1T00161 - MCA (Sem-I) (R-2020-21) / 70621 - Mathematical Foundation for Computer Science I
QP CODE: 10021817   DATE: 27/02/2023.

Time: 3 Hours   **Max. Marks: 80**

N.B.: 1) Question No.1 is **compulsory.**
   2) Attempt any **three** from the remaining **five** questions.
   3) Figures to the right indicate full marks.
   4) Scientific Calculator is allowed.

Q.1 (a) The number of scooter accidents per month in a certain town were as follows: **05**
12, 8, 20, 2, 14, 10, 15, 6, 9, 4
Are these frequencies in agreement with the belief that accident conditions were
the same during this 10 month period?
[Given the table value of χ^2 at 5% level of significance for 9 degrees of
freedom is 16.919]

(b) Find the probability that in 5 tossings, a perfect coin turns up head at least 3   **05**
times in succession.

(c) Let X be a random variable for which E(X)=10 and V(X)=25. Find the values   **05**
of a and b such that Y= aX-b has expectation zero and variance 1.

(d) Find the Spearman's Rank Correlation coefficient for the following data   **05**

Marks in MFCS1	35	47	23	6	17	10	43	9	28
Marks in Ad.Java	30	46	33	4	23	8	48	12	31

Q.2 (a) In a bolt factory, machines A, B, C manufacture respectively 25%, 35% and   **10**
40% of the total. Of their output 5,4,2 percent are known to be defective bolts.
A bolt is drawn at random from the product and is found to be defective. What
are the probabilities that it was manufactured by
(i) Machine A   (II) Machine B or C

(b) Calculate karl Pearson's coefficient of skewness for bursting pressure   **10**

Bursting pressure(in lb)	20-25	25-30	30-35	35-40	40-45	45-50	50-55
No. of bags	8	12	20	25	15	12	8

Q. 3 (a) Following data represents assets of a multinational company in crores of rupees   **10**
during year 1981-1990.

Year	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Asset	60	69	81	86	78	93	102	107	100	109

Find the regression of asset on year. Estimate the asset for the year 1992. Also
find Karl Pearson's Coefficient of correlation.

(b) In order to make a survey of the buying habits, two markets A and B are chosen   **10**
at two different part of city. 400 women shoppers are chosen at random in
market A. Their average daily expenditure on food is found to be Rs. 250 with a
standard deviation of Rs. 40. The figures are Rs. 220 and Rs. 55 respectively in
the market B where also 400 women shoppers are chosen at random. Test at 1%
level of significance (2.58) whether the average daily food expenditures of two
populations of shoppers are equal.

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Q. 4 (a) The joint probability density function of a two dimensional random variable (X,Y) is given by **10**

$$f(x,y)=2 , \quad 0<x<1, \ 0<y<x .$$

(i)Find the marginal density function of X and Y.
(ii)Find the conditional density functions of y on x and x on y
(iii) Check for independence of X and Y

(b) A radio shop sells ,on an average 200 radios per day with a standard deviation **10** of 50 radios . After an extensive advertising campaign, the management will compute the average sales for the next 25 days to see weather an improvement has occurred. Assume that the daily sales of radios is normally distributed.
(i)Write down the null and alternative hypothesis.
(ii) test the hypothesis at 5% level of significance if X mean = 216.
(III) How large must X mean be in order that the null hypothesis is rejected at 5% level of significance.
(5% level of significance is 1.645)

Q. 5 (a) Compute the quadratic regression equation of following data **10**

X	-3	-2	-1	0	1	2	3
Y	7.5	3	0.5	1	3	6	14

(b) For the following bivariate probability distribution of X and Y, find **10**
    (i) P(X<=1, Y=2)   (ii) P(X<=1)   (III) P(Y=3)   (iv) P(Y<=3),
    (V) P(X<3,Y<=4)

Q. 6 (a) The mean and standard deviation of the wages of 6000workers engaged in a **10** factory are Rs. 1200 and Rs. 400 respectively. Assuming the distribution to be normal estimate:
    (i) Percentage of workers getting wages above Rs. 1600
    (ii) Number of workers getting wages between Rs. 600 and Rs.900
    (iii) Number of workers getting wages between Rs. 1100 and Rs. 1500
    Tee relevant extract of the Area table from Z=0 to Z=z is given below:

Z	0.25	.5	.6	.75	1.00	1.25	1.5
Area	0.0987	0.1915	0.2257	0.2734	0.3413	0.3944	0.4332

(b) An urn contains four tickets marked with numbers 112, 121,211,222 and one **10** ticket is drawn at random. Let $A_{i=}$ (i=1,2,3) be the event that i[th] digit of the number of the ticket drawn is 1.Discuss the independence of the events A_1, A_2 and A_3.