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Total No. of Pages : 02

Total No. of Questions : 09

B.Tech. (CSE/IT) (2012 Batch) (Sem.-4)

DISCRETE STRUCTURES

Subject Code : BTCS-402

Paper ID : [A2305]

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A**I. Write briefly :**

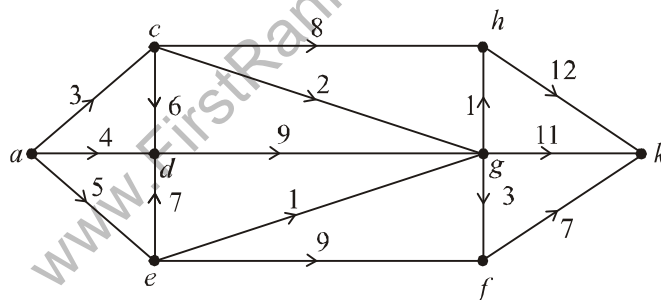
- a) How many relations are possible from a set A of m elements to another set B of n elements? Why?
- b) Write two properties of sets.
- c) Define injection and surjection.
- d) Give an example of a relation which is symmetric and transitive but neither reflexive nor anti symmetric.
- e) Give an example of graph that has Euler Circuit but not Hamiltonian Circuit.
- f) Differentiate between directed and undirected graphs.
- g) Define monoid. Give example for the same.
- h) Prove by using Boolean algebra
$$a+b.c = (a+b).(a+c)$$
- i) Define semi groups. Give example for the same.
- j) Define POSETS.

SECTION-B

2. Prove that If R is an equivalence relation on a set A , show that R^{-1} is also an equivalence relation on A .
3. a) Reduce the following using rules of Boolean Algebra $B : \overline{\overline{a.b} + a.b.c + a(b + a\overline{b})}$
 b) What is DNF? Write the DNF of $f(x, y, z) = (\overline{x}z) + (yz) + (y\overline{z})$
4. a) Definition of Isomorphic graphs. Give an example.
 b) Explain Complete and Bipartite graph.
5. a) Definition of Homomorphism.
 b) Prove the Lagrange's Theorem.
6. How many 5-digits telephone numbers can be constructed using the digits 0 to 9 if each number starts with 67, for example 67125 etc., and no digit appears more than once?

SECTION-C

7. a) Prove that the sum of the degree of all the vertices in a graph G is equal to twice the number of edges in G .
 b) Find the shortest path from a to k using Dijkstra's Algorithm.



8. If $A(n) - 9A(n-1) + 26A(n-2) - 24A(n-3) = 0$ for $n \geq 3$ with, $A(0) = 0$, $A(1) = 1$ and $A(2) = 10$. Determine the sequence from its generating function.
9. a) Suppose R and S are symmetric relation on a Set A . Show that $R \cap S$ is also symmetric.
 b) Show the difference between symmetric and anti symmetric relation with example.