LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

B.Sc. DEGREE EXAMINATION – **STATISTICS**

FIFTH SEMESTER – **APRIL 2024**

UST 5504 – TESTING OF HYPOTHESES

Date: 10-04-2024 Dept. No. Max. : 100 Marks

Time: 09:00 AM - 12:00 NOON

SECTION-A

Answer ALL the questions. **(10 x 2 = 20)**

1. What is null hypothesis and alternate hypothesis?
2. Define one-tailed test with example.
3. What is the difference between most powerful critical region and uniformly most powerful critical region?
4. State the ASN function for the SPRT for testing H_o: $\theta = \theta_0$ against H_1: $\theta = \theta_1$.
5. State the assumptions for F test.
6. What is Monotone Likelihood ratio?
7. Write any two uses of Chi-square test.
8. What is the need for non-parametric hypothesis testing?
9. Define run test.
10. What is the difference between critical value and the p-value?

SECTION-B

Answer any FOUR questions. **(4 x 10 = 40)**

11. Describe the steps involved in testing statistical hypothesis.
12. Give an example for a family of distributions which does not possesses MLR property and prove.
13. Let X have a binomial distribution resulting from n trials each with probability p of success. Given α ,find the most powerful critical region of the null hypothesis $H_0 : p = p_0$ against $H_1 : p = p_1 (p_0 > p_1)$.
14. Explain the various steps involved in sequential probability ratio test.
15. Derive a likelihood ratio test for testing the variance of a single normal population $N(\mu, \sigma^2)$.
16. Let p be the proportion of smoker in a certain city. You desire to test the hypothesis $H_0 : p=1/2$ against H_1: $p=3/4$ and if you reject the null hypothesis when 60 persons or more found smokers in a sample of 100 persons, compute the significance level and power of the test.
17. The score of 10 candidates' performance before and after training are given below. Test whether the given training is effective.

prior	84	48	36	37	54	69	83	96	90	65
after	90	58	56	49	62	81	84	86	84	75

18. What are the differences between parametric and non-parametric testing of hypothesis?

SECTION-C

Answer any TWO questions. **(2 x 20 =40)**

19. (a) Explain the concept of critical region.
    (b) State and prove Neyman Pearson lemma. **(5+15)**
20. Let $X_1, X_2,\ldots X_n$ be a random sample from the Exponential with parameter θ. Show that there exists no UMP critical region for testing $H_0: \theta = \theta_0 \;\; Vs\; H_1: \theta \neq \theta_0$.

21. (a) Derive a likelihood ratio test for testing the equality of means of two normal populations when σ^2 is known.
    (b) Explain the test of independence of attributes in contingency tables. **(10+10)**
22. (a) Explain the procedure of Wilcoxon signed rank test.
    (b) Write the method to test the significance of equality of two population proportions. **(10+10)**

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