M.Sc. DEGREE EXAMINATION,NOVEMBER 2018
I Year I Semester
Core Elective -I
PROBABILITY AND DISTRIBUTIONS

Time : 3 Hours **Max.marks :75**

Section A $(10 \times 2 = 20)$ Marks

Answer any **TEN** questions

1. Write the mean and variance of negative Binomial distribution
2. Obtain the moment generating function of Uniform distribution.
3. If $\mathbf{f}(\mathbf{x}, \mathbf{y}) = e^{-(x+y)}$; 0 < x < 8, 0 < y < 8, obtain the distribution function of (X,Y)
4. Define Conditional variance.
5. Define Bivariate normal distribution.
6. Write the probability function of bivariate Poisson distribution.
7. Write the mgf of Chi-square distribution.
8. Define T-Statistic.
9. Write the mean and variance of F distribution.
10. Define convergence in probability.
11. Give two examples of stable distribution.
12. Define moment generating function of (X,Y).

Section B $(5 \times 5 = 25)$ Marks

Answer any **FIVE** questions

13. Obtain the moment generating function of multinomial distribution.
14. Establish the additive property of normal distribution.
15. If X_1, X_2 and X_3 be iid random variables with f(x)= $\begin{cases} e^{-x}, x > 0 \\ 0, otherwise \end{cases}$

    then show that $Y_1 = X_1 + X_2 + X_3$,$Y_2 = \dfrac{X_1 + X_2}{X_1 + X_2 + X_3}$ and $Y_3 = \dfrac{X_1}{X_1 + X_2}$ are independant.

16. If X and Y are jointly distributed with density function $\mathbf{f}\,(\mathbf{x},\mathbf{y}) = e^{-x-y}$, 0 < x < 8. 0 < y < 8, show that X and Y are independent

17. Obtain mean and variance of bivariate Poisson distribution.

18. Establish the relationship between t and F.

19. Define (i) convergence in distribution (ii) convergence in rth moment (iii) convergence almost surely.

Section C $(3 \times 10 = 30)$ Marks

Answer any **THREE** questions

20. Obtain mean, median and mode of normal distribution.

21. (i) Define bivariate moment generating function (ii) For a positive random variable with finite first moment show that (a) E$\sqrt{x} \leq \sqrt{EX}$ and (b) E[1/X] $\geq$ 1/EX

22. If (X,Y) has a bivariate normal distribution, show that X and Y are independent if and only if $\rho = 0$

23. If X follows Chi-square distribution with n d.f then S.T. lim P$\{\sqrt{2X} - \sqrt{2n-1} \leq$ z$\}$ $= \int_{-\propto}^{\propto} \frac{1}{\sqrt{2\pi}}\, e^{-y^2}/2\, dy$

24. State and prove Lindeberg-Levy Central Limit theorem.

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