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Even Semester Examination-2023

Paper Name: Fundamental of Probability and Statistics

Paper Code: BCA-401

Total Marks: 75

Total Time: 3 hrs.

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

Attempt all questions from section A, any Four questions from section B and any Two questions from section C.

[SECTION-A]

All questions are compulsory. True or False & Fill in the blanks.

[35 Marks]

Q. No.	Questions	Marks	CO	BL
1	True/False; If A and B are any two events defined on a sample space S and $A \cup B = \emptyset$, then the events A and B are said to be mutually exclusive.	1	CO1	L1
2	True/False; For a continuous random variable, the CDF is the derivative of the PDF.	1	CO2	L2
3	True/False; In the case of Continuous distribution Cumulative Distribution Function gives the area under the PDF from $-\infty$ to x .	1	CO3	L1
4	True/False; If CV of any data is less it means the data is less stable.	1	CO4	L4
5	True/False; If Mode is ill defined then Mode =	1	CO3	L1
6	The β_1 is the measures of..... and given by.....	1	CO4	L4
7	The β_2 is the measures of..... If $\beta_2 < 3$ and $\gamma_2 < 0$ then the curve is.....	1	CO5	L4
8	An event in the probability that will never happened is called.....	1	CO1	L1
9	What will be the value of P(not E) if P(E) = 0.07 ?	1	CO1	L5
10	What will be the probability of getting odd numbers if a dice is thrown ?.....	1	CO2	L5
11	The sum of all probabilities equal to.....	1	CO2	L1
12	The probability of each event lies between.....	1	CO3	L5

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13	The probability of drawing an ace card from a deck of card is.....	1	CO4	L2
14	A dice is thrown, the probability of getting 1 and 5 is.....	1	CO2	L2
15	A batsman hits the boundaries for 6 times out of 30 balls. Find the probabilities that he did not hit the boundaries.....	1	CO2	L6
16	The expected value or..... of a random variable is the center of its distribution. (a): Mode (b): Median (c): Mean (d): Random Value.	1	CO4	L2
17	Which of the following of a random variable is a measure of spread. (a): Standard Variance (b): Variance (c): Empirical Mean (d): All of them	1	CO4	L2
18	The square root of the variance is called the.....	1	CO3	L1
19	The probability of getting Two tails and One head when Three coins are tossed.	1	CO1	L2
20	What is the probability of getting the sum as a prime number if two dice are thrown?	2	CO2	L3
21	Suppose a number x is chosen from the numbers -2, -1, 0, 1, 2. What will be the probability of $x^2 > 0$?	2	CO1	L4
22	The probability of randomly selecting a rotten apple is 0.18 from the heap of 900 apples. So, what is the number of rotten apples in a heap?	2	CO2	L5
23	If A and B are mutually exclusive events of an experiments. If $P(\text{not } A) = 0.65$, $P(A \cup B) = 0.65$, and $P(B) = p$. Find p .	2	CO1	L5
24	Determine the value of 'C' so that the following function can serve as a probability distribution of the discrete random variable x . $f(x) = c(x + 4)$, for $x = 0, 1, 2, 3$.	2	CO4	L4
25	Find which of the following is a Continuous random variable? (a): No. of kids in a family (b): No. of planets around the sun (c): No. of tails tossing a coin four times (d): Life of an Electric fan.	1	CO3	L1
26	In a Binomial distribution, successive trials are (a): Mutually exclusive (b): Dependent (c): Independent (d): None.	1	CO2	L1
27	If the coefficient of variation is 100, the mean of the data is 25, then find the standard deviation.	1	CO3	L2
28	If $r = 0$, then there is.....Correlation.	1	CO5	L1
29	Two lines of regression become perpendicular to each other if $r = \dots$	1	CO5	L2
30	Poisson distribution is an approximation of the Binomial distribution as $n \rightarrow \dots$ and $p \rightarrow \dots$	1	CO2	L1

SECTION-B

Attempt any FOUR questions.

[20 Marks]

	Questions	Mark s	CO	BL
1	Four cards are drawn from a pack of cards. Find the Probability that (i): all are diamonds (ii): there is one card of each suit, (iii): there are two spades and two hearts.	5	CO 1	L4

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2	The incidence of occupational disease in an industry is such that workers have a 20% chance of suffering from it. What is the probability that out of six workers chosen at random, four or more will suffer from the disease?	5	CO 2	L5	
3	Let X denote the number of heads in a single toss of 4 fair coins. Determine (i): $P(X < 2)$ and (ii): $P(1 < X \leq 3)$.	5	CO 3	L4	
4	The density function of a random variable X is $f(x) = \begin{cases} e^{-x}, & x > 0 \\ 0, & \text{elsewhere} \end{cases}$ Find $E(X)$, $E(X^2)$ and $\text{Var}(X)$.	5	CO 4	L2	
5	Calculate the median and mode of the following data.	5	CO 3	L5	
	No. of days absent				Cumulative Frequency
	Less than 5				29
	Less than 10				224
	Less than 15				465
	Less than 20				582
	Less than 25				634
	Less than 30				644
	Less than 35				650
	Less than 40				653
Less than 45	655				
6	Compute the co-efficient of skewness, Standard Deviation from the following items. 25, 15, 23, 40, 27, 25, 23, 25, 20. Where Assumed Mean is considered.	5	CO 1	L4	

SECTION-C

Attempt any TWO questions.

[20 Marks]

Q. No.	Questions	Marks	CO	BL
1	(a): An insurance Company insured 2000 scooter drivers, 4000 car drivers and 6000 truck drivers. The probability of accident is 1%, 3% and 15% resp. One of the insured persons meets an accident. What is the probability for each driver. (b): A discrete random variable X has the mean is 6 and variance 2. If it is assumed that the distribution is Binomial find the probability that $5 \leq x \leq 7$.	5 + 5 = 10	CO3	L5

2	(a): An incomplete distribution of families according to their expenditure per week is given below. The median and mode for the distribution are Rs. 25 and Rs. 24 resp. calculate the missing frequencies. Expenditure: 0-10 10-20 20-30 30-40 40-50 No. of Families: 14 ? 27 ? 15 (b): For a given distribution, the mean is 10, variance is 16, γ_1 is 16 and β_2 is 4. Find the first four moments about the origin using $M = A + \mu'_1$, also find β_1 and γ_2.	5 + 5 = 10	CO4	L4																		
3	(a): The security prices and share prices of a company is given during the below mentioned year. Using the Spearman's rank difference method determine the relationship between security and share prices. <table border="1"> <tr> <td>Year</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td></tr> <tr> <td>Security</td><td>97.8</td><td>99.2</td><td>98.8</td><td>98.3</td><td>98.4</td></tr> <tr> <td>Share</td><td>73.2</td><td>85.8</td><td>78.9</td><td>75.8</td><td>77.2</td></tr> </table> (b): If X is the Poisson Variate which denote the probability function of the distribution, then Average number of accidents on any day on a National Highway is 1.6. Determine the probability that the number of accidents are (i): at least one (ii): at most one.	Year	1	2	3	4	5	Security	97.8	99.2	98.8	98.3	98.4	Share	73.2	85.8	78.9	75.8	77.2	5 + 5 = 10	CO2	L5
Year	1	2	3	4	5																	
Security	97.8	99.2	98.8	98.3	98.4																	
Share	73.2	85.8	78.9	75.8	77.2																	
4	(a): For Discrete random variable the probability distribution is given below: <table border="1"> <tr> <td>X = x</td><td>0</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td></td></tr> <tr> <td>f(x)</td><td>0</td><td>k</td><td>2k</td><td>2k</td><td>3k</td><td>k²</td><td>2</td></tr> </table> Determine k, Mean and Variance of the Distribution. (b): The probability density function of a random variable X is $f(x) = \begin{cases} kx^3, & \text{if } 1 \leq x \leq 3 \\ 0, & \text{elsewhere} \end{cases}$ Find the value of k and the probability of the function at $\frac{1}{2} \leq x \leq \frac{3}{2}$.	X = x	0	1	2	3	4	5		f(x)	0	k	2k	2k	3k	k ²	2	5 + 5 = 10	CO3	L1		
X = x	0	1	2	3	4	5																
f(x)	0	k	2k	2k	3k	k ²	2															