LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

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

FIFTH SEMESTER – **NOVEMBER 2023**

UST 5504 – TESTING OF HYPOTHESES

Date: 10-11-2023 Dept. No. Max. : 100 Marks

Time: 09:00 AM - 12:00 NOON

SECTION-A

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

1. Define type I error and type II error.
2. Define two-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 Student's t-test.
6. What is Monotone Likelihood ratio?
7. Write any two uses of Chi-square test.
8. State any two differences between parametric and non-parametric hypothesis testing.
9. Define run test.
10. What is the difference between critical value and the p-value?

SECTION-B

Answer any FIVE questions. **(5 x 8 = 40)**

11. Explain the concept of critical region.
12. Give an example for a non-exponential family of distributions which possesses MLR property and prove.
13. Obtain the most powerful test of size α for testing H_0: $\sigma = \sigma_0$ Vs H_1: $\sigma = \sigma_1$ in $N(0, \sigma^2)$.
14. Explain the various steps involved in sequential probability ratio test.
15. Derive a likelihood ratio test for testing the mean 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. Write the method to test the significance of equality of two population proportions.

SECTION-C

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

19. (a) Describe the steps involved in testing statistical hypothesis.
    (b) State and prove Neyman Pearson lemma. (8+12)

20. (a) 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 H0: $\theta = \theta_0$ $Vs\ H_1: \theta \neq \theta_0$.

(b) 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 $H_1 : p = p_1 (p_0 > p_1)$. (10+10)

21. (a) The hypothesis $\mu=50$ is rejected if the mean of a sample of size 25 is either greater than 70.54 or less than 31.19. Assuming the distribution to be normal with s.d. 50, find the level of significance. Also obtain the power of the test.

(b) Explain the test of independence of attributes in contingency tables. (10+10)

22. (a) Explain the procedure of Mann-Whiteney U-test.
(b) Explain Sign test for one sample.

(10+10)

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