

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

Subject Code: 3150409

Date: 21/05/2026

Subject Name: Biostatistics

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) Define standard error. How does it differ from standard deviation? **03**
 - (b) Explain null hypothesis and alternative hypothesis with an example. **04**
 - (c) Describe the applications of Poisson distribution in biological data such as mutation frequency or microbial colony counts. **07**
- Q.2**
- (a) What is correlation coefficient? Mention its possible range and meaning. **03**
 - (b) Differentiate between parametric and non-parametric tests with suitable examples. **04**
 - (c) Explain analysis of variance (ANOVA) in detail. Illustrate how it can be applied to compare mean values among three different enzyme activity groups. **07**
- OR
- Q.2**
- (c) Compute the correlation coefficient for Dose: 10, 20, 30, 40, 50; Survival: 15, 25, 40, 35, 55. **07**
- Q.3**
- (a) Define mean deviation and state its formula. **03**
 - (b) Explain the features and significance of skewness and kurtosis in data interpretation. **04**
 - (c) Describe probability rules and Bayes' theorem with their biological applications **07**
- OR
- Q.3**
- (a) What is a frequency distribution table? Why is it important? **03**
 - (b) Explain correlation and regression analysis in biotechnology with examples. **04**
 - (c) Describe hypothesis testing and differentiate between one-tailed and two-tailed tests with examples. **07**
- Q.4**
- (a) Define t-test and state its assumptions. **03**
 - (b) A sample of 10 patients had mean glucose = 120 mg/dL, SD = 10. Test if mean differs from 110 at 5% level ($t = 2.262$). **04**
 - (c) Describe chi-square test with its application in genetics. **07**
- OR
- Q.4**
- (a) Define standard deviation. **03**
 - (b) Explain positive and negative skewness with examples. **04**

(c) A researcher found that as enzyme concentration increases, reaction rate also increases up to a point. Discuss how correlation and regression analysis help interpret such data in biotechnology. **07**

Q.5 (a) Differentiate between variance and standard deviation. **03**

(b) Define kurtosis. Explain the types of kurtosis and their importance in biological datasets. **04**

(c) Explain normal, binomial, and Poisson distributions. Compare their applications in biological research. **07**

OR

Q.5 (a) Define probability. **03**

(b) Explain types of data with one biological example each. **04**

(c) Discuss the advantages, limitations, and real-life applications of non-parametric tests in biological and medical data analysis. **07**
