M.Sc DEGREE EXAMINATION,APRIL 2019
I Year I Semester
Probability and Distributions

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

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

Answer any **TEN** questions

1. Define sample space with an example.
2. State the axioms of probability.
3. Let the random variable X take the values 2 and 4 with probabilities P(X=2) = 0.2 and P(X=4) =0.8. Find E(X^2).
4. Define characteristic function of the random variable X.
5. When two random variables are said to be independent? Give an example.
6. What is meant by conditional variance?
7. Obtain mean of Binomial distribution.
8. Write down the density function of multinomial distribution.
9. Define convergence in probability.
10. When does strong law of large numbers hold for sequence of random variables?
11. Give any two applications of central limit theorem.
12. Obtain moment generating function of Poisson distribution.

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

Answer any **FIVE** questions

13. Establish Bon-Ferroni's inequality.
14. State and prove uniqueness theorem on characteristic function.
15. (X,Y) is a two-dimensional random variable with density function Find the conditional mean of$f(x,y) = \begin{cases} \frac{2}{3}(x+2y), & 0 < x < 1,\, 0 < y < 1 \\ 0 & otherwise \end{cases}$
16. Obtain moment generating function of Hyper-Geometric distribution.
17. Derive Liapounoff's central limit theorem.
18. State and prove Chebychev's inequality.
19. In a certain community, 8% of all adults over 50 have diabetes. If a doctor in this community correctly diagnoses 2% of all person without diabetes as having the disease, what is the probability that an adult over 50 diagnosed by this doctor as having diabetes actually has the disease.

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

Answer any **TWO** questions

20. State and prove Boole's inequality.
21. Obtain Liapounoff's inequality.
22. Define joint distribution function and derive its properties.
23. Establish mean and variance of two parameter gamma distribution.
24. Derive Lindberg-Levy central limit theorem.

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