BACHELOR OF TECHNOLOGY (CBCS - 2023)
B. Tech. Sem-I Computer Science & Engineering : WINTER : 2024
SUBJECT: PROBABILITY & STATISTICS

Day : Friday
Date : 06/12/2024

W-27610-2024

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) Use of non-programmable **CALCULATOR** is allowed.
4) Draw neat and labeled diagram **WHEREVER** necessary.
5) Assume suitable data if necessary.

Q.1 Two dice are tossed. Find the probability of getting 'an even number on the first die' or 'a total of 8'. **(10)**

OR

Q.1 Given three identical boxes I, II and III, each containing two coins. In box I, both coins are gold coins, in box II, both are silver coins and in the box III, there is one gold and one silver coin. A person chooses a box at random and takes out a coin. If the coin is of gold, what is the probability that the other coin in the box is also of gold? **(10)**

Q.2 Let X be a continuous random variable with p.d.f. **(10)**

$$f(x) = \begin{cases} ax, & 0 \le x < 1 \\ a, & 1 \le x < 2 \\ -ax + 3a, & 2 \le x < 3 \\ 0, & elsewhere \end{cases}$$

Determine the constant 'a' and compute $P(X \le 1.5)$.

OR

Q.2 For the adjoining bivariate probability distribution of X and Y, find: **(10)**

i) $P(X \le 1, Y = 2)$,
ii) $P(X \le 1)$,
iii) $P(Y \le 3)$,
iv) $P(X < 3, Y \le 4)$

Y→ / X↓	1	2	3	4	5	6
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

Q.3 Seven coins are tossed and number of heads noted. The experiment is repeated 128 times and the following distribution is obtained: **(10)**

No. of heads	0	1	2	3	4	5	6	7
Frequencies	7	6	19	35	30	23	7	1

Fit a binomial distribution assuming that the coin is unbiased.

OR

Q.3 X is a normal variate with mean 30 and s.d. 5. Find the probabilities that $(i) 26 \le X \le 40, (ii) X \ge 45, and\ (iii) |X - 30| > 5$. **(10)**

P.T.O.

Q.4 Calculate the correlation coefficient from the following data: (10)

X	23	27	28	29	30	31	33	35	36	39
Y	18	22	23	24	25	26	28	29	30	32

OR

Q.4 The IQ's of a group of 6 persons were measured, and then they sat for a certain exam. Their IQ's and exam marks were as follows: (10)

Person:	A	B	C	D	E	F
IQ's	110	100	140	120	80	90
Exam.marks	70	60	80	50	10	20

Compute the rank correlation.

Q.5 Obtain the equations of two lines of regression for the data: (10)

X	6	2	10	4	8
Y	9	11	5	8	7

Also obtain the estimate of X for Y = 10.

OR

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

Observation No.	1	2	3	4	5	6	7	8	9	10
Overtime hrs. (X)	1	1	2	2	3	3	4	5	6	7
Additional units (Y)	2	7	7	10	8	12	10	14	11	14

Determine the coefficients of regression and regression equation using the non-linear form:

$$Y = a + b_1X + b_2X^2.$$

Q.6 Find the regression equation of X_1 on X_2 and X_3 given the following results: (10)

Trait	Mean	Standard Deviation	r_{12}	r_{23}	r_{31}
X_1	28.02	4.42	+0.80	_	_
X_2	4.91	1.10	_	-0.56	_
X_3	594	85	_	_	-0.40

where X_1 = seed per acre; X_2 = rainfall in inches and X_3 = accumulated temperature above 42^0 F.

OR

Q. 6 To study the performance of three detergents and three different water temperatures. The following 'Whiteness' readings were obtained with specially designed equipment. Perform a two way analysis of variance, using 5% level of significance. (Given: $F_{0.05} = 6.94$). (10)

Water Temperature ↓	Detergent A	Detergent B	Detergent B
Cold	57	55	67
Warm	49	52	68
Hot	54	46	58

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