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.(Maths) END SEMESTER EXAMINATIONS NOVEMBER -2023
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. Find the Moment Generating Function of Chi-Square Distribution
2. State and Prove Rao-Blackwell theorem.
3. Find the maximum likelihood estimate for the parameters λ of a Poisson Distribution on the basis of a sample size n. Also find its Variance
4. Outline the Procedure for testing of Hypothesis problem in a systematic manner.
5. Prove that if $n_1 = n_2$, the median of F-distribution is at F=1 and that the quartiles Q_1 and Q_3 satisfy the condition $Q_1Q_3 = 1$
6. For a Chi-Square distribution with n degrees of freedom, establish the recurrence relation between the moments. Also find β_1 and β_2.
7. State and Prove Invariance Property of Consistent Estimators.
8. Obtain 100(1-α)% confidence limits(for large samples) for the parameter λ of the Poisson Distribution.

Section C

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

9. Derive Probability Density function of Chi- Square distribution.
10. State and Prove Cramer-Rao Inequality.
11. List the commonly used methods of Estimation. Also discuss about the Maximum Likelihood Estimator assumptions which is also known as the Regularity Conditions.
12. Explain in detail:
    i). Null and Alternative Hypotheses
    ii). Errors in Sampling
    iii). Critical Region and Level of Significance
    iv). One-tailed and Two-tailed tests
    v). Critical values or Significant Values

Contd...

13. If the random variables X_1 and X_2 are independent and follow Chi-Square distribution with n degrees of freedom, Deduce that $\sqrt{n(X_1 - X_2)}/2\sqrt{X_1 X_2}$ is distributed as Student's t with n degrees of freedom independently of $X_1 + X_2$.

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