BACHELOR OF TECHNOLOGY (CBCS - 2023)
B. Tech. Sem-I Computer Science & Engineering : SUMMER : 2025
SUBJECT: PROBABILITY & STATISTICS

Day : Thursday
Date : 15/05/2025

S-27610-2025

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) Use of non-programmable **CALCULATOR** is allowed.
4) Assume suitable data if necessary.

Q.1 An urn contains 6 white and 8 red balls. Second urn contains 9 white and 10 red balls. One ball is drawn at random from the first urn and put it into second urn without noticing colour. A ball is then drawn at random from the second urn. What is the probability that it is red? **[10]**

OR

Q.1 In a bolt factory there are four machines A, B, C, D manufacturing 20%, 15%, 25% and 40% of the total output respectively. Of their outputs 5%, 4%, 3% and 2% in the same order are defective bolts. A bolt is chosen at random from the factory's production and is found defective. What is the probability that the bolt was manufactured by machine A or Machine D? **[10]**

Q.2 A continuous random variable X has probability density function $f(x)$ as follows: **[10]**

$$f(x)=\begin{cases} kx & 0\le x<5 \\ k(10-x) & 5\le x<10 \\ 0 & \text{otherwise} \end{cases}$$

Determine k, $P(x<6)$ and $E(x)$.

OR

Q.2 The joint probability density function of two variables x, y is given by **[10]**

$$f(x,y)=\frac{6-x-y}{8},\ 0<x<2,\ 2<y<4$$

Calculate the following probabilities

i) $P(X<1,\ Y<3)$ ii) $P(X<1 / Y=3)$

Q.3 In a sampling a large number of parts manufactured by a machine, the mean number of defectives in a sample of 20 is 2. Out of 1000 such samples, how many would you expected to contain atleast 3 defective parts. **[10]**

OR

Q.3 Let X is a normal variate with mean 30 and S.D. 5, find the probabilities that: **[10]**

i) $26\le x\le 40$ ii) $x\ge 45$ iii) $|x-30|>5$

(Given : $A_{z=2}=0.4772$, $A_{z=3}=0.4986$, $A_{z=1}=0.3413$)

Q.4 Given $r = 0.9$, $\Sigma xy = 70$, $\sigma_y = 3.5$ $\Sigma x^2 = 100$. Find the number of items if x and y are deviations from arithmetic mean. **[10]**

OR

P.T.O.

Q.4 From a group of 10 students, marks obtained by each in papers of Mathematics and Applied Mechanics are given as: **[10]**

x marks in Mathematics	23	28	42	17	26	35	29	37	16	46
y marks in Applied Mechanics	25	22	38	21	27	39	24	32	18	44

Calculate coefficient of correlation.

Q.5 Two examiners A and B independently award marks to seven students: **[10]**

Roll No.	1	2	3	4	5	6	7
Marks by A	40	44	28	30	44	38	31
Marks by B	32	39	26	30	38	34	28

Obtain equations of regression lines. If examiner A awards 36 marks to Roll No. 8, what would be the marks expected to be awarded by examiner B to the same candidate?

OR

Q.5 The two regression equations of the variables x and y are $x = 19.13 - 0.87y$, $y = 11.64 - 0.50x$. Find : **[10]**

i) $\bar{x}, \bar{y}$

ii) The correlation coefficient between x and y.

Q.6 Given the following: **[10]**

$r_{12} = 0.8$ $r_{13} = 0.6$ $r_{23} = 0.5$

$\sigma_1 = 10$ $\sigma_2 = 8$ $\sigma_3 = 5$

Find the regression equation of x_1 on x_2 and x_3.

OR

Q.6 A tea company appoints four salesmen A, B, C and D and observes their sales in three seasons – summer, winter and monsoon. The figures (in lakh) are given in the following table: **[10]**

Seasons	Salesmen			
	A	B	C	D
Summer	36	36	21	36
Winter	28	29	31	31
Monsoon	26	28	29	29

i) Do the salesmen significantly differ in performance?

ii) Is there significant difference between the seasons?

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

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