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-2023
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. State multiplication theorem of probability and establish it.
2. Compute the Probability of complementary event A namely $\bar{A}$is given by $P(\bar{A}) = 1 - P(A)$
3. A discrete random variable x has the probability function

X	1	2	3	4	5	6	7	8
P(X)	2a	4a	6a	8a	10a	12a	14a	4a

Find a.

4. A random variable X can only take the values of 2 and 5. Given that the value 5 is twice as likely the value 2. Solve the expectation of X.
5. State (a) Central limit theorem. (b) Convergence in probability.
6. Prove that V(X) = V(E(X/Y)) + E(V(X/Y)).
7. State and prove Baye's theorem.
8. Explain characteristic function. State the properties of a characteristic function.

Section C

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

9. State and prove Boole's inequality.
10. Five men in a company of 20 are graduates. If 3 men are pickend out from this 20 persons at random, Solve the probability that
    (i) all are graduates (ii) at least one is graduate
11. If two random variables X and Y have the joint probability density function.

$$f(x,y) = \begin{cases} \frac{2}{3}\,(x+2y)\,dx & for\ 0 < x < 1\,,\ 0 < y < 1 \\ 0 & otherwise \end{cases}$$

Determine the probability that x will assume a value on the interval given that y = 1/2.

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12. State and prove Chebychev's inequality.
13. Examine the Statement of
    (i) Uniqueness theorem (ii) Weak law of large numbers.

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