UG – 175

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IV Semester B.Sc. Examination, Sept./Oct. 2022
(CBCS) (F+R) (2018-2019 and Onwards)
STATISTICS – IV
Statistical Inference – II

Time : 3 Hours   Max. Marks : 70

Instructions *: 1) Answer **any 10** subdivisions from Section – **A** and*
*   **any five** questions from Section – **B**.*
*   2) Scientific calculators are **allowed**.*

SECTION – A

1. Answer **any 10** subdivisions of the following :   **(10×2=20)**

   a) Define best critical region.

   b) State Neymann-Pearson lemma.

   c) Write the test statistic for testing equality of proportions.

   d) Give the test statistic for testing single mean for large samples.

   e) What is the test statistic for paired 't' test with appropriate degrees of freedom ?

   f) Define Chi-square test. What are its applications ?

   g) Distinguish between parametric and non parametric test (mention any two).

   h) Define Mann-Whitney 'U' statistic.

   i) Mention sign test statistic for one sample.

   j) Define run and length of run.

   k) Write the test statistic used in Spearmans rank correlation coefficient in non-parametric test.

   l) What is the meaning of sequential analysis ?

P.T.O.

SECTION – B

Answer **any five** questions from the following : (5×10=50)

2. a) A sample of size 10 is taken from a normal distribution with variance 2.5. The critical region for testing. $H_0 : \mu = 25$ vs $H_1 : \mu = 27.5$ is such that mean of the sample is greater than 25.8.

   Calculate size and power of the test.

   b) What do you mean by uniformly most powerful test ? (8+2)

3. a) Find the most powerful test for testing $H_0 : \lambda = \lambda_0$ vs $H_1 : \lambda = \lambda_1 (> \lambda_0)$ based on sample observations from a Poisson distribution.

   b) Find most powerful test of level 'α' for testing $H_0 : \theta = \theta_0$ vs $H_1 : \theta = \theta_1$ (where $\theta_1 > \theta_0$) in $f(x, \theta) = \theta e^{-\theta x}$ $x > 0$. (5+5)

4. a) Describe the large sample test procedure for testing $H_0 : \mu_1 = \mu_2$ vs $H_1 : \mu_1 \neq \mu_2$ where μ_1 and μ_2 are population means of normal populations.

   b) Explain the test procedure for testing $H_0 : P = P_0$ vs $H_1 : P \neq P_0$ where P is the Binomial population proportions. (5+5)

5. a) Describe Chi-square test for testing $H_0 : \sigma^2 = \sigma_0^2$ vs $H_1 : \sigma^2 \neq \sigma_0^2$ where σ^2 is the population variance $N(\mu, \sigma^2)$ distribution.

   b) Discuss 'F' test for testing multiple correlation coefficient. (5+5)

6. a) State the conditions for the validity of Chi-square test for goodness of fit. Also describe Chi-square test of goodness of fit.

   b) Describe the test procedure for testing regression coefficient. (6+4)

7. a) Explain Fisher z transformation for testing $H_0 : \rho = \rho_0$ where ρ is the population correlation coefficient.

   b) Explain the Chi-square test for independence of attributes. (5+5)

8. a) Describe Wilcoxon signed rank test for paired samples.

   b) Explain median test. (5+5)

9. a) What is sequential probability ratio test ?

   b) Derive the SPRT for testing $H_0 : \mu = \mu_0$ vs $H_1 : \mu = \mu_1 (> \mu_0)$ in $N(\mu, \sigma^2)$ distribution (σ^2 known). (4+6)

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