

**BACHELOR OF TECHNOLOGY (CBCS) (2021-COURSE)**  
**B. Tech. Sem - II Computer Science & Engineering : WINTER : 2023**  
**SUBJECT : PROBABILITY & STATISTICS**

Day : Wednesday

Time : 10:00 AM-01:00 PM

Date : 22-11-2023

**W-24025-2023**

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 **WHEREVER** necessary.
- 5) Draw neat labeled diagrams **WHEREVER** necessary.

- Q.1** Four cards are drawn at random from a pack of 52 cards. Find the probability that (10)  
i) they are a king, a queen, a jack and an ace. ii) two are kings and two are queens  
iii) two are black and two are red iv) there are two cards of hearts and two cards of diamonds.

**OR**

- Q.1** Assume that a factory has two machines. Past records show that machine 1 (10)  
produces 30% of the items of output and machine 2 produces 70% of the items.  
Further 5% of the items produced by machine 1 were defective and only 1%  
produced by machine 2 were defective. If a defective item is drawn at random,  
what is the probability that the defective item was produced by machine 1 or  
machine 2 ?

- Q.2** The diameter of an electric cable, say  $X$  is assumed to be a continuous random (10)  
variable with p.d.f.

$$f(x) = 6x(1-x), \quad 0 \leq x \leq 1$$

- i) Verify that  $f(x)$  is p.d.f. & ii) determine a number 'b' such that  
 $P(X < b) = P(X > b)$ .

**OR**

- Q.2** Two unbiased dice are thrown. Find the expected values of the sum of numbers of (10)  
points on them.

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

No. of heads :	0	1	2	3	4	5	6	7	Total
Frequencies :	7	6	19	35	30	23	7	1	128

Fit a binomial distribution assuming, the coin is unbiased.

**OR**

- Q.3** Fit a poisson distribution to the following data : (10)

No. of mistakes per page :	0	1	2	3	4	Total
No. of pages :	109	65	22	3	1	200

- Q.4** Calculate the correlation coefficient for the following data : (10)

X :	9	8	7	6	5	4	3	2	1
Y :	15	16	14	13	11	12	10	8	9

PTO

OR

Q.4 Calculate the rank correlation coefficient for the following data :

(10)

X :	65	63	67	64	68	62	70	66	68	67	69	71
Y :	68	66	68	65	69	66	68	65	71	67	68	70

Q.5 Derive expression for regression lines of Y on X and X on 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 regression equation using the non-linear form  $Y = a + b_1X + b_2X^2$ .

Q.6 If  $r_{12} = 0.80$ ,  $r_{12} = -0.40$  &  $r_{23} = -0.56$ , find the values of  $r_{12.3}$ ,  $r_{13.2}$  &  $r_{23.1}$ . Calculate  $R_{1.23}$  &  $R_{2.13}$ .

(10)

OR

Q.6 The following data represents the study hours / day by four different students on 3 different days

(10)

Days	A	B	C	D
Monday	2	3	4	5
Tuesday	4	4	6	6
Wednesday	6	5	8	8

- Test whether the study hours of the different students are same?
  - Test whether the study hours on different days are same?
- (Tabulated F values :  $F_{0.05}(6,3) = 4.76$ ,  $F_{0.05}(6,2) = 5.14$ )

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