

Enroll No.....

Roll No.....

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New Delhi-110062
Odd Semester Examination-2023
(SUPPLEMENTARY EXAM)

Paper Name: Mathematics-III
Time: 3 Hours

Paper Code: BTCSE-311
Maximum Marks: 75

Note: Mobile Phones or programmable calculator or any equipment with memory are not allowed inside the examination hall. Follow proper numbering for answering the questions.

Attempt all questions from section A (7*5=35), Any four questions from section B (4*10=40).

Section-A (Attempt all questions 7*5=35)

Q.N.	Questions	Marks	CO	BL
1	Compute the variance of the probability distribution of the number of doublets in four throws of a pair of dice.	5	CO2	1
2	A bag contains 3 red and 4 black balls. Three balls are drawn one by one without replacement. Find the probability that all are red.	5	CO1	L3
3	Write a note on (a)Conditional probability (b)Bayes theorem	5	CO 1	5
4	Find the conditional probability density function where Joint probability density function $f(x,y) = 8xy$ for $0 \leq x \leq y \leq 1$ and $f(x,y) = 0, elsewhere$.	5	CO3	4
5	If X is a random variable, then find k so that the function $f(x) = \begin{cases} 0 & \text{for } x \leq 0 \\ kxe^{-4x^2} & \text{for } x > 0 \end{cases}$ can serve as the probability density function of X .	5	CO2	1
6	Write a note on Power Spectral Density function.	5	CO5	3
7	A wholesaler in apples claims that only 4% of the apples supplied by him are defective. A random sample of 600 apples contained 36 defective apples. Test the claim of the wholesaler at 5% level of significance.	5	CO4	4

Section- B (Attempt any four questions 4*10=40Marks)

Q.N.	Questions	Marks	CO	BL
1	State and prove Chebyshev's Theorem.	10	CO3	1
2	There are three bags. The first bag contains 4 white and 5 red balls, the second contains 2 white and 3 red balls, and the third bag contains 3 white and 5 red balls. A bag is chosen at random and a ball is selected. The ball turns to be red. Find the probability that the ball is selected from first bag.	10	CO1	3
3	If the joint distribution of (X,Y) is given by $f(x,y) = \frac{x+y}{21}, \quad x=1,2,3 \quad \text{and} \quad y=1,2$ then find the marginal distributions.	10	CO3	5
4	Consider a random process $\{X(t)\}$ such that $X(t) = A\cos(\omega t + \theta)$ where A and ω are constants and θ is a uniform random variable distributed in the interval $(-\pi, \pi)$. Check whether the process $\{X(t)\}$ is stationary or not.	10	CO2	4
5	State and prove Mean Ergodic Theorem.	10	CO5	1
6	A coin was to be used 400 times and the head turned up 216 times. Test the hypothesis that coin is unbiased.	10	CO4	5

BL-Bloom's Taxonomy Levels

(1. Remembering, 2. Understanding, 3. Applying, 4. Analysing, 5. Evaluating, 6. Creating.)