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(07 Marks)

#### OR

4 a. Prove that every positive integer n 24 can be written as a sum of 5's and / or 7's.

- b. Find the number of permutations of the letters of the word MASSASAUGA. In how may of these all four A's are together? How many of them begin with S? (07 Marks)
- C. In how many ways can one distribute eight identical balls into four distinct containers, so that, (i) No containers is left empty.
  - (ii) The fourth container gets an odd number of balls. (07 Marks)

# Module-3

- 5 a. For any non empty sets A, B, C prove that,
  - (i) Ax(BuC)=(Ax 8)u(AxC)
  - (ii)  $x(B-C) = (A \times BHA \times C)$  (06 Marks)
  - b. Let  $f: R \rightarrow R$  be defined by  $f(x) = \begin{array}{c} 3x 5 & \text{for } x > 0 \\ -3x + 1 & \text{for } x = 0 \end{array}$

(i) Determine 
$$f(0), f$$
 ;) (ii) Find f  $\{-5,5\}$ ). (07 Marks)

c. Let f, g, h be functions form z to z defined by f(x) = x - I, g(x) = 3h(x)--  $\int_{0}^{0} O \text{ if } x \text{ is even}$ if x is odd. Verify that (f a g)0 h(x) = f 0 (g 0 h)(x). (07 Markst--•

# OR

- a. Let A =11,2,3,4,6} and R be a relation on A defined by aRb if and only if "a is a multiple of b". Represent the relation R as a matrix and draw its diagraph. (06 Marks)
  - b. Draw the Hasse diagram representing the positive divisors of 36. (07 Marks)
  - C. Let A = 11,,2,3,4,51, define a relation R on A x A, by  $(x_1,y_1)R(x_1,y_2)$  if and only if
    - x, +y, =x, +y,
      - (i) Verify that R is an equivalence relation.
      - (ii) Find the partition of  $A \times A$  induced by R.

### Module-4

- 7 a. There are eight letters to eight different people to be placed in eight different addressed envelopes. Find the number of ways of doing this so that at least one letter gets to the right person.
   (06 Marks)
  - b. In how many ways can the 26 letters of the English alphabet be permuted so that none of the patterns CAR, DOG, PUN or BYTE occurs? (07 Marks,--
  - c. By using the expansion formula, obtain the rook polynomial for the board C. (07 Marks)



- 8 a. An apple, a banana, a mango and an orange are to be distributed to four boys B1, B2, B3, B4. The boys B1 and B2 do not wish to have apple. The boy B3 does not want banana or mango, and B4 refuses orange. In how many ways the distribution can be made so that no boy is displeased? (06 Marks)
  - b. If ao = 0, al = 1, a2 = 4 and a4 = 37 satisfy the recurrence relation  $4+2 + banfi + ca_n = 0$ , for n > 0, find the constants b and c, and solve the relation  $a_n$ .
  - <sup>C.</sup> How many integers between 1 and 300 (inclusive) are,

(i) Divisible by at least one of 5, 6, 8?

(ii) Divisible by none of 5, 6, 8?

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### 18CS36

(07 Marks)

### Module-5

9 a. Show that the following two graphs shown in Fig. Q9 (a) — (i) and Fig. Q9 (a) — (ii) are isomorphic,
 (06 Marks)



Fig. Q9 (a) — (i)

Fig. Q9 (a) — (ii)

- b. Define the following with example of each,
  (i) Simple graph
  (ii) Compliment of a graph
  (iv) Spanning sub graph
- c. Construct an optimal pro fix code for the symbols a, o, q, u, y, z that occurs with frequencies 20, 28, 4, 17, 12, 7 respectively. (07 Marks)
  - OR
- **10 a.** Prove that two simple graphs  $G_{\perp}$  and  $G_2$  are isomorphic if and only if their complements are isomorphic. (06 Marks)
  - b. Let G = (V, E) be a simple graph of order W n and size 1E1 = m, if G is a bipartite graph. Prove that  $4m < n^2$ . (07 Marks)
  - c. Construct an optimal prefix code for the letters of the word ENGINEERING. Hence deduce the code for this word. (07 Marks)

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