Total No. of Questions : 8]

SEAT No. : ____

PE4268

[Total No. of Pages : 4

[6582]-40

S.E. (Computer Engg./Artificial Intelligence and Data Science) (Computer Science & Design Engineering)

DISCRETE MATHEMATICS

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

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Solve Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Assume suitable data if necessary.***

Q1) a) A committee including 3 boys and 4 girls is to be formed from a group of 10 boys and 12 girls. How many different committees can be formed from the group? **[6]**

b) In a certain country, the car number plate is formed by 4 digits from the digits 1, 2, 3, 4, 5, 6, 7, 8 and 9 followed by 3 letters from the alphabet. How many number plates can be formed if neither the digits nor the letters are repeated? **[6]**

c) How many 4-letter words with or without meaning, can be formed out of the letters of the word, 'LOGARITHMS', if repetition of letters is not allowed? **[6]**

OR

Q2) 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) How many 6-digit odd numbers greater than 6,00,000 can be formed from the digits 5, 6, 7, 8, 9, and 0 **[6]**

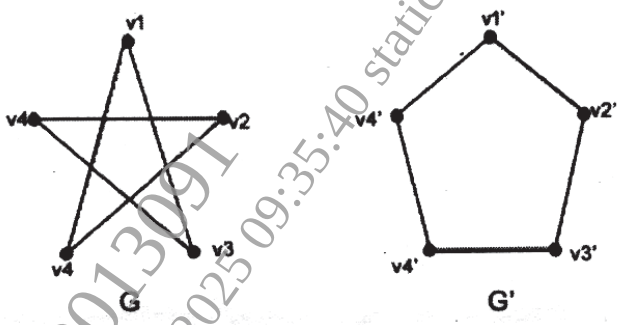
i) if repetition is allowed

ii) if repetition is not allowed

c) A box contains 4 red, 3 white and 2 blue balls. Three balls are drawn at random. Find out the number of ways of selecting the balls of different colours? **[6]**

P.T.O.

Q3) a) Show that the following graphs are isomorphic. **[7]**

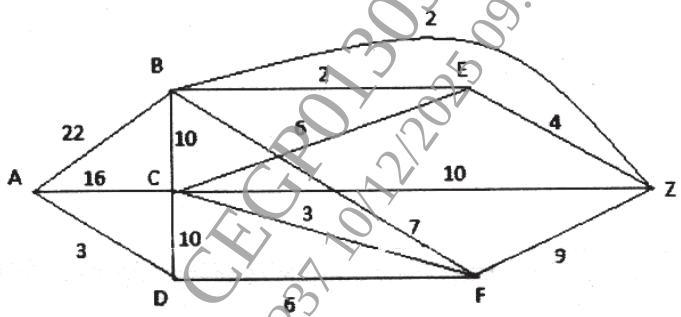


b) List and explain the necessary and sufficient conditions for Hamiltonian and eulerian path with suitable exmples. **[5]**

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

OR

Q4) a) Use dijkstras algorithm to find the shortest path between A and Z in figure. **[7]**



b) Show that in a connected planar graph with 6 vertices and 12 edges, each of the regions is bounded by 3 edges. **[5]**

c) Under what condition $k_{m,n}$ will have eulerian circuit. **[5]**

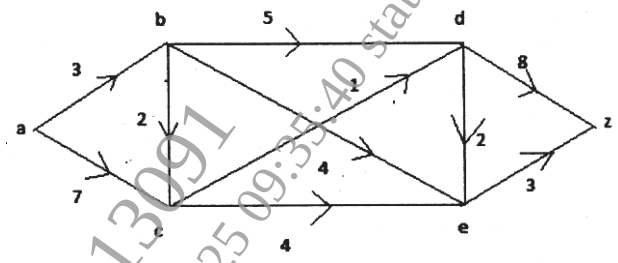
Q5) a) Define following terms. **[6]**

i) Level of a tree

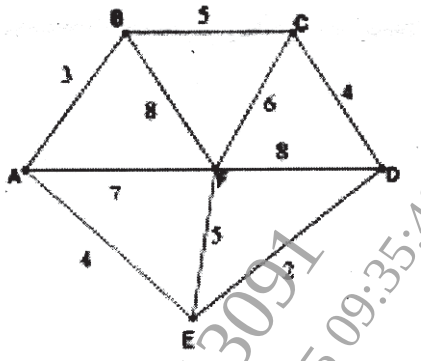
ii) Height of a tree

iii) Fundamental circuit

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



c) Construct Minimal spanning tree for the following graphs using prims algorithm. **[6]**



OR

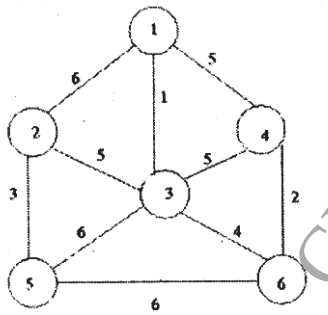
Q6) a) Define following terms **[6]**

i) Forest

ii) Fundamental cutsets

iii) Game tree

b) Construct Minimal spanning tree for the following graphs using kruskals algorithm. **[6]**



c) Construct an optimal tree for 8,9,10,11,13,15,22 using Huffman coding. **[6]**

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

i) Semi-group

ii) Field

iii) Monoid

b) Let(A,*)be an algebraic system where * is a binary operation such that for any *a*, *b*, belongs to A, $a*b = a$. **[6]**

i) show that * is an associative operation

ii) can *ever be a commutative operation?

c) Let (A,*) be a group, show that (A,*) is an abelian group iff $a^2 * b^2 = (a*b)^2$. **[5]**

OR

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

i) Ring

ii) Ring Homorphism

iii) Integral domain

b) Let $Z_n = \{0,1,2,.....n\text{-}1\}$. Construct the multiplication table for with $n = 6$. Is (Z*n*,*) an abelian group. Where * is a binary operation on Z_n such that $a*b$ = remainder of a*b divided by *n*. **[6]**

c) Prove that the set Z of all integers with binary operation * defined by $a*b = a + b + 1$ such that for all a, b belonging to Z is an abelian group. **[5]**