Total No. of Questions : 8]

SEAT No. :

PB3633

[Total No. of Pages :4

[6261]-40

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

DISCRETE MATHEMATICS

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

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) *Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.*
2) *Neat diagrams must be drawn whenever necessary.*
3) *Figures to the right indicates 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 from 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 3-digit numbers can be formed from the digits 2,3,5,6,7 and 9, which are divisible by 5 and none of the digits is repeated? **[6]**

c) 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 repitition is not allowed

OR

Q2) a) In how many different ways can the letters of the word 'OPTICAL' be arranged so that the vowels always come together **[6]**

b) If a committee has eight members. **[6]**

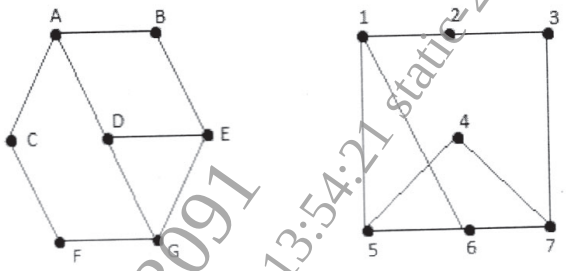
i) How many way can the committee members be seated in a row?

ii) How many way can the committee select a president, vice-precident and secretary

c) 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]**

P.T.O.

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

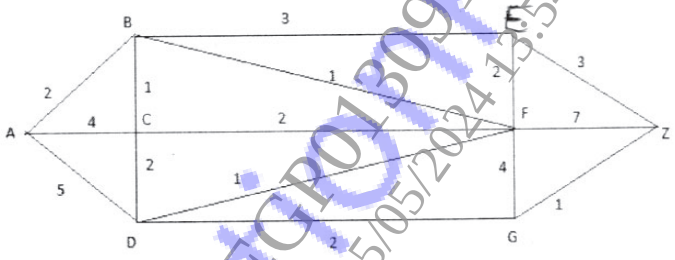


b) List and explain the necessary and sufficient conditions for Hamiltonian and eulerian path with suitable examples. **[5]**

c) Define the graph K_n and K_{mn} **[5]**

OR

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



b) Draw a complete bipartite graph on 2 and 4 vertices K2,4 and 2 and 3 vertices K2,3. **[5]**

c) Under What condition $K_{m,n}$ will have eulerian circuit **[5]**

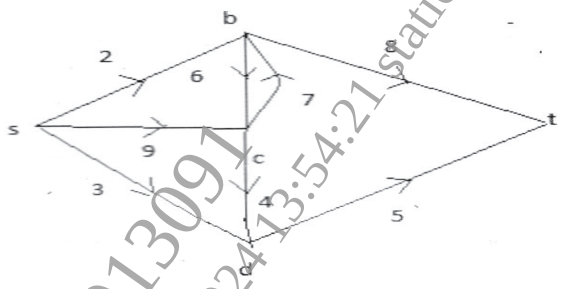
Q5) a) Define following terms **[6]**

i) Level of a tree

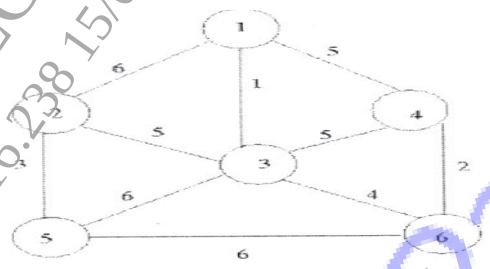
ii) Height of a tree

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

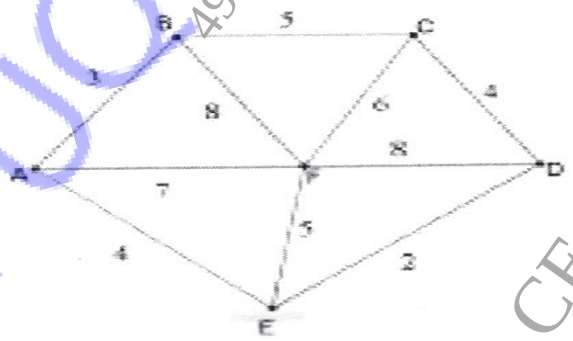
Q6) a) Define following terms **[6]**

i) Forest

ii) Fundamental cutsets

iii) Game tree

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



c) Construct an optimal tree for 10,11,14,21,16,18 using Huffman conding **[6]**

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

i) Cyclic group

ii) Abelian group

iii) Cosets

b) Let $Z_n = \{0,1,2,\ldots n-1\}$. Constract the multiplication table for 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) 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) Group codes

ii) Subgroup

iii) Integral domain

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 associated operation

ii) Can * ever be a communtative operation?

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]**