BACHELOR OF TECHNOLOGY (CBCS) (2021-COURSE)

B. Tech. Sem - II COMPUTER SCIENCE & ENGINEERING-A&M : SUMMER : 2024

SUBJECT: PROBABILITY & STATISTICS

Day : Friday | Time : 10:00 AM-01:00 PM

Date : 24/05/2024 | **S-23930-2024** | 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 An urn contains 6 white, 4 red and 9 black balls. If 3 balls are drawn at random, find the probability that **[10]**

i) Two of the balls drawn are white.

ii) One is of each colour.

iii) None is red.

OR

Q.1 In a machines 1, 2 and 3 manufacture respectively 25%, 35%, 40% of the total production. Thus output 4%, 5%, 2% on defective. A drawn at random from the production is found to be defective. What is the probability that it was manufactured by machines 1, 2 and 3.

Q.2 A random variable X is distributed at random between the values 0 and 1so that its probability density functions is $f(x) = Kx^2(1-x^3)$ where K is constant. Find the value of K. Using this value of K, find its mean and variance. **[10]**

OR

Q.2 The joint probability distribution of two random variables X and Y is given by $P(x=0, y=1)=\frac{1}{3}$, $P(x=0, y=-1)=\frac{1}{3}$ and $P(x=1, y=1)=\frac{1}{3}$. Find

i) Marginal distribution of X and Y.

ii) The conditional probability distribution of X given Y = 1.

Q.3 If X ~ B (n, p), show that $E\left(\frac{X}{n}-P\right)^2=\frac{pq}{n}$, $\text{cov}\left(\frac{X}{n}, \frac{n-x}{n}\right)=\frac{-pq}{n}$ **[10]**

OR

Q.3 Fit a Poisson distribution to the following data.

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

Q.4 Calculate the coefficient of correlation between X and Y for the following: **[10]**

X	1	3	4	5	7	8	10
Y	2	6	8	10	14	16	20

OR

P.T.O.

Q.4 Ten competitors in a musical test were ranked by 3 judges A, B and C in the following order.

Ranks by A :	1	6	5	10	3	2	4	9	7	8
Ranks by B :	3	5	8	4	7	10	2	1	6	9
Ranks by 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 common likings in music.

Q.5 Fit an exponential curve of the form $Y = a\,b^x$ to the following data [10]

X	1	2	3	4	5	6	7	8
Y	1.0	1.2	1.8	2.5	3.6	4.7	6.6	9.1

OR

Q.5 For 10 observations on price (X) and supply (Y) the following data were obtained
$\Sigma X = 130$, $\Sigma Y = 220$, $\Sigma X^2 = 2288$, $\Sigma Y^2 = 5506$, $\Sigma XY = 3467$ obtain the lines of regression of Y on X.

Q.6 If $r_{12} = 0.80$, $r_{13} = -0.40$, $r_{23} = -0.56$ find the values of $r_{12.3}$, $r_{13.2}$ and $R_{1.23}$ [10]

OR

Q.6 To test the significance of the variation of the retail prices of a commodity in three principle cities Mumbai, Kolkata and Delhi, Four shops were chosen at random in each city and process observed in rupees were as follows:

Mumbai	16	8	12	14
Kolkata	14	10	10	6
Delhi	4	10	8	8

Do the data indicate that the prices in the three cities are significantly different? [Given: $F_{0.05} = 4.26$].

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