BACHELOR OF TECHNOLOGY (CBCS) (2021-COURSE)
B. Tech. Sem - II Computer Science & Engineering AI & ML : WINTER : 2024
SUBJECT: PROBABILITY & STATISTICS

Day : Saturday
Date : 07/12/2024

W-23930-2024

Time : 10:00 AM-01:00 PM
Max. Marks : 60

N.B :

1) All questions are **COMPULSORY.**
2) Figures to the right indicate **FULL** marks.
3) Draw neat and labeled diagrams **WHEREVER** necessary.
4) Use of non programmable **CALCULATOR** is allowed.
5) Assume suitable data if necessary.

Q.1 A bag contains 5 white and 8 red balls. Two drawing of 3 balls are made such that **(10)**

i) the balls are replaced before the second trial and
ii) the balls are not replaced before the second trial. Find the probability that the first drawing will give 3 white and the second 3 red balls in each case.

OR

Q.1 A company has two plants to manufacture cars. plant A manufacture 70 % of the cars and plant B manufacture 30%. At plant A, 80% if cars are rated standard quality and at plant B, 90% of cars are rated standard quality. A car is picked up to random and is found to be of standard quality. A car is picked up to random and is found to be of standard quality. What is the probability that it was come from plant B? **(10)**

Q.2 A random variables X has the following probability distribution. **(10)**

X=x	0	1	2	3	4	5	6	7	8
P (X=x)	K	3K	5K	7K	9K	11K	13K	15K	17K

i) Determine the value of K.
ii) Find $P(X<3)$, $P(X\geq 3)$, $P(X<5)$

OR

Q.2 Let X be a continuous random variables with the following probability distribution : **(10)**

X= x	-3	6	9
P (X = x)	1/6	1/2	1/3

Find E(X) and $E(X^2)$ and using the laws of expectation, evaluate $E(2X+1)^2$.

Q.3 X is normally distributed and the mean of X is 12 and S.D. is 4. Find out probabilities that **(10)**

i) $X \geq 20$
ii) $X \leq 20$
iii) $0 \leq X \leq 12$

(Given: $Z_{(0,2)} = 0.4772$, $Z_{(0,1)} = 0.3413$, $Z_{(0,3)} = 0.49865$)

OR

Q.3 A manufacturer, who produces medicine bottles, finds that 0.1% of the bottles are defective. The bottle are packed in boxes containing 500 bottles. A drug manufacturer buys 100 boxes from the producer of bottles. Using Poisson distribution, find how many boxes will contain **(10)**

i) No detective
ii) At least two defectives

P.T.O.

Q.4 The marks obtained by 10 students in mathematics X and statistics Y are given below. Find the coefficient at correlation between X and Y **(10)**

X	75	30	60	80	53	35	15	40	38	48
Y	85	45	54	91	58	63	35	43	45	44

OR

Q.4 A sample of 12 fathers and their eldest sons gave the following data about their height in inches . Calculate coefficient of correlation between x and y. **(10)**

Father (x)	65	63	67	64	68	62	70	66	68	67	69	71
Son (y)	68	66	68	65	69	66	68	65	71	67	68	70

Q.5 For 10 randomly selected observations the following data were recorded: **(10)**

X	1	1	2	2	3	3	4	5	6	7
Y	2	7	7	10	8	12	10	14	11	14

Determine the regression equation using non-linear form $Y = a + b_1x + b_2x^2$.

OR

Q.5 Derive expression for regression lines on Y on X and X on Y. **(10)**

Q.6 The following table gives the no. of refrigerators sold by 4 salesmen in three months May, June and July **(10)**

	Salesmen			
Months	A	B	C	D
May	50	40	48	39
June	46	48	50	45
July	39	44	40	39

i) Is there a significant difference in the sales made by the four salesmen?
ii) Is there a significant difference in the sales made during different months?

(Given: $F_{0.05}(3,6) = 4.76$, and $F_{0.05}(2,6) = 5.14$)

OR

Q.6 If $r_{12} = 0.8963$, $r_{13} = 0.648$ and $r_{23} = 0.709$
Find $r_{12.3}$ and $R_{1.32}$ **(10)**

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