Total No. of Questions : 8]

SEAT No. :

PD-4075

[Total No. of Pages : 4

[6402]-35

S.E. (Computer Engg./Comp.Sc.& D.E /AI & DS, Computer Science & Design Engg.)

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 wherever necessary.*
3) *Figures to the right indicate full marks.*
4) *Assume suitable data,if necessary.*

Q1) a) A committee of 3 persons is to be formed from a group of 2 men and 3 women. In how many ways can this be done? **[6]**

b) Find the number of arrangements that can be made out of the letters. i) ASSASSINATION ii) GANESHPURI **[6]**

c) What is the number of ways of choosing 4 cards from a pack of 52 playing cards? In how many of these i) are face cards. ii) two are red cards and two are black cards. **[6]**

OR

Q2) a) Out of 4 officers & 10 clerks, a committee of 2 officers & 3 clerks is to be formed. In how many ways committee can be done? **[6]**

i) Any officer & clerk can be included.

ii) A particular clerk must be in committee.

iii) A particular officer cannot be in committee.

b) How many words with or without meaning can be formed using the letters of the word EQUATION using each letter exactly once? **[6]**

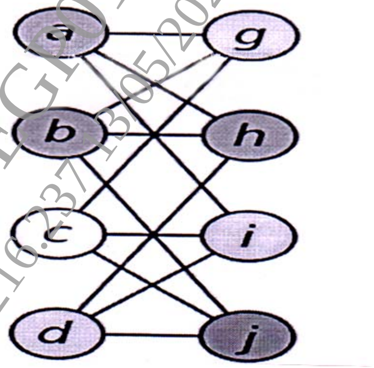
c) Salad is made with combination of one or more eatables, how many different salads can be prepared from onion, carrot, cabbage & cucumber. **[6]**

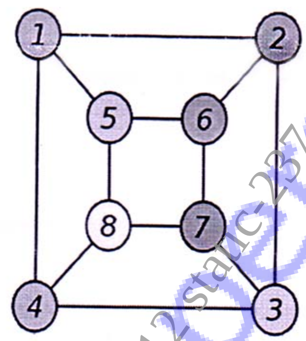
P.T.O.

Q3) a) Define following terms with example. **[7]**

i) Complete graph
ii) Regular graph
iii) Bipartite graph
iv) Complete bipartite graph
v) Paths and Circuits
vi) Acyclic Graph
iv) Complement of a graph

b) The graphs G and H with vertex sets V(G) and V(H), are drawn below. Determine whether or not G and H drawn below are isomorphic. If they are isomorphic, give a function g: V(G)-> V(H) that defines the isomorphism. If they are not explain why they are not. **[5]**

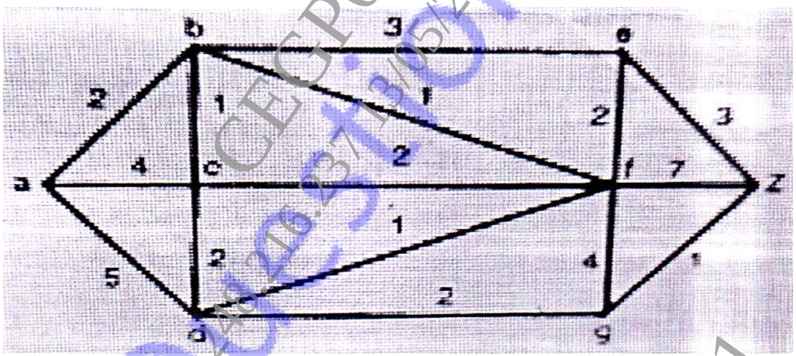




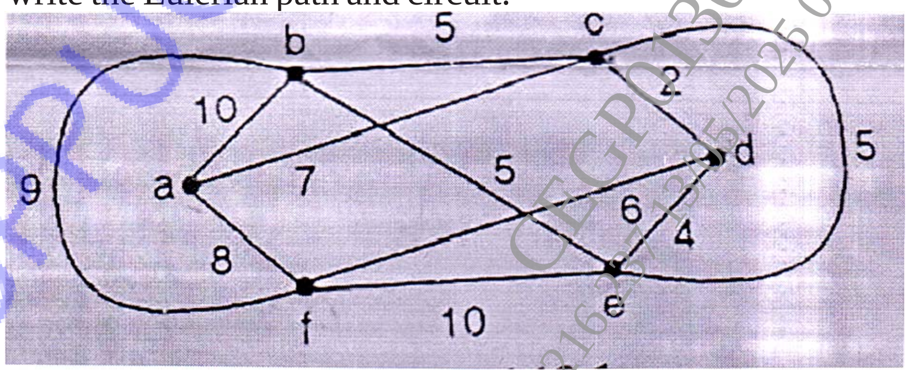
c) Is it possible to draw a simple graph with 4 vertices and 7 edges. Justify? **[5]**

OR

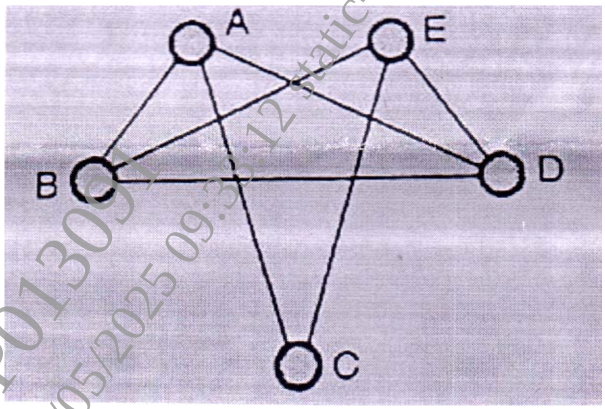
Q4) a) Find the shortest path for a to z in the following graph using Dijkstra's algorithm: **[7]**



b) For the following graph find whether Eulerian graph and circuit exists. If yes write the Eulerian path and circuit. **[5]**

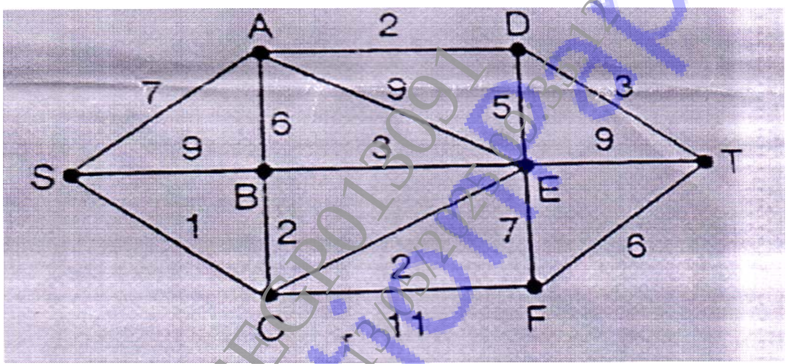


c) Convert following non planar into planar graph. Also show the validity of Euler's formula for the given graph. **[5]**

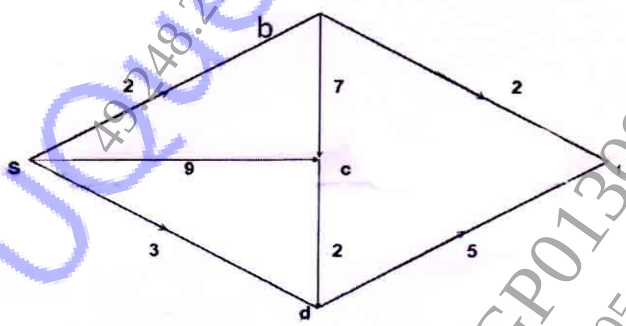


Q5) a) Construct an optimal binary tree for the set of weights as {8, 9, 10, 11, 13, 15, 22}. Find the weight of an optimal tree. Also assign the prefix codes and write the code words. **[6]**

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



c) Use labeling procedure to find a maximum flow in the transport network given in the following figure. Determine the corresponding minimum cut. **[6]**



OR

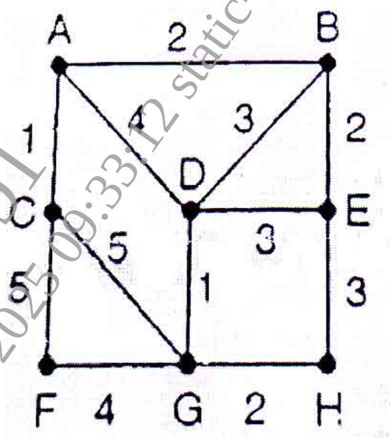
Q6) a) Explain **[6]**

i) Cut set

ii) Complete Binary tree

iii) Prefix code

b) Use Prim's algorithm to find minimum spanning. Take A as starting vertex (label remaining vertices) **[6]**



c) Construct binary search tree by inserting integers in order 50, 15, 62, 5, 20, 58, 91, 3, 8, 37, 60, 24 Find **[6]**

i) No of internal nodes ii) Leaf nodes

Q7) a) Define with examples : **[6]**

i) Ring with unity ii) Fields

iii) Integral Domain

b) Explain Algebraic system and properties of binary operations. **[6]**

c) Consider the set Q of rational numbers and let a*b be the operation defined by a*b = a + b-ab **[5]**

i) Find 3*4

ii) 2*(-5),

iii) 7*(1/2)

Is (Q,*) semi group? Is it commutative?

OR

Q8) a) Define with examples : **[6]**

i) Groupoid ii) Monoid

iii) Abelian group.

b) Let R = {0, 60, 120, 180, 240, 300} and* binary operation so that for a and b in R, a*b is overall angular rotation corresponding to successive rotations by a and by b. Show that (R,*) is a group. **[6]**

c) Prove that (I, +) is an abelian group, where I is a set of all integers with respect to binary operation '+'. **[5]**