Total No. of Questions: 8]

SEAT No. :

PA-1233

[Total No. of Pages : 5

[5925]-255

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

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 Q.8.***
2) ***Neat diagrams must be drawn whenever necessary.***
3) ***Assume suitable data wherever necessary.***

Q1) a) The company has 10 members on its board of directors. In how many ways can they elect a president, a vice president, a secretary and treasure. **[6]**

b) Find eighth term in the expansion of $(x+y)^{13}$ **[6]**

c) A box contains 6 white and 5 black balls. Find number of ways 4 balls can be drawn from the box if **[6]**

i) Two must be white

ii) All of them must have same colour

OR

Q2) a) In how many ways can word the 'HOLIDAY' be arranged such that the letter I will always come to left of letter L. **[6]**

b) In how many ways can one distribute 10 apples among 4 children **[6]**

c) Use Binomial theorem to expand $(X^4+2)^3$ **[6]**

Q3) a) Is it possible to draw a simple graph with 4 vertices and 7 edges. Justify? **[7]**

b) Define following terms with example. **[5]**

i) Complete graph

ii) Regular graph

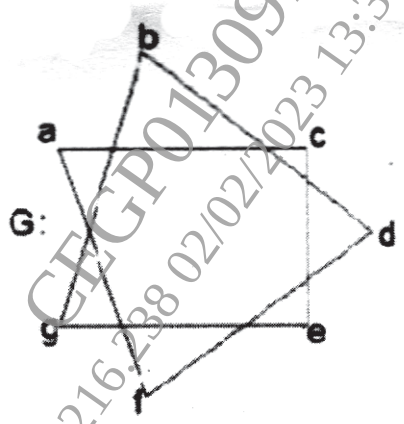
iii) Bipartite graph

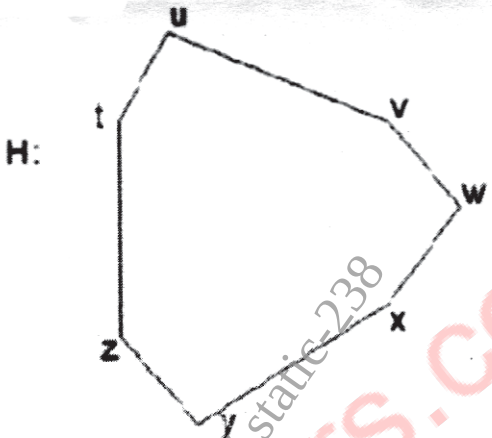
iv) Complete bipartitie graph

v) Paths and circuits

P.T.O.

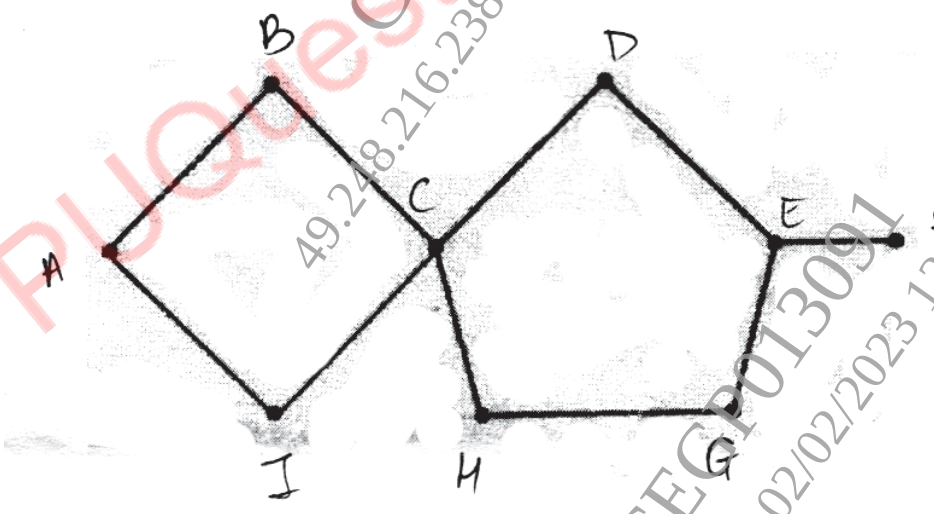
c) The graphs G and H with vertex sets V(G) and V(H), are drawn below. Determine whether or not G and H drawn below are isomorphic. If they are isomorphic, give a function g: V(G)-> V(H) that defines the isomorphism. If they are not explain why they are not. **[5]**

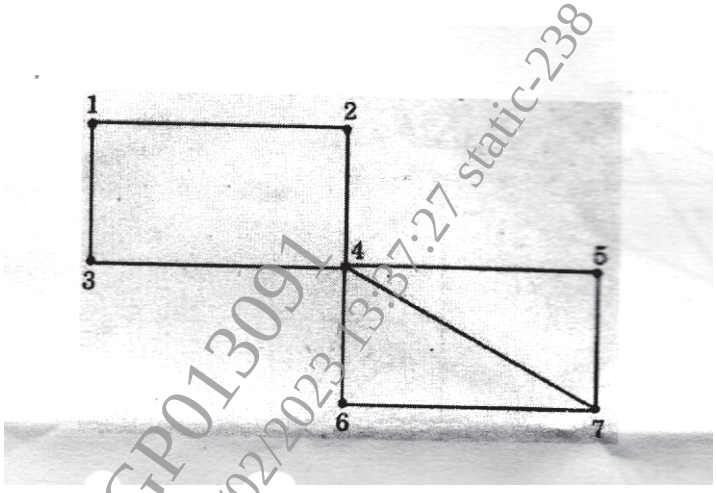




OR

Q4) a) Determine which if the graph below represents Eulerian circuit, Eulerian path, Hamiltonian circuit and Hamiltonian Path. Justify your answer **[7]**





b) A connected planar graph has nine vertices with degree 2,2,2,3,3,3,4,4,5 **[5]**

Find

i) number of edges

ii) number of faces

iii) construct two such graphs

c) Explain the following statement with example **[5]**

"Every graph with chromatic number 2 is bipartite graph"

Q5) a) Construct Huffman tree. **[6]**

A	5
B	6
C	6
D	11
E	20

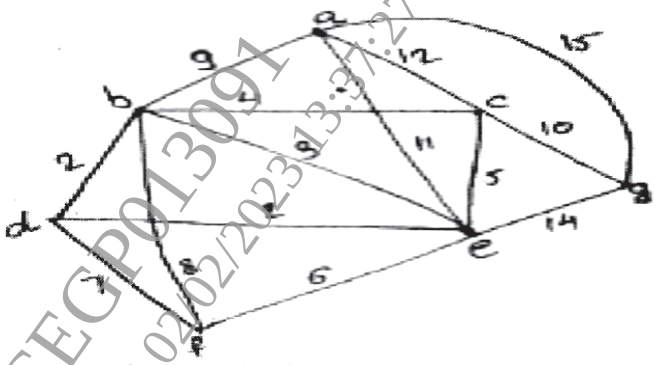
b) Explain **[6]**

i) Cutset

ii) Tree properties

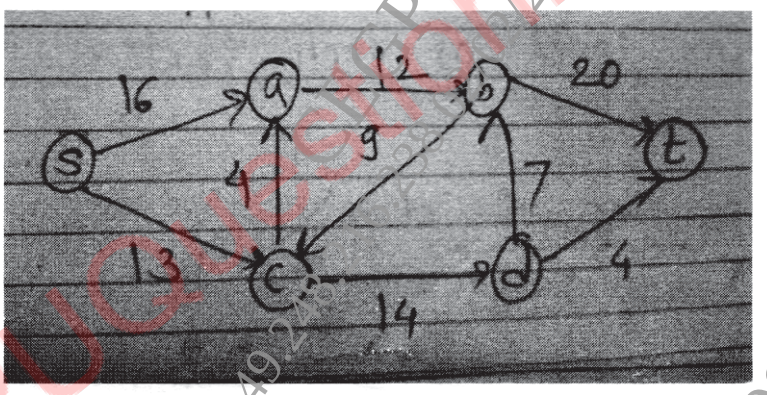
iii) Prefix code

c) Give the stepwise construction of minimum spanning tree using Prims algorithm for the following graph. Obtain the total cost of minimum spanning tree. **[6]**



OR

Q6) a) Using the labelling procedure to find maximum flow in the transport network in the following figure. Determine the corresponding minimum cut. **[6]**



b) Define with example. **[6]**

i) Level and height of a tree.

ii) Binary search tree.

iii) Spanning tree

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

Find

i) No of internal nodes

ii) leaf nodes

Q7) a) 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]**

b) Following is the incomplete operation table of 4-element group. Complete the last two rows. **[6]**

*	e	a	b	c
e	e	a	b	c
a	a	b	c	e
b				
c				

c) Explain Algebraic system and properties of binary operations. **[5]**

OR

Q8) a) Explain the following terms with examples

i) Ring with unity

ii) Integral domain

iii) Field **[6]**

b) Consider the set Q of rational numbers and let a*b be the operation defined by a*b=a+b-ab **[6]**

i) Find 3*4

ii) 2*(-5),

iii) 7*(1/2)

Is (Q,*)a semigroup? Is it commutative?

c) Show that $(Z_n \oplus)$ is Abelian group **[5]**