BACHELOR OF TECHNOLOGY (CBCS) (2021-COURSE)
B. Tech. Sem - II Computer Science & Engineering AI & ML : SUMMER : 2025
SUBJECT: PROBABILITY & STATISTICS

Day : Monday
Date : 26/05/2025

S-23930-2025

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) Draw neat and labeled diagram **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.
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 The probabilities of X,Y and Z becoming managers are $\frac{4}{9}, \frac{2}{9}$, and $\frac{1}{3}$ respectively. The probabilities that the Bonus scheme will be introduced if X, Y, and Z becomes managers are $\frac{3}{10}, \frac{1}{2}$, and $\frac{4}{5}$ respectively.

i) What is the probability that bonus scheme will be introduced.
ii) If the bonus scheme has been introduced, what is the probability that the manager appointed was X.

Q.2 The joint p.d.f. of two random variables X and Y is given by **[10]**
$$f(x,y)=\frac{9(1+x+y)}{2(1+x)^4(1+y)^4}, 0 \le x < \infty, 0 \le y < \infty$$
Find the marginal distribution of X and Y and the conditional distribution of Y for X = x.

OR

Q.2 A coin is tossed until a head appears. What is the expectation of the number of tosses required.

Q.3 Seven coin are tossed and number of heads noted. The experiment repeated 128 times and the following distribution is obtained. **[10]**

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

OR

Q.3 A car hire firm has two cars, which it hires out day by day. The number of demands for a car on each day is distributed as a Poisson distribution with mean 1.5. Calculate the proportion of days on which

i) neither car is used
ii) the proportion of days on which some demand is refused.

Q.4 Calculate the correlation coefficient for the following heights (in inches) of fathers (x) and their sons (Y). **[10]**

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

OR

P.T.O.

Q.4 Obtain the rank correlation coefficient for the following data.

X	68	64	75	50	64	80	75	40	55	64
Y	62	58	68	45	81	60	68	48	50	70

Q.5 Given N = 100, $\Sigma X = 12500$, $\Sigma Y = 8000$, $\Sigma X^2 = 1585000$, $\Sigma Y^2 = 648100$, $\Sigma XY = 1007425$ for the above data obtain the regression equation Y on X. **[10]**

OR

Q.5 For 10 randomly selected observations the following data were recorded.

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 coefficient of regression.

Q.6 In a trivariate distribution : $\sigma_1 = 2$, $\sigma_2 = \sigma_3 = 3$, $r_{12} = 0.7$, $r_{23} = r_{31} = 0.5$ find **[10]**
i) $r_{23.1}$ ii) $R_{1.23}$ iii) $b_{12.3}$

OR

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

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

i) Test whether the study hrs. of the different students are same?
ii) Test whether the study hrs. 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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