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 - NOV'2024
SEMESTER - I
20USTCT1002 - Probability and Random Variables

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

Section B

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

1. For any two events A and B show that P($\bar{A} \cap$ B) = P(B) - P(A∩B)
2. Let X be a random variable with the following probability distribution

x:	-3	6	9
P(x):	1/6	1/2	1/3

   Compute variance of the random variable X.
3. If two dice are thrown, compute the probability of getting neither 7 nor 11.
4. Explain the multiplicative law of probability for two independent events.
5. State and prove the addition theorem of probability for two events.
6. Two random variables X and Y have the following joint probability density function

$$f(x,y) = \begin{cases} 2-x-y, & 0 \le x \le 1, 0 \le y \le 1 \\ 0, & otherwise \end{cases}$$

   Compute the Marginal probability density functions of X and Y.
7. List any five properties of characteristic function.
8. Distinguish between convergence in probability and convergence in distribution

Section C

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

9. Solve Boole's Inequality.
10. The probability of X, Y and Z becoming managers are 4/9, 2/9 and 1/3 respectively. The probability that the bonus scheme will be introduced if X, Y and Z becomes managers are 3/10, 1/2 and 4/5 respectively.
    (i) Compute the probability that the bonus scheme will be introduced.
    (ii) If the bonus scheme has been introduced compute the probability that the manager appointed was X.

Contd...

11. A random variable X has the following probability function

X	0	1	2	3	4	5	6	7
P(x)	0	k	2k	2k	3k	k^2	$2k^2$	$7k^2+k$

Determine the value of k

(i) Evaluate P(0< X<5)

(ii) If P(X≤a)>1/2.

Determine the minimum value of a

12. If X and Y are two independent random variables then solve the following

(i) E(X+Y)=E(X)+E(Y) (ii) E(XY)=E(X)E(Y)

13. Evaluate the effect of change of origin and scale on moment generating function

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