

Total No. of Questions : 8]

SEAT No. :

P1018

[Total No. of Pages : 3

[4457] - 211

S.E. (Computer Engineering) (Semester - I)

DISCRETE STRUCTURE

(2012 Course)

Time : 2 Hours]

[Max. Marks : 50

Instructions to the candidates:

- 1) *Attempt Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.*
- 2) *Assume suitable data wherever necessary.*
- 3) *Figure to the right indicate full marks.*

- Q1)** a) With the help of mathematical induction prove that $8^n - 3^n$ is multiple of 5, for $n \geq 1$. [4]
- b) What is multiset? Explain its significance with at least two examples. [2]
- c) Find the transitive closure by using warshall's algorithm $A = \{1,2,3,4,5,6\}$ and $R = \{(x,y) \mid |x-y| = 2\}$. [6]

OR

- Q2)** a) Salad is made with combination of one or more eatables, how many different salads can be prepared from onion, carrot, cabbage, and cucumber? [2]
- b) It is known that in university 60% of professors play tennis, 50% of them play bridge, 70% jog, 20% play tennis and bridge, 40% play bridge and jog and 30% play tennis and jog. If someone claimed that 20% professors jog and play tennis and bridge, would you believe his claim? Why? [4]
- c) Show that the set of all divisors of 70 forms a lattice. [6]

- Q3)** a) Define the following terms with suitable example: [6]
- Group.
 - Monoid.
 - Isomorphism.
- b) List and explain the necessary & sufficient conditions for Hamiltonian and Eulerian path with suitable examples. [6]

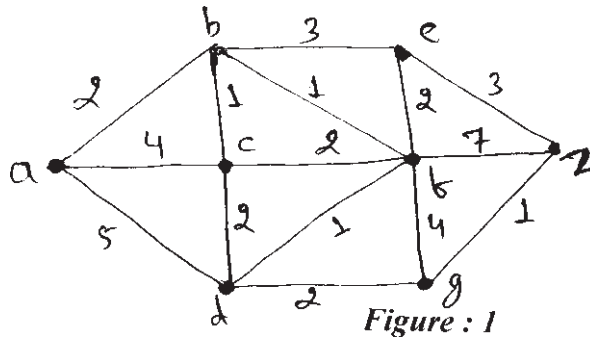
OR

P.T.O.

Q4) a) Define the following terms with suitable example: [6]

- Ring.
- Integral domain.
- Field.

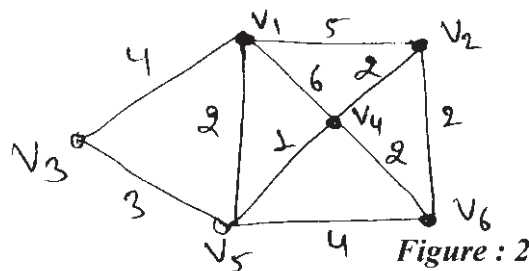
b) Find the shortest path between a-z for the graph given in *figure 1* using Dijkstra's algorithm. [6]



Q5) a) Define the following terms with reference to tree: [6]

- Rooted tree.
- Optimal Binary tree.
- Height of the tree.

b) Find minimum spanning tree for graph given in *figure 2* using Kruskal's algorithm. [7]

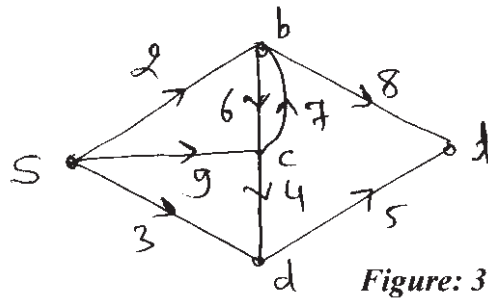


OR

Q6) a) Define the following terms with reference to the tree [6]

- Binary Search Tree.
- M-ary Tree.
- Tree Traversal.

- b) Find the Maximum flow of the given Transport network in *figure 3*. [7]



- Q7) a)** In a college 25% students failed in Maths, 15% student failed in Physics and 10% students failed in both Maths and Physics. A student is selected randomly then what is the probability that [6]
- i) If he failed in Physics, he also failed in Maths.
 - ii) He failed in maths or Physics.
- b) A problem on probability is given to four students A,B,C,D. The probability of solving that problem are $\frac{1}{2}$, $\frac{3}{4}$, $\frac{1}{4}$ and $\frac{2}{5}$ respectively. What is the probability that [7]
- i) The problem will be solved.
 - ii) Exactly one of them will solve the problem.

OR

- Q8) a)** Find the number of arrangements that can be made out of the letters: [6]
- i) ASSASSINATION.
 - ii) MISSISSIPPI.
- b) Two cards are drawn at random from an ordinary deck of 52 cards. Find the probability that [7]
- i) Both are spades.
 - ii) One is spade and one is heart.

