Graphic Era HILL UNIVERSITY

Mid Term (Odd) Semester Examination October 2024

Roll no 23198813

Name of the Course and semester: B.tech (SPL. of AI/ML, 3rd semester)
Name of the Paper: Probability and Random Processes
Paper Code: TCS-344
Time: 1.5 hours Maximum Marks: 50

Note:

(i) Answer all the questions by choosing any one of the sub-questions.
(ii) Each question carries 10 marks.
(iii) Use of a non-scientific calculator is allowed.

Q1. (10 Marks)

a. Two unbiased dice are thrown. Find the probability that:
(i) Both the dice show the same number,
(ii)The first die shows 6,
(iii)The total of the numbers on the dice is 8,
(iv)The total of the numbers on the dice is greater than 8. CO1

OR

b. In a certain town there are equal numbers of male and female residents. It is known that 5% of females and 20% of males are unemployed. If any unemployed person is picked up at random, what is the probability that:
(i)It is male, and
(ii)It is female? Use Baye's theorem CO1

Q2. (10 Marks)

a. 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	$2K^2$	$7K^2+K$

(i)Find K,
(ii)Evaluate P(X<6) , P(X≥6) and P(0<X<5) CO1

OR

b. Write the probability mass function (p.m.f) of Binomial distribution. Ten coins are thrown simultaneously. Find the probability of getting at least 7 heads. CO1

Q3. (10 Marks)

a. A car hire firm has two cars, which it hires out day by day. The number of demands for a car on each day is distributed as a Poisson distribution with a mean 1.5. Calculate the proportion of days on which
(i) Neither car is used
(ii)Some demand is refused. CO1

OR

b. State Central limit theorem. In a communication system each data packet consists of 1000 bits. Due to the noise, each bit may be received in error with a probability 0.1. It is assumed bit errors occur independently. Find the probability that there are more than 120 errors in a certain data packet. CO2

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Q4. (10 Marks)

a. The joint probability distribution of two random variables X and Y is given by:
P(X=0, Y=1)=1/3, P(X=1, Y=-1)=1/3 and P(X=1, Y=1)=1/3
Find (i) Marginal distribution of X and Y and
(ii) The conditional probability distribution of X given Y=1. CO2

OR

b. For the following bivariate probability distribution of X and Y, find:
(i) P(X≤1, Y=2),
(ii)P(X≤1)
(iii)P(Y≤3) and
(iv)P(X<3, Y≤4)

	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

CO2

Q5. (10 Marks)

a. Calculate the coefficient of correlation between X and Y from the following data:
X: 65 66 67 67 68 69 70 72
Y: 67 68 65 68 72 72 69 71 CO2

OR

b. The following table shows the number of motor registrations in a certain territory for a term of 5 years and the sale of motor tyres by a firm in that territory for the same period.
Find the regression equation to estimate sale of tyres when registration is 850.

Year	Motor registrations	Number of tyres sold
1	600	1250
2	630	1100
3	720	1300
4	750	1350
5	800	1500

CO2