409

Date:15-05-2025

Subject Name:Molecular Biology and Genetics

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) Explain Mendel's laws of heredity and how they apply to genetic inheritance.	03
(b) What is pleiotropy? Give an example of a trait that demonstrates pleiotropy.	04
(c) Define chromosomal anomalies and describe the processes that lead to them. Provide an example of a disorder caused by autosomal trisomy.	07
Q.2 (a) Discuss the significance of linkage and crossing over in genetic inheritance.	03
(b) Describe sex-linked inheritance and give an example of a disorder caused by this type of inheritance.	04
(c) Explain the process of DNA denaturation and renaturation and their importance in molecular biology.	07
OR	
(c) Discuss the one gene one protein hypothesis and how it has evolved.	07
Q.3 (a) How do dominance and epistasis differ in genetic interactions?"	03
(b) What is cytoplasmic inheritance and why is it significant?	04
(c) Discuss the SOS repair system and its significance in mutation repair.	07

OR

- Q.3** (a) Compare and contrast the conservative, semi-conservative, and dispersive models of DNA replication. **03**
- (b) What is the role of primase in DNA replication? Explain the concept of a primosome. **04**
- (c) Explain the concept of genetic recombination and its relationship with linkage. **07**
- Q.4** (a) What roles do promoters, silencers, and enhancers play in gene regulation? **03**
- (b) Discuss the mechanism of DNA replication in eukaryotes, highlighting the differences from prokaryotic replication. **04**
- (c) Explain post-transcriptional modifications of mRNA, including splicing and capping. **07**

OR

- Q.4** (a) Describe the termination process of transcription in prokaryotes and the role of rho factor **03**
- (b) What is the function of auxiliary proteins in transcription? **04**
- (c) Discuss the regulation of transcription in eukaryotes, including the role of promoters, silencers, and enhancers. **07**
- Q.5** (a) Explain the characteristics of the genetic code and the significance of redundancy. **03**
- (b) Discuss the adaptor hypothesis and its importance in translation. **04**
- (c) Explain the mechanism of translation in prokaryotes, focusing on initiation, elongation, and termination steps. **07**

OR

- Q.5** (a) Describe different types of mutations and their molecular basis. **03**
- (b) Explain nucleotide excision repair with a diagram. **04**

(c) What is post-translational modification, and why is it important in protein synthesis?

07
