

SHRIMATHI DEVKUNVAR NANALAL BHATT VAISHNAV COLLEGE FOR WOMEN
(AUTONOMOUS)

(Affiliated to the University of Madras and Re-accredited with 'A+' Grade by NAAC)
Chromepet, Chennai - 600 044.

B.Sc.Statistics - END SEMESTER EXAMINATIONS - APRIL 2025
SEMESTER - V

20USTCT5009 - Statistical Inference - II

Total Duration : 2 Hrs.30 Mins.

Total Marks : 60

Section B

Answer any **SIX** questions ($6 \times 5 = 30$ Marks)

1. Explain power of a test and Most powerful test.
2. If $x \geq 1$ is the critical region for testing $H_0 : \theta = 2$ against $H_1 : \theta = 1$, on the basis of the single observation from the population, $f(x, \theta) = \theta \exp(-\theta x)$, $0 \leq x \leq \infty$, Obtain the values of type I and type II errors.
3. Write short notes on power function and curve.
4. Explain the likelihood ratio tests in testing of hypothesis.
5. Describe Mann-Whitneys U test by specifying appropriate hypothesis.
6. Derive the procedure for median test in non-parametric.
7. Explain the concept of loss and risk functions.
8. Let X have the distribution: $f(x, \theta) = \theta^x(1 - \theta)^{1-x}$; $x = 0, 1$; $0 < \theta < 1$. For testing $H_0 : \theta = \theta_0$ against $H_1 : \theta = \theta_1 (> \theta_0)$, obtain the OC function in $SPRT$.

Section C

Answer any **THREE** questions ($3 \times 10 = 30$ Marks)

9. State and prove Neyman Pearson lemma.
10. Prove that uniformly most powerful critical region is necessary unbiased, if W be an $MPCR$ of size α for testing $H_0 : \theta = \theta_0$ against $H_1 : \theta = \theta_1$
11. A random sample of size n from $N(\mu, \sigma_2)$, construct the likelihood ratio test for testing $H_0 : \mu = \mu_0$ against $H_1 : \mu = \mu_1$, when σ_2 is unknown
12. Describe the Kolmogrov - Simrnov one sample and two sample tests.
13. Given the $SPRT$ for testing $H_0 : \theta = \theta_0$ against $H_1 : \theta = \theta_1 : \theta_1 > \theta_0$ in sampling from a normal distribution.

$$f(x, \theta) = \frac{1}{\sigma\sqrt{2\pi}} \exp\left[-\frac{1}{2}\left(\frac{x - \theta}{\sigma}\right)^2\right], -\infty < x < \infty$$

Here σ is known, also obtain its OC function and ASN function.
