

BACHELOR OF SCIENCE (COMPUTER SCIENCE) (CBCS - 2018 COURSE)
F.Y.B.Sc.(Computer Science) Sem-II :SUMMER- 2022
SUBJECT : GRAPH THEORY

Day : Wednesday
 Date : 6/7/2022

S-20080-2022

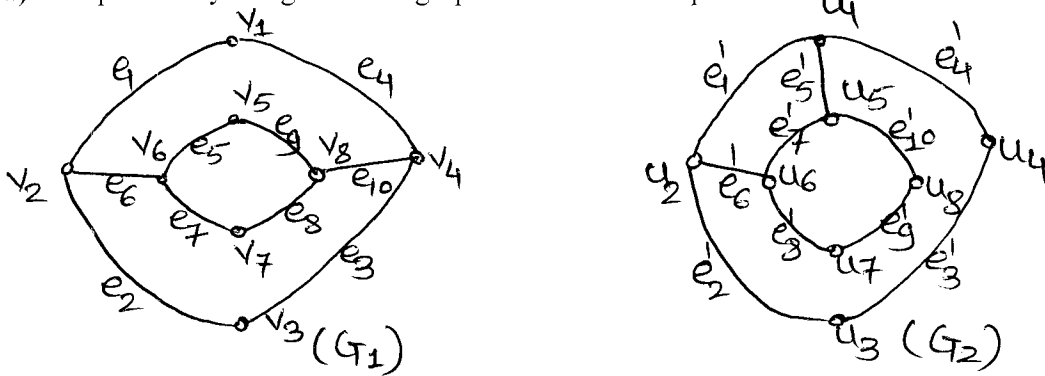
Time : 11:00 AM-02:00 PM
 Max. Marks : 60

N. B. :

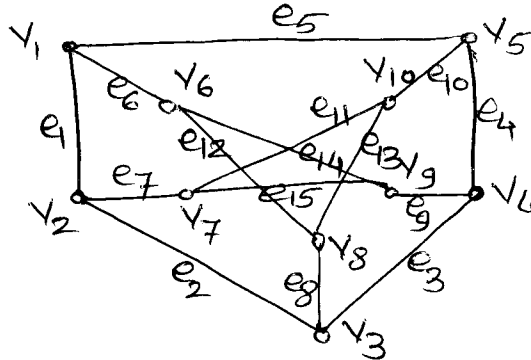
- 1) All questions are **COMPULSORY**.
- 2) Figures to the right indicate **FULL** marks.
- 3) Use of non-programmable calculator is **ALLOWED**.

Q.1 Attempt **ANY TWO** of the following: (12)

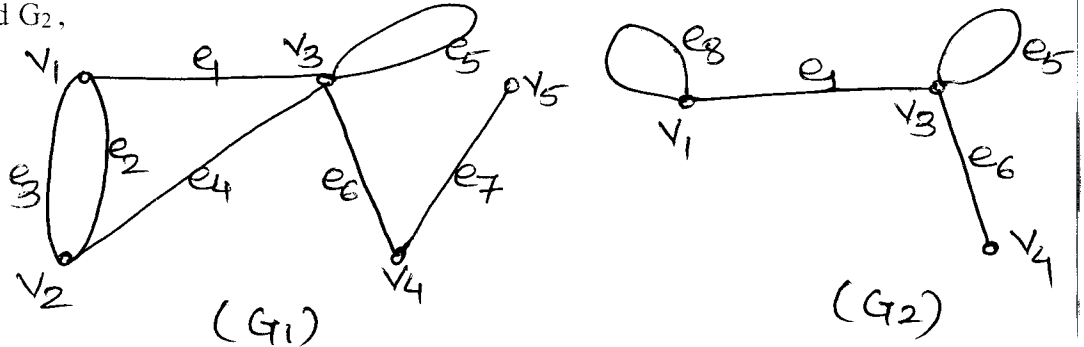
a) Explain why the given two graphs are not isomorphic:



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

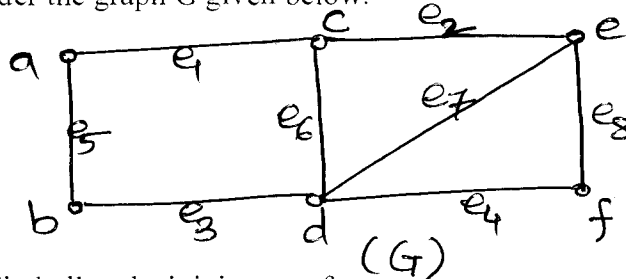


c) Find: i) $G_1 \cup G_2$ ii) $G_1 \cap G_2$ iii) $G_1 \oplus G_2$ for the following graphs G_1 and G_2 .



Q.2 Attempt **ANY TWO** of the following: (12)

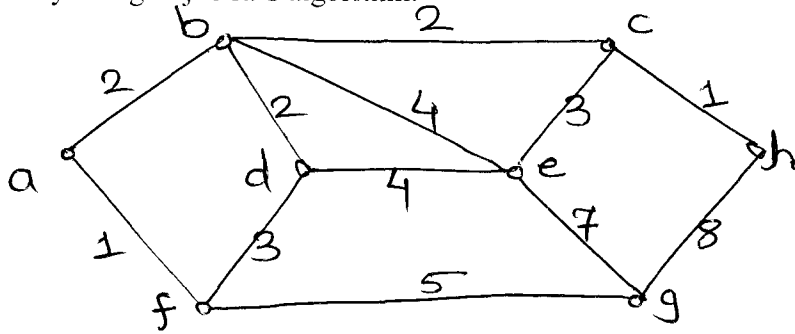
a) Consider the graph G given below:



- i) Find all paths joining a to f .
- ii) What are the lengths of the paths from a to f ?
- iii) Which path is the shortest path joining a to f ?
- iv) What is $d(a, f)$?

P. T. O.

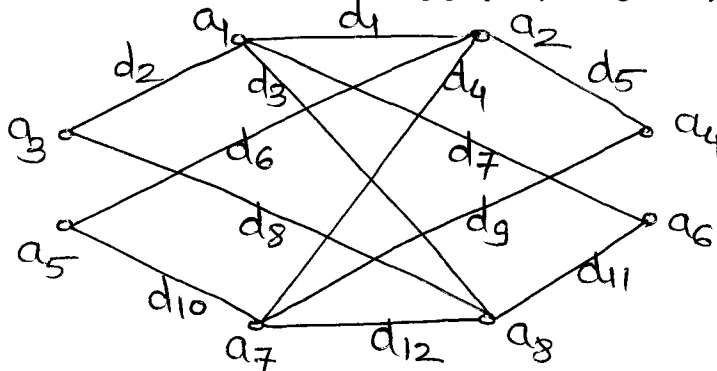
- b) Find the shortest path from the vertex a to all vertices of the graph given below by using Dijkstra's algorithm.



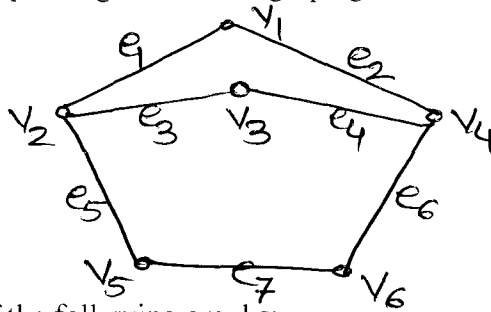
- c) Explain Chinese postman problem in brief.

Q. 3 Attempt ANY TWO of the following: (12)

- a) Find an Eulerian tour in the following graph by using Fleury's algorithm:



- b) Draw at least six spanning trees of the graph given below:



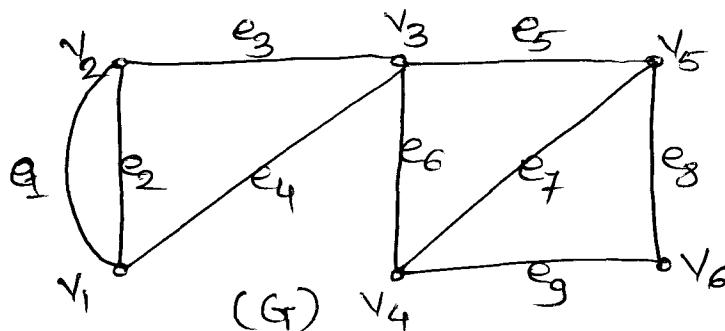
- c) Give examples of the following graphs:

- i) Hamiltonian but not Eulerian.
- ii) Eulerian but not Hamiltonian.
- iii) Neither Hamiltonian nor Eulerian

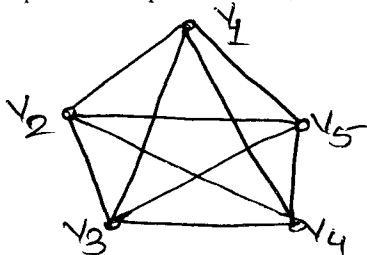
Q. 4 Attempt ANY THREE of the following: (12)

- a) Find:

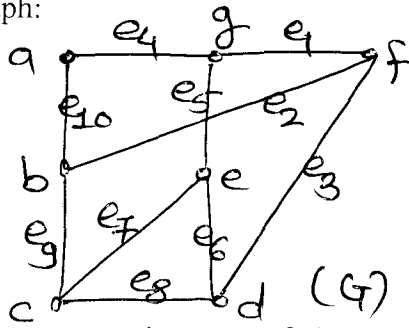
- i) $G - A$ where $A = \{e_1, e_2, e_8, e_9\}$
- ii) Induced subgraph $G[V]$ where $V = \{v_1, v_2, v_3, v_6\}$ for the following graph G:



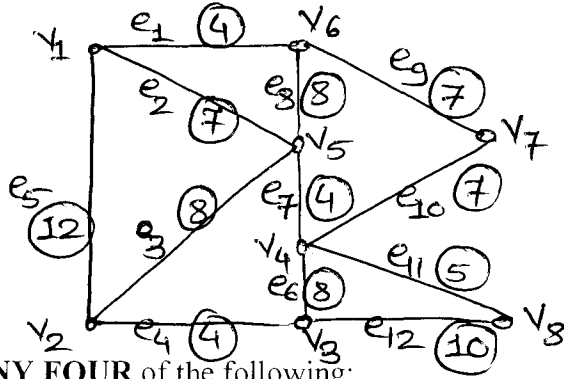
- b) Whether the given graph is complete? If so, draw its complement.



- c) Find the edge connectivity $\lambda(G)$ and the vertex connectivity $K(G)$ of the following graph:



- d) Find the shortest spanning tree of the graph below by using Kruskal's algorithm:

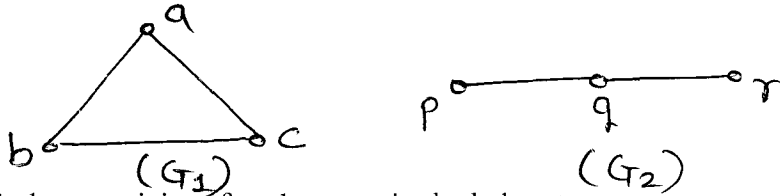


Q. 5

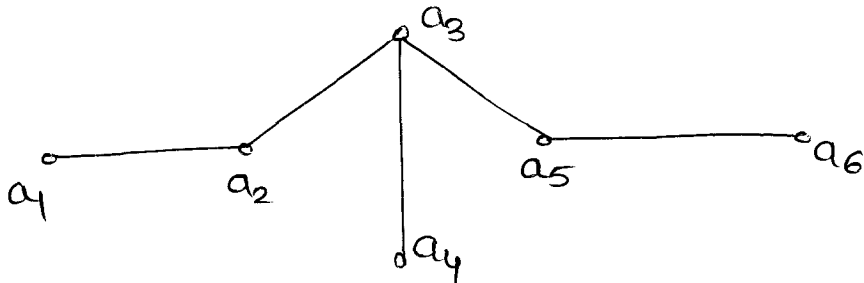
Attempt ANY FOUR of the following:

(12)

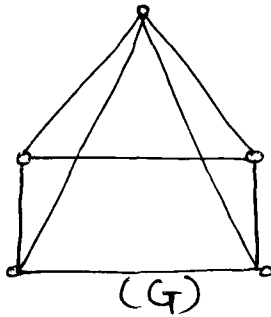
- a) State and prove Handshaking lemma.
 b) Find the product $G_1 \times G_2$ for the following pair of graphs:



- c) Find eccentricity of each vertex in the below tree:



- d) Find the number of Hamiltonian cycles in the following graphs:



- e) Define :

- i) Completer graph ii) Regular graph iii) Bipartite graph

- f) Find the fusion of the vertices v_1, v_2, v_5 below:

