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 r^{th} raw moment of F-distribution.
2. State and prove the additive property of chi-square distribution.
3. Explain about the invariance property of consistent estimator.
4. Estimate α and β for the following distribution by the method of moments.
   $f(x;\alpha,\beta)= \frac{\beta^{\alpha}}{\Gamma(\alpha)}x^{\alpha-1}e^{\beta x}, 0 \leq x < \infty.$
5. Given one observation from a population with p.d.f.
   $f(x;\theta)=\frac{2}{\theta^2}(\theta - x), 0 \leq x \leq \theta$: Obtain 100(1 - α)% confidence interval for θ.
6. Write the procedure for testing of hypothesis.
7. Explain about F test for equality of variances.
   For 2 x 2 contingency table

a	b
c	d

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

Section C

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

9. Derive student's t – distribution.
10. State and prove Cramer-Rao's inequality.

Contd...

11. Show that in a random sample from a distribution with p.d.f. $f(x;\theta) = \theta e^{-\theta x}, x \geq 0;$ $1/\ \overline{X}$ is the MLE for θ and has greater variance than the unbiased estimator $(n-1)/(n\ \overline{X})$.

12. Explain about chi-square test for independence of attributes.

13. Explain the following terms as used in hypothesis testing
    (i) Test of significance
    (ii)Null Hypothesis - Alternate Hypothesis
    (iii) Type I error - Type II error
    (iv) one Tailed test - Two Tailed test.

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