Seat No.: _____ Enrolment No. _____

GUJARAT TECHNOLOGICAL UNIVERSITY

B.PHARM - SEMESTER–8 EXAMINATION – WINTER -2023

Subject Code: BP801TT **Date: 01/12/2023**

Subject Name: Biostatistics and Research Methodology

Time:02.30 p.m. to 5.30 p.m. **Total Marks: 80**

Instructions:

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

Q.1 **(a)** Define mean, Median and Mode. Comment: Median can express data efficiently then mean when data are not normally distributed. **06**

(b) Calculate average particle size from given data. **05**

Particle size (μ)	8	9	10	11	12	13	14
No. of Particles	12	21	35	42	29	11	3

(c) Enlist types of frequency distribution. Explain any one in detail. **05**

Q.2 **(a)** Explain correlation with a suitable example. **06**

(b) Discuss method of least squares. Give its applications and limitations. **05**

(c) Differentiate: Normal Distribution and Poisson's Distribution. **05**

Q.3 **(a)** Define null hypothesis. Discuss types of error. **06**

(b) Explain terms: i) Standard Error of Mean ii) Population **05**

(c) Calculate Standard deviation and Standard Error for given data of tablet crushing strengths: 8, 6, 7, 8, 9, 8, 6, 8, 7, 8, 7, 9, 6, 7, 9, 7 **05**

Q.4 **(a)** Explain probability with example of tossig 3 coins and probability of all possible occurances. **06**

(b) Data of heart rate before and after exercise are given below. Using t-test state whether exercise has any effect on heart rate or not? **05**

Heart Rate	Before	71	75	73	71	73	74	72	75	73
	After	78	81	80	79	77	82	83	81	78

($t_{(0.05, 17)} = 2.11$, $t_{(0.05, 18)} = 2.10$, $t_{(0.05, 9)} = 2.30$, $t_{(0.05, 9)} = 2.26$)

(c) Differentiate One Way ANOVA and Two Way ANOVA **05**

Q.5 **(a)** Give your Comments: **06**

i) t-calculated must always be greater than t-tabulated for acceptable results of an experiment

ii) Rejecting null hypothesis shows failure of experiment in parametric tests.

(b) Compare Parametric tests and Non Parametric tests. **05**

(c) Data for smoking and blood pressure are given below. Check whether both are associated with each other or not. **05**

	Non Smokers	Moderate Smoker	Chain Smokers
High Blood Pressure	95	111	126
No High Blood Pressure	55	39	24

$\chi^2_{(5, 0.05)} = 11.1$ $\chi^2_{(2, 0.05)} = 5.99$ $\chi^2_{(1, 0.05)} = 3.84$ $\chi^2_{(6, 0.05)} = 12.6$

Q. 6	**(a)**	Explain Pie Charts, Histogram and Contour Plots in brief.	**06**
	(b)	Discuss confounding with reference to fractional factorial designs.	**05**
	(c)	Write a note on Full factorial designs.	**05**
Q.7	**(a)**	What are rotatable designs? Discuss central composite designs.	**06**
	(b)	Write a note on cohort studies.	**05**
	(c)	Derive model for given data of 2^2 full factorial design.	**05**

	X_1	X_2	Y
1	-1	-1	8
2	1	-1	13
3	-1	1	6
4	1	1	11

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