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.
M.Sc. - END SEMESTER EXAMINATIONS NOVEMBER - 2022
SEMESTER - I
22PAMET1001 - Probability and Distributions

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

Section A

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

1. Find the mean and variance of Poisson distribution.
2. Let (X, Y) be jointly distributed with probability density function,
   f (x, y) = 2, 0 < x < y < 1 and f (x, y) = 0 otherwise.
   Find the marginal probability distribution functions of X and Y.
3. Find the moment generating function of bivariate normal distribution.
4. Find the mean and variance of F distribution.
5. Let $\{X_n\}$ be a sequence of random variables such that $X_n \xrightarrow{2} X$. Then show that, $EX_n \to EX$ and $EX_n^2 \to EX^2$ as $n \to \infty$.
6. Find the moment generating function of Uniform distribution.
7. State and prove additive property of Chi-square distribution.
8. Show that, $E(h(X)) = E\{E\{h(X) \mid Y\}\}$ if $E(h(X))$ exists.

Section B

Part A

Answer any **TWO** questions $(2 \times 10 = 20$ Marks)

9. Find the moment generating function of Binomial distribution and also find mean and variance.
10. Let X_1,X_2 be independent random variables with common density given by
    $f(x) = \begin{cases} 1 & 0 < x < 1 \\ 0 & otherwise \end{cases}$ Let $Y_1 = X_1 + X_2$,$Y_2 = X_1$ - X_2.
    Find joint pdf, marginal pdf of Y_1 and Y_2.

Contd...

11. Let $X = (X_1, X_2, ...X_n)$ be an n-dimensional random variable with a normal distribution. Let Y_1,Y_2,...Y_k,$k \leq n$, be linear function of X_j(j=1, 2, ...,n). Then, show that, (Y_1,Y_2,...Y_n) also has a multivariate normal distribution.

12. Find the moment generating function of t-distribution and find its mean and variance.

Part B

Compulsory question $(1 \times 10 = 10$ Marks)

13. State and prove Lindberg-Levy form of central limit theorem.

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