Roll.No. | 20UMAAT4004

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 - NOVEMBER 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 m.g.f of the chi-square distribution.
2. Describe the relationship between chi square and F distribution.
3. Let $x_1, x_2, \ldots, x_n$ be a random sample from a uniform population on [0,θ]. Find a sufficient estimator for θ.
4. Estimate α and β for the following distribution by the method of moments. f(x,α, β) $= \frac{\beta^\alpha}{\Gamma(\alpha)} x^{\alpha-1} e^{-\beta x}, 0 \leq x < \infty$.
5. State Neyman Fisher
   a) Factorization Theorem
   b) State Rao- Blackwell Theorem.
6. If x ≥ 1,is the critical region for testing $H_0 : \theta = 2$ against the alternative $H_1 : \theta = 1$ on the basis of the single observation from the population f(x;θ)=$\theta e^{-\theta x}, 0 \leq x < \infty$. Obtain the values of type I and type II errors.
7. Explain about t test for difference of means
8. For 2 x 2 contingency table

a	b
c	d

   Prove that the chi square test of independence is $\chi^2 = \frac{N(ad-bc)^2}{(a+c)(b+d)(a+b)(c+d)}$

Section C

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

9. Derive the Snedecor's F distribution.
10. State and prove Cramer-Rao's inequality.
11. Explain about the test of significance for difference of proportions.
12. Explain about chi-square test for independence of attributes.

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13. A random sample form N(μ, σ^2),find the MLE for (i)μ when σ^2 is known (ii)σ^2 when μ is known and (iii) the simultaneous estimation of μ and σ^2.

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