Third Semester M.Sc Degree Examination (CSS)

ST3C12 - STATISTICAL TESTING OF HYPOTHESIS

Time: 3 hours   Total Weights: 30

Part A

(*Answer any five questions. Weightage 1 for each question.*)

1. Define an unbiased test.

2. What is the significance of MLR property in testing of hypotheses?

3. Define LMP tests.

4. Define similar region tests.

5. Define ASN functions of SPRT.

6. What are the advantages of SPRT over fixed sample size tests?

7. Define UMAU confidence intervals.

8. What are the advantages of non-parametric tests over parametric tests?

Part B

(*Answer any five questions. Weightage 2 for each question.*)

9. When σ^2 is known, find the UMP test for testing $\theta \leq \theta_0$ against $\theta > \theta_0$ in uniform $(0, 1)$. Also obtain its power function.

10. Describe how a UMA confidence interval can be obtained based on a UMP test.

11. State and prove Wald's identity.

12. For an SPRT with bounds A and B and strength $(\alpha, \ \beta)$, obtain the inequalities connecting the tests.

13. Let X follows Poisson distribution with mean θ. Find SPRT for testing $H_0 : \theta = 1$ against $H_0 : \theta = 2$ where $\alpha = \beta = 0.1$.

14. Compare Kolmogorov-Smirnov and Chi-square tests for goodness of fit.

15. Describe Kruskal-Wallis test.

16. Give a suitable non parametric test for testing the equality of medians.

Part C

(***Answer any* three *questions. Weightage* 5 *for each question.***)

17. State and prove Neymann Pearson Lemma. Show that if a sufficient statistics exists for the family, the Neymann Pearson most powerful test is a function of it.

18. State and prove a set of sufficient conditions for a similar test to have Neymann structure.

19. Derive the asymptotic distribution of likelihood ratio test statistic.

20. Let $x_1, x_2, \ldots, x_n$ be a random sample $N(\mu, \sigma^2)$ where μ is known and σ^2 unknown. Find a UMA unbiased family of confidence intervals for σ^2 at level $1 - \alpha$.

21. Show that SPRT terminates with probability one.

22. (a) Explain Wilicoxon signed rank test procedure for location, stating the assumptions made.

    (b) Describe Mann-Whitney U-test.