Total No. of Questions : 8]

SEAT No. :

P1526

[Total No. of Pages : 4

[6002]-155

S.E. (Computer/A.I.& D.S./C.S & D.E.)

DISCRETE MATHEMATICS
(2019 Pattern) (Semester-III)(210241)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Neat diagram must be drawn whenever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data if necessary.***

Q1) a) From a group of 7 men and 6 women, five persons are to be selected to form a committee so that at least 3 men are there on the committee. In how many ways can it be done? **[6]**

b) Suppose repetitions are permitted: **[6]**

i) How many ways three-digit no. can be formed from six digits 2,3,4,5,7 and 9?

ii) How many are multiple of 10?

iii How many are even?

c) What is the coefficient of x^{09} in the expansion of $(2–x)^{19}$? **[6]**

OR

Q2) a) Five pencils and 5 pens are to be arranged in a row. In how many ways they can be arranged if **[6]**

i) All pencils must be arranged together

ii) No two pencils should be kept together and

iii) One pen and one pencil must be arranged together?

b) Find the number of permutations that can be made out of the letters **[6]**

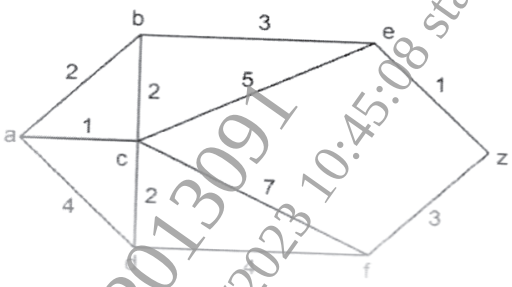
i) Mississippi

ii) Assassination

c) How many automobile license plates can be made if each plate contains two different letters followed by three different digits. Solve the problem if the first digit can not be zero. **[6]**

P.T.O.

Q3) a) Find the shortest path between a - z for the given graph using Dijkstra's algorithm **[6]**



b) Explain the terms adjacency matrix and incidence matrix. **[5]**

c) Define the following terms with suitable example. **[6]**

i) Factor of graph

ii) Weighted Graph

iii) Bipartite graph

OR

Q4) a) Draw all isomorphic graphs on vertices 2 and 3, also draw all non-isomorphic graphs on 2,3 and 4 vertices. **[6]**

b) Explain Edge connectivity and Vertex Connectivity with suitable example. **[5]**

c) Is it possible to construct a graph with 12 nodes such that 2 of the nodes have degree 3 and the remaining have degree 4. **[6]**

Q5) a) Construct a binary tree from given inorder and preorder traversals:

Inorder : b d f h k m p t v m

Preorder : b f d k h v w t m **[6]**

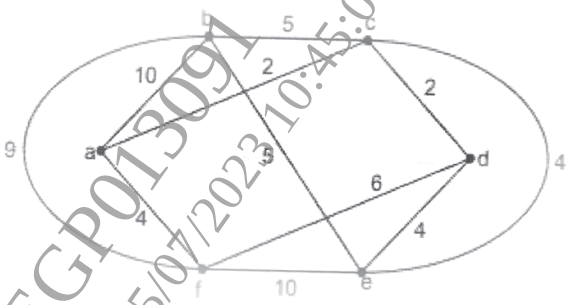
b) Define following terms **[6]**

i) Forest

ii) Fundamental cutsets

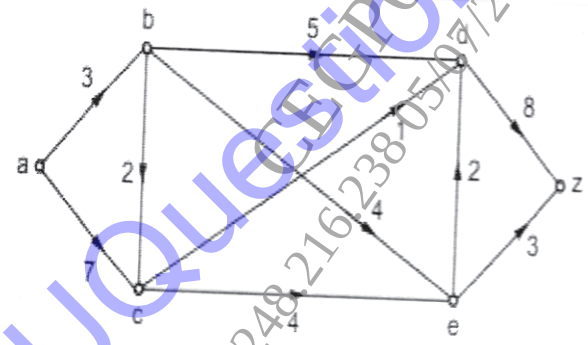
iii) Game tree

c) Use Kruskal's algorithm to find the minimum spanning tree for the connected weighted graph G as shown in fig. below **[6]**



OR

Q6) a) Find maximum flow in the transport network using labeling procedure. Determine the corresponding min-cut. **[6]**



b) Construct an optimal binary tree for the set of weights as {8,9,10,11,13,15,22}. Find the weight of an optimal tree. Also assign the prefix codes and write the code words. **[6]**

c) What is Minimum Spanning tree? Explain briefly steps involved in finding MST in Prim's Algorithm? **[6]**

Q7) a) Define with examples: **[10]**

i) Groupoid

ii) Semigroup

iii) Monoid

iv) Abelian group.

v) Subgroup

b) Let (A,*x*) be monoid such that for every $x \in A$, $x * x = e$ wheree is the identity element. Show that (A,*) is an abelian group. **[7]**

OR

Q8) a) Define with examples: **[10]**

i) Properties of binary operation

ii) Ring with unity

iii) Fields.

iv) Integral Domain

b) Find the number of codes generated by the given check matric H. Also find all code words. **[7]**

1	1	0	1	0	0
0	1	1	0	1	0
1	0	1	0	0	1