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0904E105

Candidate's Seat No :_____

B.Sc. Sem.-6 Examination

CC-307

Statistics

Time : 2-30 Hours] **April-2025** **[Max. Marks : 70**

Q1 A) Explain the concept of Statistical Hypothesis and define (i) Null and Alternative Hypothesis (ii) simple and composite hypothesis with illustration, (iii) Critical region Give illustration. [7 marks]

B) State and prove Neyman-Pearson Lemma. Discuss its uses. [7 marks]

OR

Q 1 A) Write short note on two types of errors in testing of hypothesis and explain role of level of significance. Also explain power function. [7 marks]

B) given the probability density function:

$$f(x,\theta) = \frac{1}{\theta}, 0 < x < \theta$$
$$= 0, \quad Otherwise$$

It is required to test that H_0: $\theta = 1$, Vs H_1: $\theta = 2$ when a single value is observed on x. If the critical regions is $C = \{x: x \geq 0.5\}$ then find probabilities of Type I and II error [7 marks]

Q 2 A) Give detail procedure for test of significance for single sample proportion. [7 marks]

B) Explain the test for the significance of observed value of correlation coefficient when hypothetical value of correlation coefficient = ρ_0? [7 marks]

OR

Q 2 A) Write in detail for the test of homogeneity of correlation coefficients r_1 and r_2 calculated from pairs of sizes n_1 and n_2 respectively. [7 marks]

B) Give detail procedure for the test of significance of the difference between two sample proportions. [7 marks]

Q 3 A) Write the test to test the homogeneity and independence of attributes in a contingency table of order r rows and s columns. [7 marks]

B) A coin is tossed 6 times and hypothesis H_0: p=1/2 is rejected against H_1: p = 3/4 if the number of head is greater than 4. Calculate probabilities of two types of errors. [7 marks]

OR

Q 3 A) Explain the procedure to test the significance difference between two sample means having sample sizes n_1 and n_2 respectively drawn from the populations having same variance. [7 marks]

B) Discuss the procedure to test homogeneity of two variances in two independent samples of sizes n_1 and n_2 from normal population. [7 marks]

Q 4 A) Describe Run test in detail. [7 marks]

B) Write a short note on Median test. [7 marks]

OR

Q 4 A) Write the advantages and disadvantages of non-parametric test. [7 marks]

B) Explain Mann-Whitney U test. [7 marks]

(P.T.O.)

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Q 5 Attempt Any Seven. [14 marks]

1. The mean price of mid-sized cars in a region is Rs. 32,000. A test is conducted to see if the claim is true. State the Type I and Type II errors in complete sentences.
2. The power of a test is 0.981. What is the probability of a Type II error?
3. Write the test statistic used to test the significance for single sample mean.
4. Consider the following hypothesis:

$$H_0: H_0: \mu \geq 20 \; Vs \; H_1: \mu < 20$$

A sample of 50 provide a sample mean of 19.4. The population standard deviation is 2. Compute the value of test statistics.

5. Consider the following hypothesis:

$$H_0: H_0: \mu \geq 20 \; Vs \; H_1: \mu < 20$$

What is the rejection rule, show critical region using normal curve.

6. What is the test statistics used to test the significance of an observed correlation coefficient (whether sample has come from an uncorrelated population)?
7. What is the test statistics used in Wilcoxon signed rank test?
8. Define Run.
9. Under what situation Mann-Whitney U test is applied.
10. Write one advantage of non-parametric test.