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]**

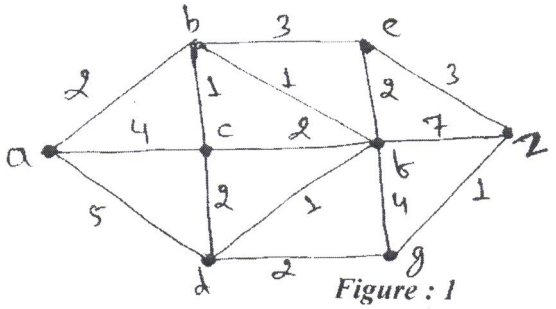

Figure : 1

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]**

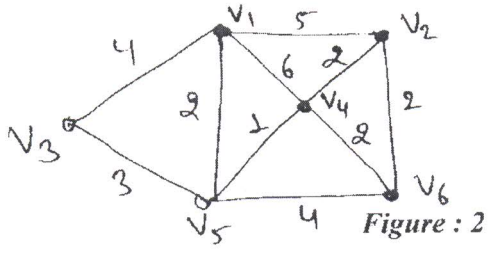

Figure : 2

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]**

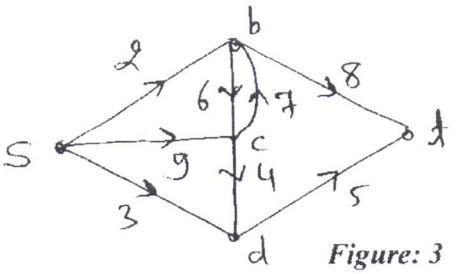

Figure: 3

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 1/2, 3/4, 1/4 and 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.