Exam.Code:0915
Sub. Code: 6778

1078

B.E. (Computer Science and Engineering)
Third Semester
CSE-303: Discrete Structures

Time allowed: 3 Hours Max. Marks: 50

NOTE: Attempt five questions in all, including Question No. 1 which is compulsory and selecting two questions from each Section.

x-x-x

1. Answer the following:
   a) Let A= {1, 2, 3}. Find how many reflexive relations can be defined on A.
   b) How many 6-digit numbers can be formed from the digits 0, 1, 2, 3, 4, 5, 6, 7, if no digit is repeated.
   c) Express the statement using quantifiers. "Every student in your school has a computer or has a friend who has a computer."
   d) Show that $(p \wedge q) \rightarrow (p \vee q)$ is tautology or contradiction.
   e) Let $f(x) = x^3$ and $g(x) = 3x + 1$ are the functions. Find (gof)(x).
   f) If $f(x) = y = 2x + 1$, find the range when domain = {-3,-2, -1, 0, 1, 2, 3}.
   g) Define extended binary tree.
   h) Give an example of graph which is Eulerian but not Hamiltonian and vice versa.
   i) Define Monoids. Give examples.
   j) Define Semigroups with examples.

(10x1=10)

Section A:

2. a) If R is a relation 'is greater than' from A to B, where A= {1, 2, 3, 4, 5} and B = {1, 2, 6}. Find (i) R in the roster form. (ii) Domain of R (iii) Range of R.
   b) Consider f: R →R defined by f(x) = 3x-7. Show that f is both injective and surjective.

(04+06)

3. a) What is the minimum number of students required in a class to be sure that at least 6 will receive the same grade if there are five possible grades A, B,C, D and F?
   b) Let A = B = {1, 2, 3, 4}. Define function f: A→B (if possible) such that
      (i) f is one-to-one and onto.
      (ii) f is neither one-to-one nor onto
      (iii) f is onto but not one-to-one.
      (iv) f is one-to-one but not onto.

(04+06)

4. a) Consider the following arguments.
      S1: If the Violinist plays the concerto, then crowds will come if the prices are not too high.
      S2: If the Violinist plays the concerto, the prices will not be too high.
      S : If the Violinist plays the concerto, crowds will come.
      Find whether the conclusion S follows logically from the premises S1 & S2?
   b) Prove the validity of following arguments without using truth table
      $(p \wedge q) \rightarrow r, p \rightarrow q \vdash p \rightarrow ((p \wedge q) \wedge r)$

(05+05)

P.T.O.

Section B:

5. a) How many committees of five with a given chairperson can be selected from 12 persons?

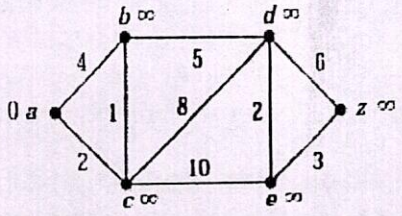
b) Solve the following recurrence relation by substitution method:

$$t_n = \begin{cases} 2t_{n-1} + 1, & n \geq 2 \\ 1, & n = 1 \end{cases}$$

c) Solve the recurrence relation $a_{n+2} - 5a_{n+1} + 6a_n = 2$ by the method of generating function satisfying the initial conditions, $a_0 = 1$ and $a_1 = 2$.

(02+04+04)

6. a) Determine the shortest path between the vertices a to z of the graph given in following figure:



b) Define the following terms in respect of graph with the help of suitable example:

(i) Bipartite graph
(ii) Planar Graph
(iii) K-Regular graph
(iv) Chromatic number of graph

(05+05)

7. a) Consider a ring (R , +, *) defined by a * a = a. Determine whether the ring is commutative or n

b) Prove that the set, S = {0, 1, 2, 3, 4} is a ring with respect to the operation of addition a multiplication modulo 5.

(05+05)

x-x-x

Time all

NOTE:

Q1.

a)

b)

c)

d)

e)

Q2.

a)

b)

c)

Q3.

a)

b)

c)