LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

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

FIFTH SEMESTER – **NOVEMBER 2022**

UST 5504 – TESTING OF HYPOTHESES

Date: 02-12-2022 Dept. No. Max. : 100 Marks

Time: 09:00 AM - 12:00 NOON

Part A

Answer ALL the Questions **(10x2=20 Marks)**

1. What do you mean by Alternative hypothesis?
2. Define Critical region.
3. State the monotonic likelihood ratio test.
4. Define a uniformly most powerful test.
5. State the likelihood ratio tests.
6. What is meant by sequencial probability ratio test?
7. What is meant by the term ‘Significally significant’?
8. What are the assumptions of t-test?
9. What do you mean by non-parametric testing?
10. What is a Run ?

Part B

Answer any FIVE questions: **(5×8=40 Marks)**

11. Describe the unbiased test and unbiased critical region.
12. Examine whether a best cirtical region exists for testing the null hypothesis $H_0 : \theta = \theta_0$ against $H_1 : \theta > \theta_0$ for the parameter θ of the distribution :

$$f(x,\theta) = \frac{1+\theta}{(x+\theta)^2} \quad ,1 \leq x < \infty$$

13. If W be a most powerful critical region of size α for testing $H_0: \theta = \theta_0$ against $H_1: \theta = \theta_1$, prove that it is necessarily unbiased.
14. Explain the concept of Sequential probability ratio test for testing H_0 against H_1.
15. Discuss the test procedure for testing the significance of difference between two means for large samples.

16. Two independent samples of 10 and 8 items respectively had the following values:

Sample I	5	6	8	1	12	4	3	9	6	10
Sample II	2	3	6	8	1	10	2	8	-	-

Is the difference between the means of samples significant.

17. Explain the main difference between parametric and non- parametric approaches to the theory of statistical inference.

18. Suppose playing four rounds of golf at the Mumbai club 11 professionals totalled

250, 252, 260, 243, 253, 253, 245, 254, 252, 249 and 251.

Use the Sign test at 5% level of significance to test the null hypothesis that professional golfers average $\mu = 254$ for four rounds against the alternative $\mu<254$.

Part –C

Answer any TWO questions **(2 X 20=40 Marks)**

19. a. Given a random sample $x_1, x_2, \ldots\ldots x_n$ from the distribution with pdf $f(x,\theta) = \theta e^{-\theta x}$, $x>0$, show that there exist no UMP test for testing $H_0 : : \theta = \theta_0$ against $H_1 : : \theta \neq \theta_0$ **(10)**

b. Let X have a probability density function of the form $f(x,\theta) = \begin{cases} \frac{1}{\theta} e^{-x/\theta}; & 0 < x < \infty, \theta > 0 \\ 0 \quad ; & \text{elsewhere} \end{cases}$.

To test H_0: $\theta = 2$, against H_1: $\theta = 1$, use the random sample x_1, x_2 of size 2 and define a critical region $W = \{(x_1, x_2): 9.5 \leq x_1 + x_2\}$. Find (i) power of the test (ii) Significance of the test. **(10)**

20. State and prove Neyman Pearson lemma.

21. Given a random sample of size n from N (μ, σ^2), derive the likelihood ratio test for testing H_0: $\mu = \mu_o$ against

H_1: $\mu \neq \mu_0$, where μ and σ_2 are unknown.

22. a) Explain median test and obtain its mean and variance. **(10)**

b) Explain the procedure of applying Mann Whitney Wilcoxon test. **(10)**

****