Total No. of Questions : 8]

P9115

SEAT No. :

[Total No. of Pages : 5

[6179]-240

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

DISCRETE MATHEMATICS

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

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) *Answer Question No. Q1 or Q2, and Q3 or Q4, and Q5 or Q6 and Q7 or Q8.*
2) *Neat diagram must be drawn whenever necessary.*
3) *Figures to the right indicate full marks.*
4) *Assume suitable data, if necessary.*

Q1) a) How many bit strings of length 8 bits can be constructed which will either start with '1' or end with '00'? **[6]**

b) In how many ways can 6 Boys and 2 Girls be seating in a row such that

i) 2 Girls are seating together

ii) 2 Girls are not seating together. **[6]**

c) How many bit strings can be formed of length 10 bits which contains? **[6]**

i) at least four 1's

ii) at most four 1's?

OR

Q2) a) How many bit strings of length 10 can be formed which will contain either 5 consecutive 0s or 5 consecutive 1s? **[6]**

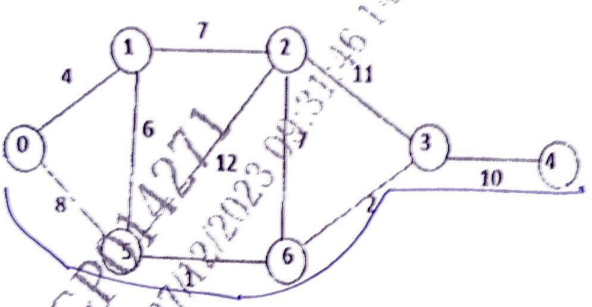
b) A zip code contains 6 digits. How many different zip codes can be made with the digits 0-9 if.

i) No digit is used more than once.

ii) The first digit is not '0' **[6]**

c) Use the Binomial theorem to expand $(3a-2b)^6$ **[6]**

Q3) a) Find shortest path from vertex '0' to vertex '4' using Dijkstra's algorithm. **[7]**

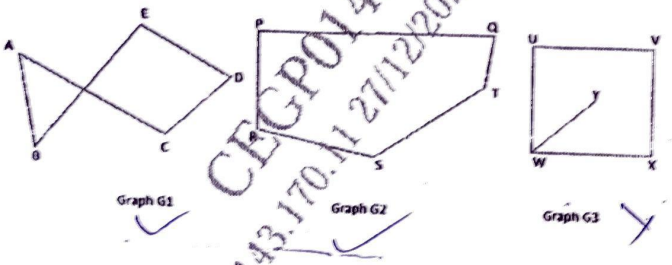


b) Explain with example: **[5]**

i) Bipartite Graph

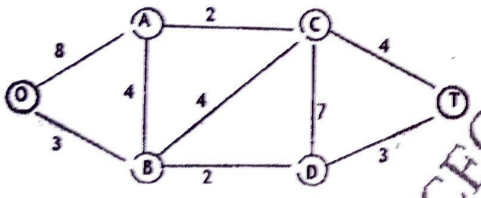
ii) Connected Graphs

c) What is Graph isomorphism? Which of the following graphs are isomorphic? Justify your answer. **[5]**



OR

Q4) a) Find shortest path from vertex 'O' to Vertex 'T' using Dijkstra's algorithm. **[7]**



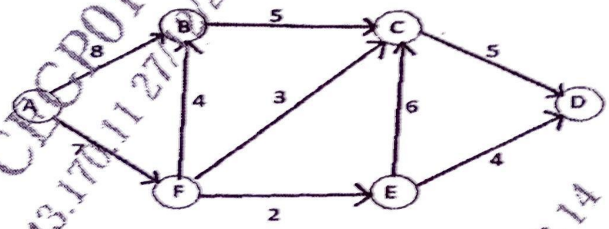
b) Explain with suitable example: **[5]**

i) Euler path & Euler circuit

ii) Hamilton path & Hamilton circuit.

c) What is planar Graph? A simple planar graph G contains 20 vertices and degree of each vertex is 3. Determine the number of regions in planar graph G? [5]

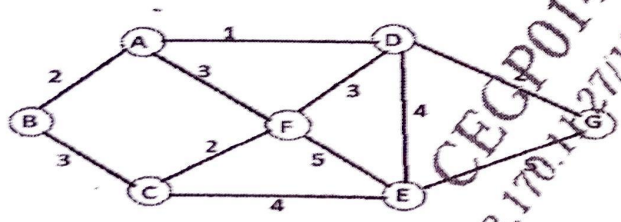
Q5) a) For the following graph find different cut set and identify the max flow in given network? [6]



b) Find the optimal prefix code for the given characters with the frequency of occurrences as below. [6]

Character	Frequency
A	9
E	15
I	12
O	3
U	4
S	13
T	1

c) Find minimum Spanning tree using prims algorithm. [6]

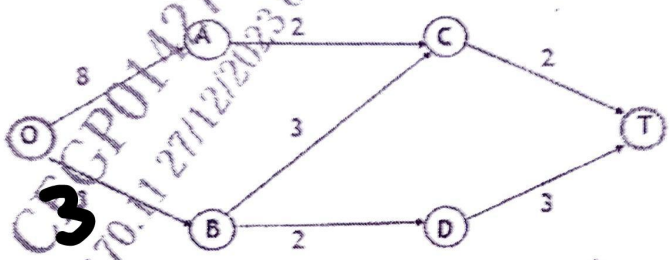


OR

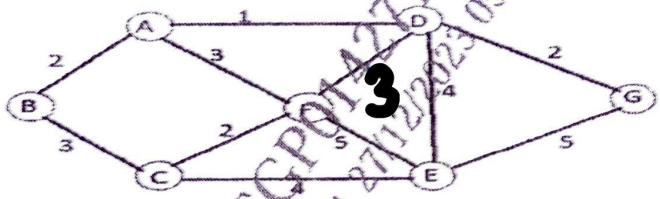
Q6) a) Construct Binary search Tree: **[6]**

21, 28, 14,18,11, 32, 25, 23, 37, 27, 5, 15, 19, 30, 12, 26

b) For the following transport network find the maximum flow using max flow min cut theorem. **[6]**



c) Find minimum spanning tree using Kruskals Algorithm. **[6]**



Q7) a) Let $Z_4=\{0,1,2,3\}$ and 'R' be the relation under operation '+' defined as

$a+b=a+b$: if $(a+b)<4$

$a+b=a+b-4$: if $(a+b)\leq 4$

Where $a,b \in Z_4$

Determine Algebraic System $(Z_4,+)$ is abellian group or not? **[6]**

b) Explain: **[6]**

i) Integral domain

ii) Field

c) Let A={0,1,2,3} and 'R' be the relation under operation '$\odot$' defined as $a \odot b=a,b\%4$. Determine algebraic system $(A, \odot)$ is monoid or not? **[5]**

OR

Q8) a) Let Zn={0,1,2,3,...n-1}

Consider 'R' relation under operation '+' defined as "addition Modulo 5" and operation '*' defined as " multiplication modulo 5". Does the Algebraic system. $(Z_5,+,*)$ forms Ring"? **[8]**

b) Explain the following properties of Algebraic structure with example **[4]**

i) Identity

ii) Inverse

c) Consider 'R' be the relation under binary operation '*' on a set Z. Does the algebraic system (Z,*) is Abelian Group? **[5]**