

19P261

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Name.....

Reg. No.....

SECOND SEMESTER M.Sc. DEGREE EXAMINATION, APRIL 2020

(CUCSS - PG)

CC15P MST2 C09 - TESTING OF STATISTICAL HYPOTHESES

(Statistics)

(2019 Admission - Regular)

Time: Three Hours

Maximum: 30 Weightage

PART A

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

1. (a) Define simple and composite hypothesis with example.
(b) Define Type I error, Significance level and Power of the test.
2. (a) What are most powerful test and uniformly most powerful test?
(b) Define UMP unbiased test.
3. (a) Define locally most powerful test.
(b) Define Bayesian test.
4. Explain Mann-Whitney-Wilcoxon test for two sample problem.
5. Explain Spearman rank correlation test.
6. Define SPRT. Explain its advantages.
7. (a) State Wald's identity.
(b) Define OC function of SPRT.

(4 x 2 = 8 Weightage)

PART B

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

8. State and prove Karlin-Rubin theorem.
9. Obtain the MP size α test for testing $H_0: \theta = \theta_0$ against $H_1: \theta = \theta_1 (> \theta_0)$, based on a sample of size n from $f_\theta(x) = e^{-(x-\theta)}, x \geq \theta$.
10. Let a random sample of size n drawn from a normal population with mean μ and variance σ^2 . Obtain likelihood ratio test of $H_0: \sigma^2 = \sigma_0^2$ against $H_1: \sigma^2 \neq \sigma_0^2$ when population mean μ is known.
11. (a) Define Kendall's tau. State its properties.
(b) Explain Chi-square test for homogeneity.
12. (a) Explain two sample Kolmogorov Smirnov test.
(b) Explain median test for two samples.

13. Let X have the distribution $f(x; \theta) = \theta^x(1 - \theta)^{1-x}$, $x = 0, 1$, $0 < \theta < 1$. Construct the SPRT for testing $H_0: \theta = \theta_0$ against $H_1: \theta = \theta_1$.
14. Define ASN function. Let $X \sim P(\lambda)$, Consider $H_0: \lambda = \lambda_0$ against $H_1: \lambda = \lambda_1 (\lambda > 0)$. Derive SPRT and find ASN of the test.

(4 x 3 = 12 Weightage)

PART C

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

15. (a) State and Prove generalized Neyman-Pearson lemma.
 (b) Obtain UMP test for testing $H_0: \theta < \theta_0$ against $H_1: \theta \geq \theta_0$ based on a sample of size n from $U(0, \theta)$.
16. (a) What is α - similar test? Show that an unbiased size α test with continuous power function is α - similar on the boundary.
 (b) Define invariant test. To test $H_0: X \sim N(\theta, 1)$, against $H_1: X \sim C(1, \theta)$, a sample of size two is available on X . Find a UMP invariant test of H_0 against H_1 .
17. Explain Wilcoxon signed rank test. Discuss its null distribution. What are the advantages of Wilcoxon signed rank test over sign test?
18. (a) Determine the expressions for the boundary values A and B of SPRT with strengths (α, β)
 (b) Show that SPRT terminates with probability one.

(2 x 5 = 10 Weightage)
