K. J. SOMAIYA INSTITUTE OF MANAGEMENT STUDIES AND RESEARCH,
Vidyavihar, Mumbai- 400077

Program: *MCA I Sem- Batch (2019-22),*
Subject: Mathematical and Statistical Foundation in Computer Science
(End term exam)

Maximum Marks: 50
Duration: 3hrs.   **Date: 2ⁿᵈ December, 2019**

Instructions

1. Exam will be conducted in the Computer Lab. Use Excel where required.

2. Attempt any five questions.

3. Figures to the right indicate marks to the question.

4. Every question carry equal marks.

QUESTION 1   (5 + 5)

(a) Determine whether the relation R on a set A is reflexive, irreflexive, symmetric, asymmetric, antisymmetric or transitive.

  I.   A = set of all positive integers, aRb iff $|a-b| \leq 2$

(b) Let B={ 1, 2, 3, 6, 12, 18 } and R be defined by xRy iff x/y.

  I.   Draw the digraph and Hasse diagram of R.

  II.   Determine the minimal and maximal elements.

QUESTION 2   (5 + 5)

(a) Use brack tracking method to find the solution of the recurrence relation.

   $a_n = 2a_{n-1} + 1$, $b1 = 7$

(b) What is the homogeneous solution of the following recurrence relation

   $a_n = a_{n-1} + 2a_{n-2}$ with the initial conditions $a_0 = 2$, $a_1 = 7$.

QUESTION 3
(5+5)

(a) Let S = {1, 2, 3,4 } and let A=SxS. Define the following relation R on A:

(a, b) R (a', b') iff a+b = a'+b'

I.   Show that R is an equivalence relation.

II.   Compute A/R

(b) Find the value of the mean, median and mode from the data given below:

No of days absent	Less than 5	Less than 10	Less than 15	Less than 20	Less than 25	Less than 30	Less than 35	Less than 40	Less than 45
No of students	29	224	465	582	634	644	650	653	655

QUESTION 4
(5+5)

(a) The following table gives the ages and blood pressure of 10 women. Calculate the coefficient of correlation and interpreat.

Age(X)	56	42	36	47	49	42	60	72	63	55
Blood Pressure (Y)	147	125	118	128	145	140	155	160	149	150

(b) Indicate the type of scale (nominal, ordinal, interval or ratio) that is being used in each of the following questions:

I.   How large is the market size for shampoos?
II.   In which of the following functional areas of management do you wish to specialize in the second year?

i) Marketing
ii) Finance
iii) HR
iv) IT

III. State the order of your preference for the following colors?
   i) Grey
   ii) White
   iii) Blue
   iv) Black
IV. Was the research methods course difficult to understand:
   i) Yes
   ii) No
V. In which month were you born?

QUESTION 5
(5+5)

(a) The following is the age distribution of 125 persons. Find the coefficient of variation.

Age	0-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80
No of persons	15	15	23	22	25	10	5	10

(b) Calculate the First and Third Quartile.

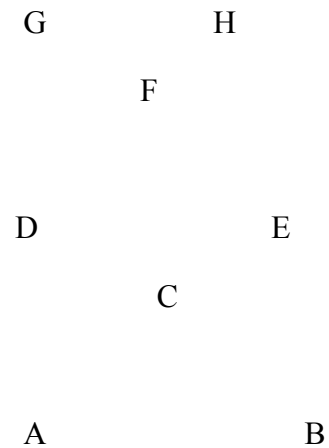| Marks	0-20	20-40	40-60	60-80	80-100
No of students	17	28	32	24	19

QUESTION 6
(5 + 5)

(a) Find the Particular solution of the following recurrence relation

$$a_n + 5a_{n-1} + 6a_{n-2} = 42 \times 4^n$$

(b) Find the partial order relation, represented by the following Hasse Diagram.

G   H

   F

 D   E

   C

 A   B

Find the following:

I.   Maximal and Minimal elements

II.   Greatest and least Minimal elements if they exist

III. For S = {c, d, e}, find Upper bounds, lower bounds, Least Upper Bound, and Greatest Upper Bound.