22P256 (Pages: 2) Name: .....

Reg.No: .....

SECOND SEMESTER M.Sc. DEGREE EXAMINATION, APRIL 2023

(CBCSS - PG)

(Regular/Supplementary/Improvement)

CC19P MST2 C09 / CC22P MST2 C09 - TESTING OF STATISTICAL HYPOTHESES

(Statistics)

(2019 Admission onwards)

Time : 3 Hours Maximum : 30 Weightage

Part-A

Answer any ***four*** questions. Each question carries 2 weightage.

1. Find the null distribution of Kolmogorov-Smirnov one sample test.
2. Define (i) α similar test. (ii) UMP unbiased test.
3. (a) What do you mean by tests with Neyman structure. (b) Define UMP unbiased test.
4. Explain sign test.
5. Explain chi-square test for homogeneity.
6. What are the merits and demerits of SPRT over fixed sample size tests.
7. Define ASN function and derive the expression of ASN in sequencial statistical Inference.

(4 × 2 = 8 Weightage)

Part-B

Answer any ***four*** questions. Each question carries 3 weightage.

8. A sample of size 1 taken from a populaton distribution $P(\lambda)$. To test $H_0 : \lambda = 1$ against $H_1 : \lambda = 2$, consider the non-randomized test $\varphi(x) = \begin{cases} 1, & \text{if } x > 3 \\ 0, & \text{if } x \leq 3 \end{cases}$. Find the probabilities of Type I and Type II errors and the power of the test against $\lambda = 2$.
9. For the family of Neyman-Pearson tests show that the larger the α, the smaller the β(=P{Type II error}).
10. State and prove the assymptotic properties of LRT.
11. Describe
    (i) Chi-square test for goodness of fit. (ii) Kolmogorov Smirnov test for one sample.
12. Explain: (i) Kendal tau (ii) Robustness.
13. Show that SPRT terminates with probability one.
14. Define Operating chatacteristic function. Derive it from the fundamental identity of SPRT.

(4 × 3 = 12 Weightage)

Part-C

Answer any ***two*** questions. Each question carries 5 weightage.

15. State and prove Neyman Pearson lemma.

16. Let $X_1, X_2, \ldots, X_n$ taken from $N(\mu, \sigma^2)$, develop LRT for size α for testing $H_0 : \mu = \mu_0$ against $H_1 : \mu \neq \mu_0$. When σ_1, σ_2 known.

17. Explain :
    (a) Mann-Whitney Wilcoxon test.
    (b) Test for independence.
    (c) Median test.

18. Construct SPRT for testing $H_0 : \mu = \mu_0$ against $H_1 : \mu = \mu_1$, where μ is the mean of normal population with $\sigma = 1$.

(2 × 5 = 10 Weightage)

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