

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^{109} 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?

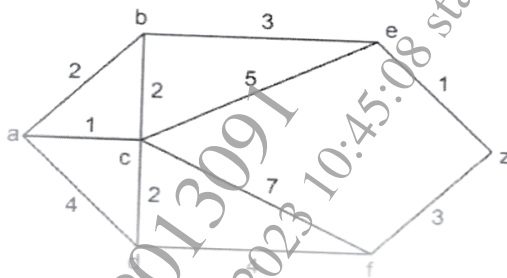
b) Find the number of permutations that can be made out of the letters **[6]**

- 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]
- Factor of graph
 - Weighted Graph
 - 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]

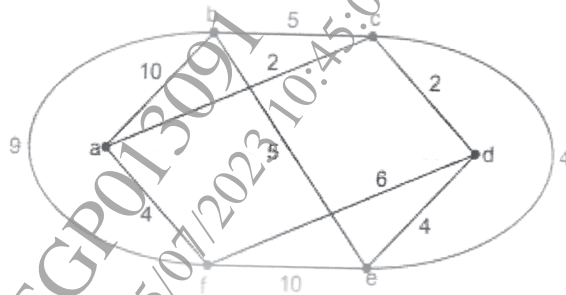
- Q5) a)** Construct a binary tree from given inorder and preorder traversals:

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

Preorder : b f d k h v w t m

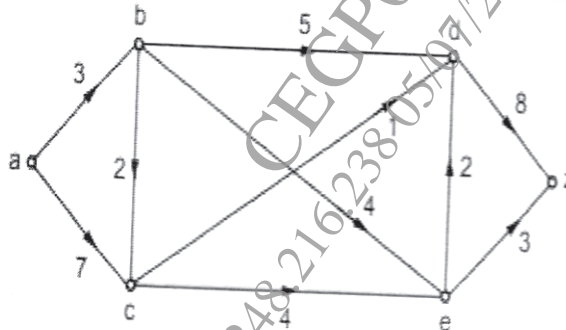
- b) Define following terms [6]
- Forest
 - Fundamental cutsets
 - Game tree

- 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]
- Groupoid
 - Semigroup
 - Monoid
 - Abelian group.
 - Subgroup
- b) Let (A, x) be monoid such that for every $x \in A$, $x * x = e$ where e is the identity element. Show that $(A, *)$ is an abelian group. [7]

OR

- Q8) a)** Define with examples: [10]
- Properties of binary operation
 - Ring with unity
 - Fields.
 - Integral Domain
- b) Find the number of codes generated by the given check matrix 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

