

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]

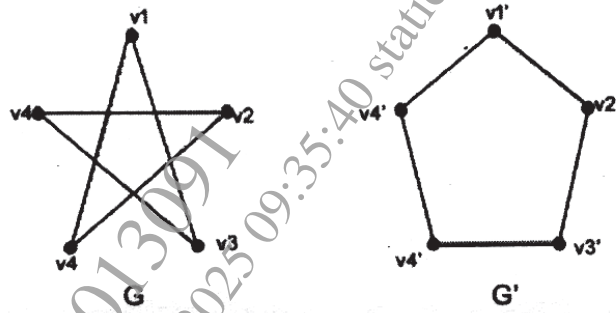
b) How many 6-digit odd numbers greater than 6,00,000 can be formed from the digits 5, 6, 7, 8, 9, and 0 [6]

- 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.

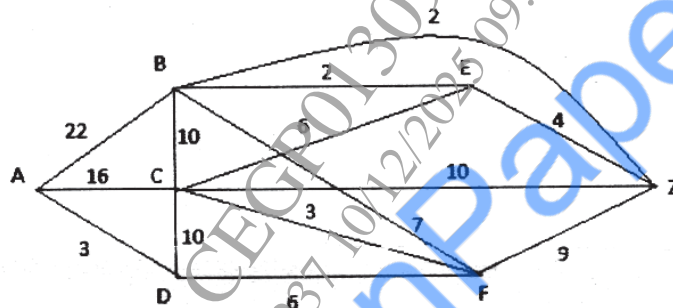
Q3) a) Show that the following graphs are isomorphic. [7]



- b) List and explain the necessary and sufficient conditions for Hamiltonian and Eulerian path with suitable examples. [5]
- c) Explain the terms adjacency matrix and incidence matrix. [5]

OR

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

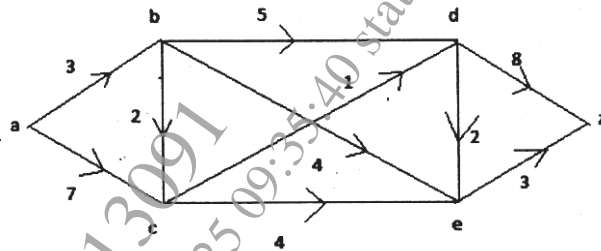


- b) Show that in a connected planar graph with 6 vertices and 12 edges, each of the regions is bounded by 3 edges. [5]
- c) Under what condition $k_{m,n}$ will have Eulerian circuit. [5]

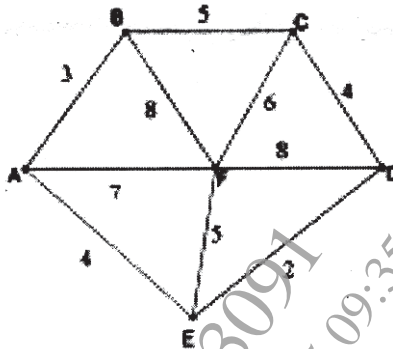
Q5) a) Define following terms. [6]

- 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]

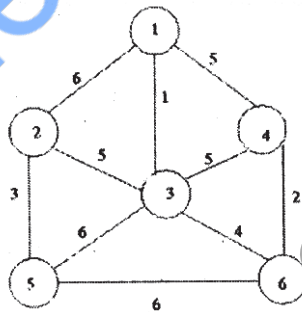


OR

- 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 $Z_n = \{0, 1, 2, \dots, n-1\}$. 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]

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