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.Mathematics - END SEMESTER EXAMINATIONS - APRIL 2025
SEMESTER - IV

20UMAAT4004 - Mathematical Statistics - II

Total Duration : 2 Hrs.30 Mins. Total Marks : 60

Section B

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

1. Derive the students t- distribution.
2. Find the $M.G.F$ of χ^2 distribution.
3. If T is an unbiased estimator for θ. Show that T^2 is a biased estimator for θ^2.
4. Write the properties of maximum likelihood estimators.
5. Obtain the maximum likelihood estimate of θ $inf(x, \theta) = (1 + \theta)x^{\theta}$, $0 < x < 1$ based on an independent sample of size n. Examine whether this estimate is sufficient for θ.
6. Write the procedure for testing of hypothesis.
7. Show that the $S.E$ of mean of a random sample of size n from a population with variance σ^2 is $\sigma/\sqrt{n}$.
8. Write the applications of t distribution.

Section C

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

9. Derive the F - distribution.
10. State and prove the Cramer - Rao inequality.
11. In random sampling from normal population $N(\mu, \sigma^2)$, find the maximum likelihood estimators for
    (i) μ when σ^2 is known.
    (ii) σ^2 when μ is known.
    (iii) the simultaneous estimation of μ and σ^2.
12. Explain to test of significance for difference of proportions (Large samples).
13. Prove that chi square test of independence gives
    $\chi^2 = (N(ad - bc)^2)/(a + c)(b + d)(a + b)(c + d)$ $N = a + b + c + d$
    using 2 x 2 contingency table.

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