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.(Appl.Maths) END SEMESTER EXAMINATIONS NOVEMBER - 2023
SEMESTER - I
**22PAMET1001 - Probability and Distributions**

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

## Section B

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

1. If X is a Poisson variate such that $P(X = 2) = 9\,P(X = 4) + 90\,P(X = 6)$. Interpret the mean and variance of X.
2. Apply moment generating function, to find the mean and variance of Geometric distribution.
3. Use chi square variate X with n d.f. to prove that for large n $\sqrt{2X} \sim N(0, 1)$.
4. Show that the central limit theorem holds good for a sequence $\{X_k\}$, if $P\{X_k = \pm K^{\alpha}\} = \frac{1}{2} K^{-2\alpha},\ P\{X_k = 0\} = 1 - K^{-2\alpha},\ \alpha < \frac{1}{2}$
5. Let$f(x, y) = \begin{cases} 8xy, & 0 < x < y < 1 \\ 0, & otherwise \end{cases}$.
   Obtain $E\,(Y/X = x)\ and\ Var(Y/X = x)$.
6. Derive the probability generating function of bivariate Poisson distribution.
7. Explain and derive the pdf Student’s t – distribution.
8. Compare convergence in r$^{th}$ mean and convergence in probability.

## Section C

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

9. Define Poisson function. Find MGF, mean and variance of Poisson function.
10. If $f(x, y) = e^{-(x+y)},\ I_{(0,\infty)}(x), I_{(0,\infty)}(y)$ separate joint density by marginal density function.
11. Obtain the moment generating function of bivariate normal distribution.
12. Write about Snedecor’s F distribution and derive it.

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

13. State and Prove Central Limit Theorem.

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