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

Day : Wednesday
Date : 24-05-2023

Time : 10:00 AM-01:00 PM
S-23930-2023
Max. Marks : 60

N.B.:

1) All questions are **COMPULSORY.**
2) Figures to the right indicate **FULL** marks.
3) Use of non-programmable **CALCULATOR** allowed.
4) Assume suitable data if necessary.

Q.1 A box contains 6 red, 4 white and 5 black balls. A person drawn 4 balls from the box at random. Find the probability that among the balls drawn there is at least one ball of each colour. **(10)**

OR

Q.1 From a vessel containing 3 white and 5 black balls, 4 balls are transferred into an empty vessel. From this vessel, a ball is drawn and found to be white. What is the probability that out of four balls transferred 3 are white and 1 is black? **(10)**

Q.2 If X and Y are two random variables having joint density function **(10)**

$$F(x,y)=\begin{cases}\frac{1}{8}(6-x-y), & 0\le x<2,\ 2\le y<4,\\ 0, & \text{otherwise.}\end{cases}$$

Find: $P(X<1\cap Y<3)$, $P(X+Y<3)$, $P(X<1/Y<3)$

OR

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

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

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

Q.3 Let X is 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: $A_{z=0.8}=0.2881$, $A_{z=2}=0.4772$, $A_{z=3}=0.4986$, $A_{z=1}=0.3413$)

OR

Q.3 Fit a Poisson distribution to the following data which given the number of doddens in a sample of clover seeds. **(10)**

X	0	1	2	3	4	5	6	7	8
f	56	156	132	92	37	22	4	0	1

P.T.O.

Q.4 Obtain the rank correlation of coefficient for the following data: **(10)**

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

OR

Q.4 Calculate the correlation coefficient for the following data of heights of father (X) and their sons (Y) **(10)**

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

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

OR

Q.5 Fit an exponential curve of the form $Y = ab^X$ to the following: **(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)**

Traits	Mean	Standard deviation	r_{12}	r_{23}	r_{31}
X_1	28.02	4.42	+0.80	-	-
X_2	4.91	110	-	-0.56	-
X_3	594	85	-	-	-0.40

OR

Q.6 The following 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

a) Test whether the study hours of the different students are same?

b) Test whether the study hours on different days are same?
(Given: $F_{0.05}(6,3) = 4.76$, $F_{0.05}(6,2) = 5.14$)

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