F.Y.B.Sc. (Computer Science)
MATHEMATICS
MTC-122: Graph Theory
### (2019 Pattern) (Semester-II) (Paper-II)

[Time: 2 Hours]

[Max. Marks: 35]

Instructions to the candidates:

1) All questions are compulsory.
2) Figures to the right indicate full marks.
3) Neat diagrams must be drawn wherever necessary.
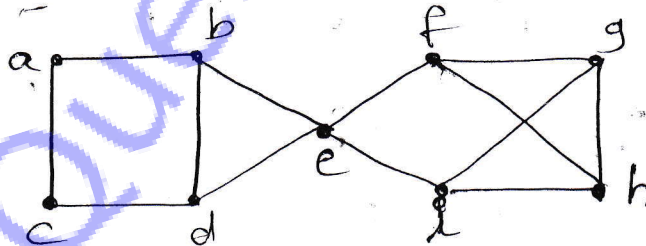
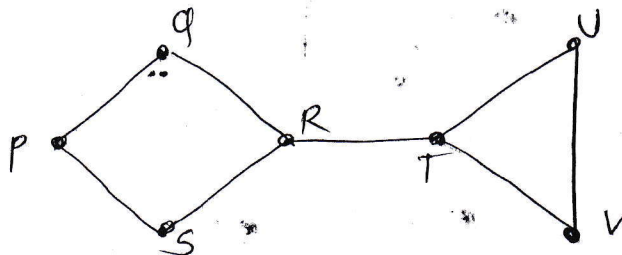**Q1)** Attempt any five of the following   [10]

a)   Define complete graph K_n on n vertices. Also draw K_4.

b)   Draw the following graphs: $3R_6$, C_7

c)   Verify handshaking lemma for the following graph.
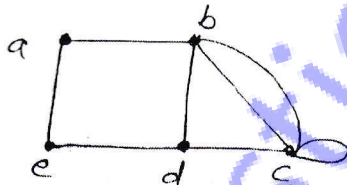
d)   What is the number of connected components in the following graph?

e)   Find cut edges in the following graph.
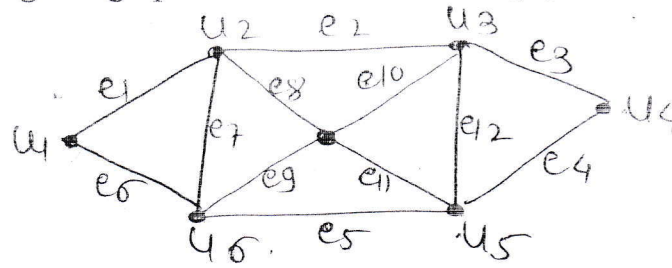

f)   Define center of a tree.

g)   Define Asymmetric digraph with example

Q3) **Attempt any one of the following.** [10]
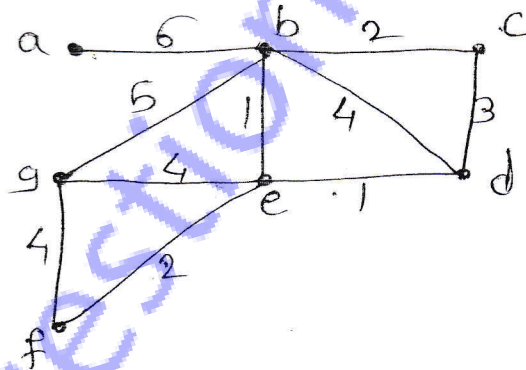
a) For the given graph G answer the following questions

    i) List all cut vertices in G.

    ii) List all cycles in G.

    iii) List any two distinct paths from the vertex *a* to vertex *h* in G.

    iv) Verify Handshaking lemma for this graph.

    v) Minimal degree of graph G.

b)   i) Use Kruskal's algorithm to find a minimum spanning tree in the following weighted graph given below.
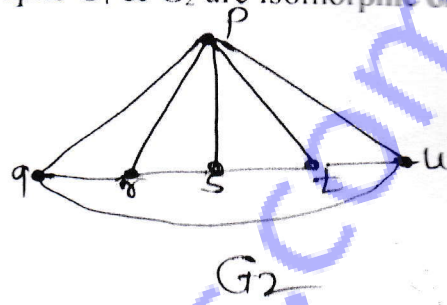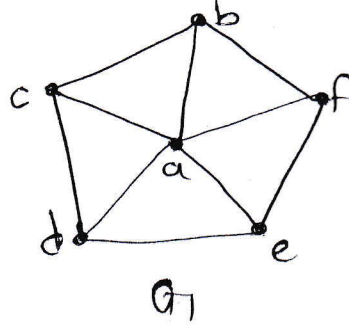

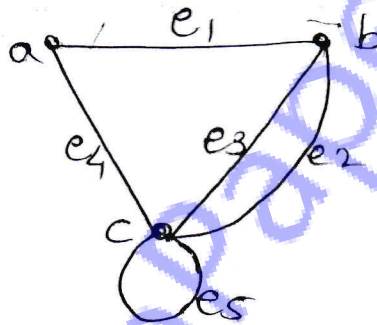   ii) Give an example of a graph which is Eulerian graph but not Hamiltonian.

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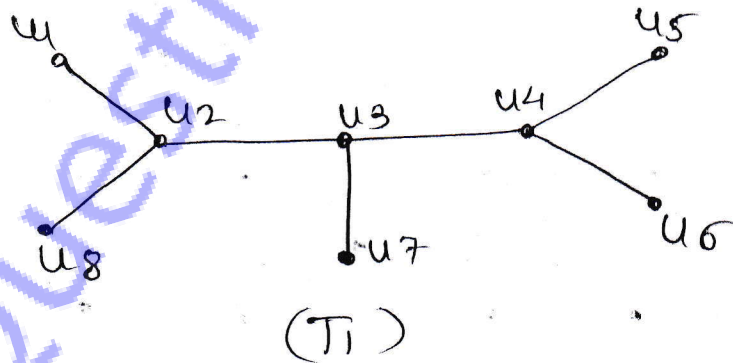**Q2)** **Attempt any three of the following.** [15]

a) Determine whether the following graphs G_1 & G_2 are isomorphic or not

G_1

G_2

b) Write the adjacency matrix and incidence matrix for the following graph G.

c) Draw 5 non isomorphic simple graphs with 4 vertices.

d) Find radius, Centre and diameter of the following tree.

(T_1)

e) Solve travelling salesmen problem for the following graph.