

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

Day : Friday
 Date : 12/12/2025

W-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) Draw neat and labeled diagram **WHEREVER** necessary.
- 5) Assume suitable data if necessary.

Q.1 A problem in Statistics is given to three students A, B and C whose chances of solving it are $\frac{1}{2}$, $\frac{3}{4}$ and $\frac{1}{4}$ respectively. What is the probability that the problem will be solved if all of them try independently? (10)

OR

Q.1 Bag I contains 3 red and 4 black balls while another Bag II contains 5 red and 6 black balls. One ball is drawn at random from one of the bags and it is found to be red. Find the probability that it was drawn from Bag II. (10)

Q.2 A random variable X has the following probability distribution: (10)

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 $P(X < 6)$, $P(X \geq 6)$, and $P(0 < X < 5)$,
 (iii) If $P(X \leq c) > \frac{1}{2}$, find the minimum value of c, and (iv) Determine the distribution function of X.

OR

Q.2 For the adjoining bivariate probability distribution of X and Y, find: (10)
 i) $P(X \leq 1, Y = 2)$,
 ii) $P(X \leq 1)$,
 iii) $P(Y \leq 3)$,
 iv) $P(X < 3, Y \leq 4)$

Y →	1	2	3	4	5	6
X ↓						
0	0	0	$\frac{1}{32}$	$\frac{2}{32}$	$\frac{2}{32}$	$\frac{3}{32}$
1	$\frac{1}{16}$	$\frac{1}{16}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$
2	$\frac{1}{32}$	$\frac{1}{32}$	$\frac{1}{64}$	$\frac{1}{64}$	0	$\frac{2}{64}$

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

OR

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

P.T.O.

- Q.4 25 pairs of value of variates X and Y led to the following results: $N=25$, $\sum X=127$, $\sum Y=100$, $\sum X^2=760$, $\sum Y^2=449$ and $\sum XY=500$. A subsequent scrutiny showed that two pairs of values were copied down as: (10)

X	Y
8	14
8	6

Instead of

X	Y
8	12
6	8

Obtain the correct value of the correlation coefficient.

OR

- Q.4 Ten competitors in a musical test were ranked by three judges A, B and C in the following order: (10)

A	1	6	5	10	3	2	4	9	7	8
B	3	5	8	4	7	10	2	1	6	9
C	6	4	9	8	1	2	3	10	5	7

Using rank correlation method, discuss which pair of judges has the nearest approach to likings in music.

- Q.5 Obtain the equations of two lines of regression for the following data. Also obtain the estimate of X for Y = 70. (10)

X	65	66	67	67	68	69	70	72
Y	67	68	65	68	72	72	69	71

OR

- Q.5 Fit an exponential curve of the form $Y = ab^x$ to the following data: (10)

X	1	2	3	4	5	6	7	8
Y	1	1.2	1.8	2.5	3.6	4.7	6.6	9.1

- 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° F.

OR

- Q.6 Set up two-way ANOVA Table and test if there is any difference between the yield of different plots and if there is any difference in the performance of different fertilizers for the following data: (10)

Plots →	A	B	C	D
Fertilizers ↓				
Nitrogen	6	4	8	6
Potash	7	6	6	9
Phosphate	8	5	10	9

Given F value for $v_1 = 3, v_2 = 6$ is 4.76 and for $v_1 = 2, v_2 = 6$ is 5.14, both at 5% level of significance.

* * * * *