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. Statistics - END SEMESTER EXAMINATIONS APRIL - 2024
SEMESTER - I
20USTCT1002 - Probability and Random Variable

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

Section B

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

1. State and prove addition theorem of probability.
2. Illustrate the properties of Distribution function in detailwith proof.
3. Compute the values of (a) E(X), (b) E(X^2), (c) E(2X +1), (d) V(X) and (e) V(2X) for the following probability distribution.

x	-3	6	9
P(X=x)	1/6	1/2	1/3

4. State and prove any two properties of cumulant generating function.
5. State and prove multiplication theorem of probability.
6. Show that Two random variables X and Y with joint pdf f(x,y) are stochastically independent if and only if $f_{X,Y}(x, y)$ can be expressed as the product of a non-negative function of x alone and a non-negative fucntionof u alone.
7. State and prove the addition theorem of expectation.
8. Examine the statement and meaning of Central limit theorem.

Section C

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

9. State and prove Boole's Inequality.
10. A factory produces a certain type of outputs by three types of machines. The daily production of Machine I, II and III are 3000, 2500 and 4500 units respectively. Past experience shows that 1% , 1.2% and 2% of the outputs produced by machine I, II and III respectively are defective.
    An item is drawn at random from the days production run and is found to be defective. What is the probability that it comes from the output of
    a))Machine I b)Machine II Machine III?

Contd...

11. Determine the values of (i) P(X=1, Y=2), (ii) P(X=1), (iii) P(Y=3) and (iv) P(x<3, Y=4) for the bivariate probability distribution values of X and Y.

		Y					
		1	2	3	4	5	6
X	0	0	0	1/32	2/32	2/32	3/32
	1	1/16	1/16	1/8	1/8	1/8	1/8
	2	1/32	1/32	1/64	1/64	0	2/64

12. State and prove Chebychev's Inequality.

13. Examine the various properties of Characteristic function.

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