F.Y. B. SC. (Computer Science) SEM – II (CBCS 2018 COURSE) :
SUMMER - 2019
SUBJECT : GRAPH THEORY

Day : Saturday
Date : 04/05/2019

Time : 11.00 AM TO 02.00 PM
Max. Marks : 60

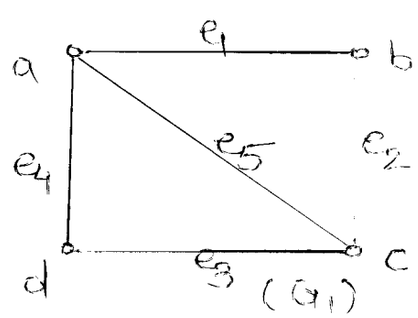
S-2019-1065

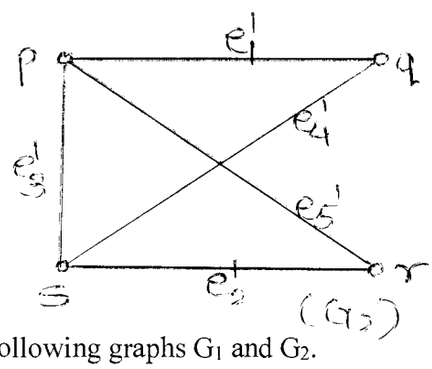
N.B.:

1) All questions are **COMPULSORY**.
2) Figures to the right indicate **FULL** marks.

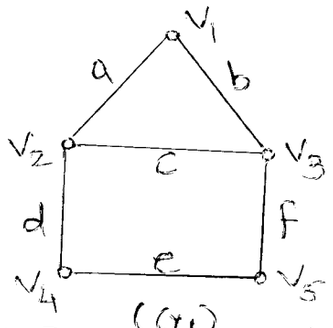
Q.1 Attempt **ANY TWO** of the following: **[12]**

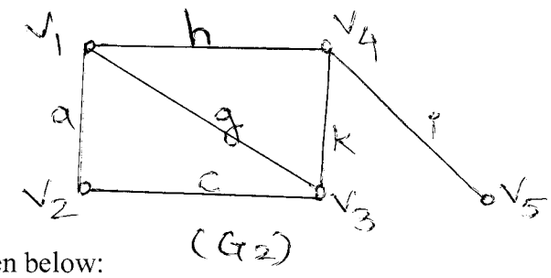
a) Show that the following two graphs are isomorphic :



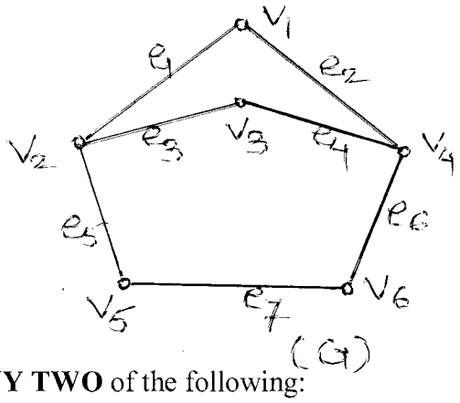


b) Find : **i)** $G_1 \cap G_2$ **ii)** $G_1 \cup G_2$ **iii)** $G_1 \oplus G_2$ for the following graphs G_1 and G_2.



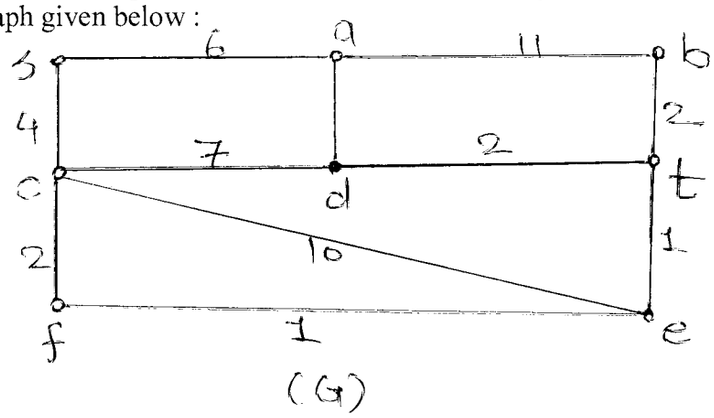


c) Draw atleast six spanning trees of the graph given below:



Q.2 Attempt **ANY TWO** of the following: **[12]**

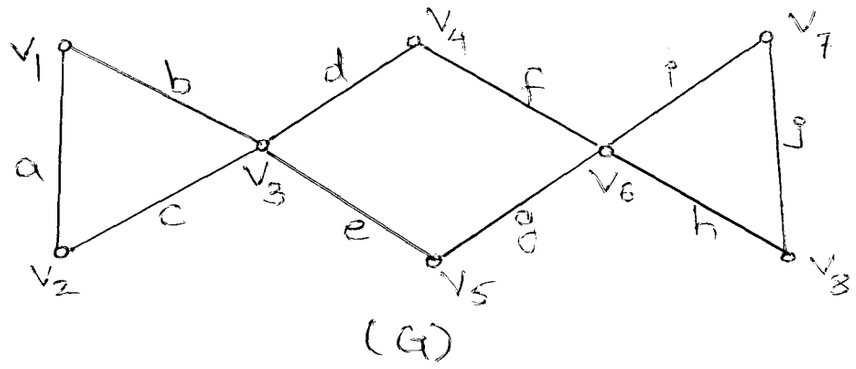
a) Find shortest path from vertex s to vertex t using Dijkstra's algorithm for the graph given below :



P.T.O.

b) Explain Konigsberg Seven Bridge problem.

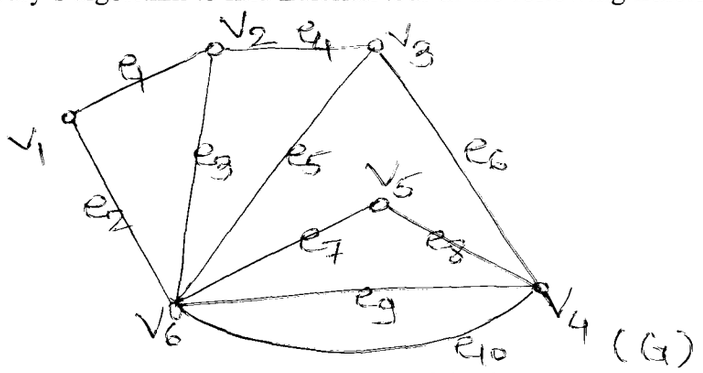
c) Draw the subgraphs of following graph (at least 6).



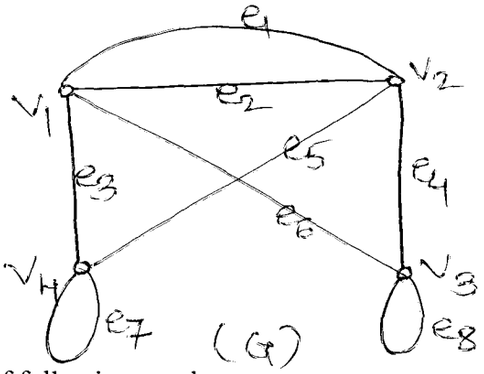
(G)

Q.3 Attempt **ANY TWO** of the following: **[12]**

a) Apply Fleury's algorithm to find Eulerian tour in the following Eulerian graph G:



b) Find adjacency matrix and incidence matrix of the following graph G:



c) Give examples of following graphs:

i) Eulerian but not Hamiltonian.

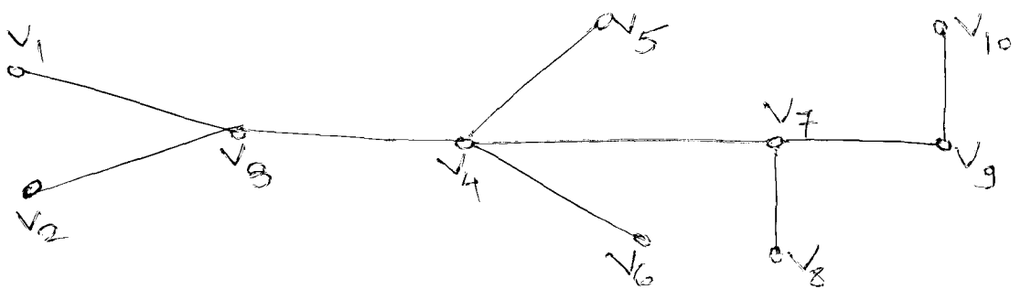
ii) Hamiltonian but not Eulerian.

iii) neither Hamiltonian nor Eulerian.

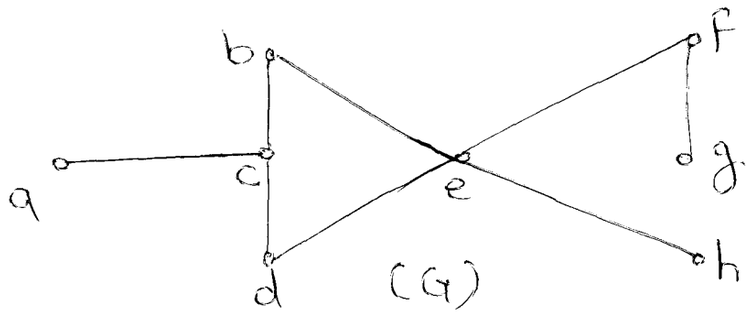
Q.4 Attempt **ANY THREE** of the following: **[12]**

a) Prove that the number of vertices in a self-complementary graphs is of the type 4k or 4k + 1, where k is a positive integer.

b) Find the eccentricity of each vertex of the tree given below. Hence, find its centre.



c) Find vertex connectivity and edge connectivity of the following graph :

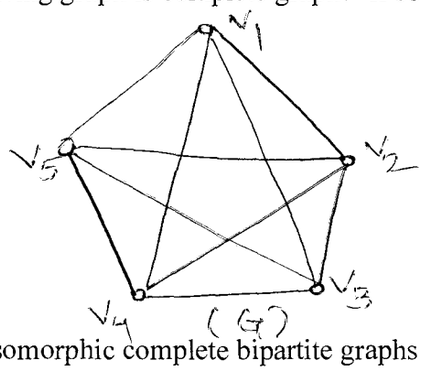


d) Define: **i)** Cut vertex **ii)** Cut edge
iii) Vertex connectivity **iv)** Edge connectivity.

Q.5 Attempt **ANY FOUR** of the following: **[12]**

a) State and prove Handshaking Lemma.

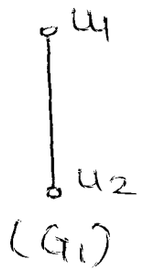
b) Whether following graph is complete graph? If so draw it's complement?

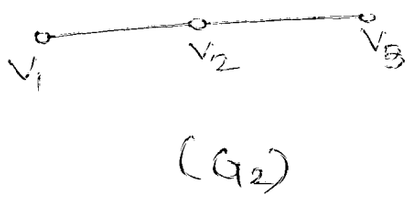


c) Find all non-isomorphic complete bipartite graphs with 7 vertices.

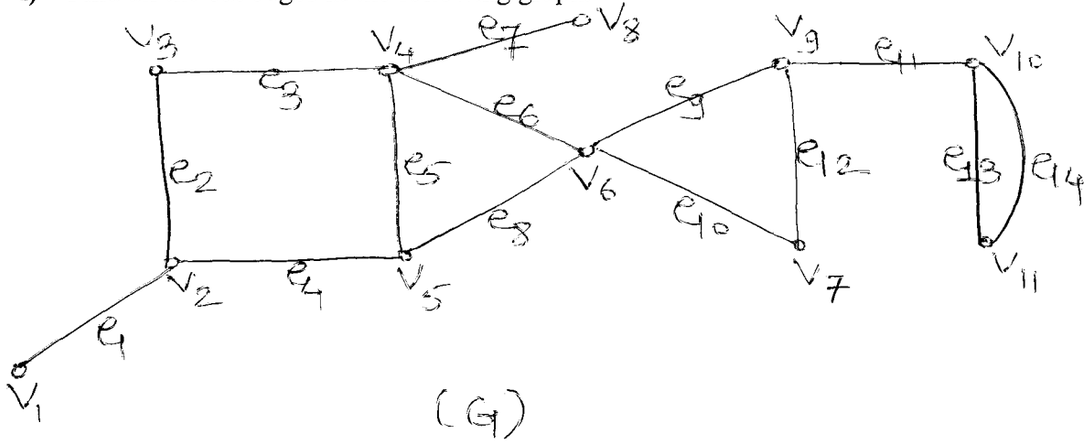
d) Can you draw a binary tree on 7 vertices and of height 2? Justify.

e) Find the product $G_1 \times G_2$ for the following pair of graphs:





f) Find all the cut edges in the following graph.



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