Registration Number:

Date & session:

ST.JOSEPH'S UNIVERSITY, BENGALURU -27
M.Sc. (STATISTICS) – II SEMESTER
SEMESTER EXAMINATION: APRIL 2023
(Examination conducted in May 2023)

ST 8221 – TESTING OF HYPOTHESIS AND INTERVAL ESTIMATION

Time: 2 Hours **Max Marks: 50**

This paper contains TWO printed pages and ONE part

PART-A

Answer any FIVE of the following

1. A) State and prove Neyman Pearson Lemma.

   B) Derive a Most powerful test procedure for testing H_0: $p = p_0$ against H_1: $p = p_1$ ($p_1 > p_0$) when X follows Geometric distribution with parameter 'p'.

   (5+5)

2. A) Define the following terms:
   i. Power of the test
   ii. Randomized and Non-randomized test function
   iii. p-value of a test

   B) Define MLR Property. Derive an UMP test in Pitman family when only upper or lower end points depends on a parameter. (3+7)

3. A) Explain the concept of Non-existence of UMP test for testing simple null hypothesis against two sided alternatives in one parameter exponential family.

   B) State and prove the asymptotic property of Likelihood Ratio Test.

   (6+4)

4. A) Write a short note on Bartlett's test for homogeneity of variances.

   B) Derive a LRT procedure for testing H_0: $\mu = \mu_0$ against H_1: $\mu \neq \mu_0$ when X follows Normal distribution with mean μ and variance σ^2, where μ and σ^2 are unknown.

   (4+6)

5. A) Define SPRT. State and prove Wald's Sequential Identity.

   B) Explain the concept of Pearson's Chi-square test for Goodness of fit test with the necessary assumptions.

   (5+5)

6. A) Write a short note on Rao's score test.

   B) Define the following terms in Interval estimation:

      i. Confidence sets
      ii. Pivotal quantity method
      iii. UMA confidence interval

   C) Write a short note on evaluating interval estimators using size and coverage probability. (2+4+4)

7. A) Let $X_1, X_2, \dots, X_n$ be a random sample from Uniform distribution over $(0,\ \theta)$. Find the shortest expected length confidence interval for θ.

   B) Let $X_1, X_2, \dots, X_n$ be a random sample from shifted exponential distribution with parameter θ. Obtain 100*$(1-\alpha)$% Uniformly Most Accurate lower bound for θ.

   (5+5)

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