

Enrollment No./Seat No.:

**GUJARAT TECHNOLOGICAL UNIVERSITY**  
**PHARM.D. - YEAR - IV EXAMINATION - WINTER 2025**

**Subject Code: 848804**

**Date: 21-11-2025**

**Subject Name: Biostatistics & Research Methodology**

**Time: 10:30 AM TO 01:30 PM**

**Total Marks: 70**

**Instructions**

- 1. Attempt any five questions.**
- 2. Make suitable assumptions wherever necessary.**
- 3. Figures to the right indicate full marks.**

- |   | <b>Marks</b> |
|---|--------------|
| <b>Q.1 (a)</b> Describe the key components included in a research report with its significance                                | <b>06</b>    |
| (b) Explain the key features, advantages, and limitations of cohort and cross-sectional studies                               | <b>04</b>    |
| (c) The following cholesterol levels of 10 people were measured in mg/dl: {260, 150, 165, 201, 212, 243, 219, 227, 210, 240}. | <b>04</b>    |

For this sample:

1. Calculate the mean and median.
2. Calculate the variance and standard deviation.

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|--|-----------|
| <b>Q.2 (a)</b> Attack rate among the vaccinated and unvaccinated against measles are given below. Prove the protective value of vaccination using chi square test. (table value: 5.41) | <b>06</b> |
|--|-----------|

<b>Group</b>		<b>Attacked</b>	<b>Not Attacked</b>
<b>Vaccinated</b>	O	10	90
	E	18	82
<b>Unvaccinated</b>	O	26	74
	E	18	82

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|---|-----------|----|----|----|----|----|----|
| (b) Define the term 'sample' and outline the various techniques used to determine an appropriate sample size in research. | <b>04</b> |    |    |    |    |    |    |
| (c) Calculate the Correlation coefficient from the following data:  | <b>04</b> |    |    |    |    |    |    |
| X   | 12        | 16 | 20 | 24 | 28 | 32 | 36 |
| Y   | 6         | 9  | 12 | 15 | 18 | 21 | 24 |

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|---|-----------|
| <b>Q.3 (a)</b> Define epidemiology. Explain in brief incidence and prevalence with suitable example   | <b>06</b> |
| (b) Provide examples of parametric and non-parametric data and list the statistical tests used to determine the level of significance for each type | <b>04</b> |
| (c) Explain the general rules of constructing and labeling a graph. Explain histogram with suitable example   | <b>04</b> |

- Q.4 (a)** The fluoride concentration in a toothpaste sample was determined in ppm by two trainee analysts from a calibration curve constructed using an ionselective electrode (ISE). The two trainees performed the experiment using the same method and obtained following results. ( $t_{0.05, 95\%}:2.57$ ) **06**

Trainee 1 (ppm): 1392, 1390, 1390, 1391, 1395

Trainee 2 (ppm): 1413, 1408, 1406, 1420, 1399

Perform a t-test and assess whether the mean concentration value obtained by the two trainees are different at significance level ( $\alpha$ ) 0.05.

- (b) Describe the key features of semi logarithmic plots and scatter plots. **04**
- (c) What is SPSS? Describe its features and uses in statistical analysis **04**
- Q.5 (a)** Calculate analysis of variance table for the following per hour production data for three varieties of table, each manufactured on four different machines and state if the quality differences are significant. (The table is 4.26 at 5% level with d.f. being  $v_1=2$  and  $v_2=9$ ) **06**

Machine	Hardness (kg/m <sup>2</sup> )		
	A	B	C
1	6	5	5
2	7	5	4
3	3	3	3
4	8	7	4

- (b) Describe the application of computer technology in managing patient records in hospital. **04**
- (c) Explain: Power is a function of sample size and variability **04**
- Q.6 (a)** Explain Wilcoxon's signed rank test and Mann Whitney U test. **06**
- (b) Briefly explain hypothesis testing and distinguish between Type I and Type II errors. **04**
- (c) Explain the role of computers in delivering pharmaceutical care in a community pharmacy setting. **04**
- Q.7 (a)** Describe the applications of computer systems in drug information services, including retrieval and storage functions. **06**
- (b) Explain the concepts of relative risk and attributable risk in epidemiological studies. **04**
- (c) Describe uses of Computers in Inventory control and Management in a hospital. **04**

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