UPES

End Semester Examination, May 2025

Course: Biostatistics and Research Methodology   Semester   : VIII

Program: B. Pharma   Duration   : 03 Hours

Course Code: BP801T   Max. Marks: 75

Instructions: The use of Scientific Calculator is permitted

SECTION A

(20Qx1M=20 Marks)

S. No.		Marks	COs
Q 1	Which of the following is the primary condition to use a z-test instead of a t-test? a. Sample size less than 30 b. Population variance is unknown c. Population standard deviation is known d. Population follows a normal distribution	**1**	CO1
Q 2	In a normal distribution, what percentage of data falls within one standard deviation of the mean? a. 68% b. 75% c. 95% d. 99%	**1**	CO1
Q 3	Which statistical test is used to compare the means of two independent groups? a. t-test b. Chi-square test c. ANOVA d. Mann-Whitney U test	**1**	CO1
Q 4	Which of the following is not a measure of dispersion? a. Range b. Standard deviation c. Interquartile range (IQR) d. Mode	**1**	CO1
Q 5	In a paired sample t-test, the data must: a. Be from two unrelated groups b. Be categorical c. Be from the same group tested at two different times d. Have equal sample sizes	**1**	CO2

Q 6	A researcher wants to compare the mean blood pressure of two independent groups. Which test should be used? a. Paired t-test b. Z-test c. Independent samples t-test d. ANOVA	1	CO2
Q 7	In a two-tailed z-test, if the calculated z-value is 2.6 and the critical value at 5% significance is 1.96, then: a. Accept the null hypothesis b. Reject the null hypothesis c. Cannot conclude d. Increase the sample size	1	CO2
Q 8	State the statistical test to use if one wants to test between bivariate association between categorical variables?	1	CO2
Q 9	Identify the correct formula for calculating 95% Confidence interval for sample mean ($\overline{X}$) if S.D. and S.E. are standard deviation and standard error of the sample respectively? a. $(\overline{X} - 1.96 \times S.D., \overline{X} + 1.96 \times S.D.)$ b. $(\overline{X} + 1.96 \times S.D., \overline{X} - 1.96 \times S.D.)$ c. $(\overline{X} - 1.96 \times S.E., \overline{X} - 1.96 \times S.E.)$ d. $(\overline{X} + 1.96 \times S.E., \overline{X} - 1.96 \times S.E.)$	1	CO3
Q 10	Identify which of following is not correct in context of test statistic? a. It captures the deviation of sample estimate from the population. b. It captures the standard error of the sample taken. c. It provides the basis for rejection or not rejection of null hypothesis. d. It provides the level of significance.	1	CO3
Q 11	Identify which is true in context of standard error? a. Standard deviation of the different samples of a same population b. Standard deviation of different observations in a sample c. Standard deviation of different samples from different populations d. Standard deviation of different observations from different samples.	1	CO3
Q 12	Identify which of the following is true for a null hypothesis to be rejected if p represents the p-value and α is the level of significance? a. $p < \alpha$ b. $p = \alpha$ c. $p > \alpha$ d. $p \sim \alpha$	1	CO3
Q 13	If calculated value of test statistic is -3.56, then comment about the p-value.	1	CO4
Q 14	Define Sample and Population.	1	CO4

Q 15	Define Null Hypothesis.	1	CO4
Q 16	Define p-value.	1	CO4
Q 17	Define IQR.	1	CO5
Q 18	Define 95% Confidence Interval for mean.	1	CO5
Q 19	State one difference between descriptive statistics and inferential statistics.	1	CO5
Q 20	Comment briefly on why standard error came into play.	1	CO5

SECTION B (20 Marks)
(2Qx10M=20 Marks)

Attempt 2 Question out of 3

Q 1	a. Discuss the difference between standard error and how it differs from standard deviation? b. Discuss 95% Confidence Interval for mean.	5*2=10	CO3
Q2.	Identify which of the following variables are outcomes and which are exposures. Also, link the variables through possible outcome–exposure relationships. i) Child diagnosed with asthma (yes, no) ii) Parent(s) have a history of asthma (yes, no) iii) Number of days child missed school due to illness (days) iv) Exposure to indoor air pollution (e.g., cooking with biomass fuel) (yes, no) v) Child has recurrent respiratory infections (yes, no)	2*10	CO4
Q3.	A pharmaceutical company produces 500 mg of medication tablets. The quality control department claims the average active ingredient in the tablets is 500 mg. A regulatory audit tests a random sample of 40 tablets and finds a sample mean of 497.5 mg. The population standard deviation (σ) is known to be 5 mg. At $\alpha = 0.05$, test whether the tablets are under-dosed. I) State Null and Alternative Hypothesis II) Calculate Test-Statistic III) Conclude the result	10	CO5

SECTION-C (35 Marks)
(7Qx5M=35 Marks)

Attempt 7 Question out of 9

Q 1	Discuss in detail about Probability.	5	CO1
Q 2	For the following dataset, calculate mean, median, mode, standard deviation and variance 5,5,5,5,5	5	CO1
Q 3	Explain the differences between one sample t-test and z-test.	5	CO1
Q 4	Explain Correlation and Regression Analysis.	5	CO2
Q 5	Discuss Randomisation, Repetition and Control for an experimental study.	5	CO2
Q 6	Discuss ANOVA	5	CO3
Q 7	Discuss the features of Normal Distribution.	5	CO3

Q 8	Discuss the need of research in pharmaceutical industry.	**5**	CO4
Q 9	Discuss Chi-square test.	**5**	CO5