

D3AST2302

Name.....

Reg. No.

THIRD SEMESTER M.Sc. DEGREE EXAMINATION, NOVEMBER 2024
(Regular/Improvement/Supplementary)
STATISTICS
FMST3C12: TESTING OF STATISTICAL HYPOTHESES

Time : 3 Hours

Maximum Weightage: 30

Part A: Answer *any four* questions. Each carries 2 weightage.

1. A sample of size one is drawn from Poisson distribution with parameter λ . To test $H_0 : \lambda = 1$ against $H_1 : \lambda = 2$, consider the critical region $\{x : x > 3\}$, then find the probability of type I error.
2. Describe most powerful test and uniformly most powerful test.
3. Explain: (i) Unbiased tests; (ii) Similar tests.
4. Explain locally most powerful tests.
5. Define Kendall's tau and state its properties.
6. Explain the properties of SPRT.
7. Explain average sample number.

(4 × 2 = 8 weightage)

Part B: Answer *any four* questions. Each carries 3 weightage.

8. Define power function. Let X be an exponential random variable with mean θ . Consider the testing problem $H_0 : \theta = 1$ against $H_1 : \theta = 2$. Derive the most powerful test of size α and find its power function.
9. Consider a random sample of size n from $U(0, \theta)$ distribution. Derive the UMP level α test for testing the hypothesis $H_0 : \theta \leq 3$ against $H_1 : \theta > 3$.
10. Explain the concept of Neyman structure. Establish a necessary and sufficient condition for all similar tests to have Neyman structure.

(P.T.O.)

11. By stating the necessary regularity conditions, find asymptotic distribution of the likelihood ratio test statistic.
12. Explain chi-square test for homogeneity.
13. Describe Wilcoxon signed rank test. Obtain the null-distribution its test statistic.
14. Define OC function. Obtain approximate solution of the OC function.

(4 × 3 = 12 weightage)

Part C: Answer *any two* questions. Each carries 5 weightage.

15. State and prove Neyman-Pearson lemma.
16. Construct the likelihood ratio test for testing the equality of variances of two normal populations under the assumption of unknown means.
17. What are the advantages of non-parametric tests? Explain Kolmogorov-Smirnov one sample and two sample test procedures.
18. State and prove fundamental identity of SPRT.

(2 × 5 = 10 weightage)