

F.Y. B. SC. (Computer Science) SEM –II (CBCS - 2016 COURSE) :
WINTER - 2018
SUBJECT : GRAPH THEORY

Day : Friday
Date : 12/10/2018

Time : 03.00 PM TO 06.00 PM
Max. Marks :60

W-2018-0905

N. B. :

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

Q.1 A) Choose the correct alternatives: (06)

i) Which of the following is complete graph _____ .

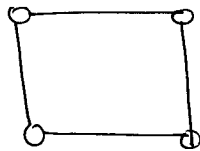
- a) $K_{1,1}$ b) $K_{1,2}$ c) $K_{2,1}$ d) $K_{2,2}$

ii) If $G = K_n$ then \bar{G} is _____ .

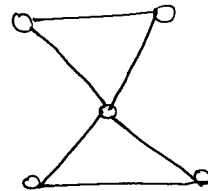
- a) Self complementary c) Regular graph
b) Null graph d) None of these

iii) Which of the following graph has a bridge _____ .

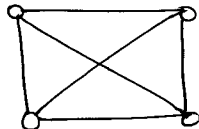
a)



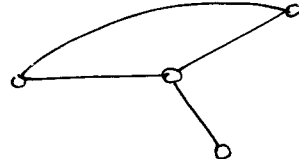
c)



b)



d)



iv) K_n is Eulerian graph for which value of n _____ .

- a) Even b) Odd c) All d) Zero

v) We can draw a binary tree with 17 vertices of height 3.

The statement is _____ .

- a) False c) Sometimes true
b) True d) None of these

vi) A tree of 15 vertices then it has _____ edges .

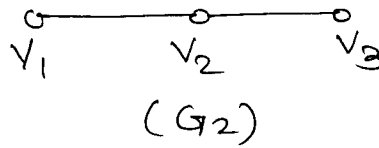
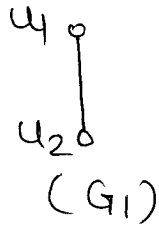
- a) 13 c) 16
b) 14 d) 15

P.T.O.

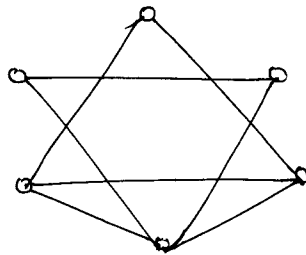
B) Attempt all the following:

(06)

- i) Define complete graph with suitable example.
- ii) How many edges are there in a graph having 10 vertices with each of Degree 6?
- iii) Find the Product $G_1 \times G_2$ of the following pair of graphs:



- iv) Can you draw a binary tree on 7 vertices and height 2? Justify.
- v) Show that following graph is non-Hamiltonian.

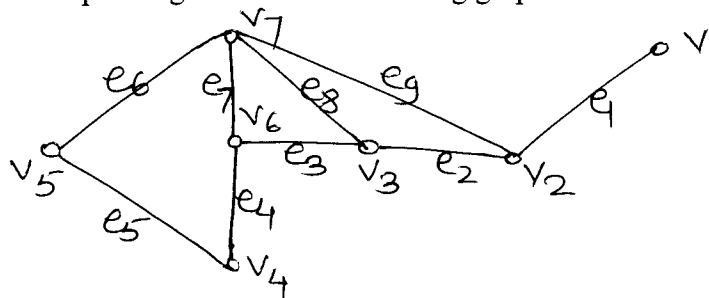


- vi) Define : i) Isthmus or Cutedge
ii) Cut vertex

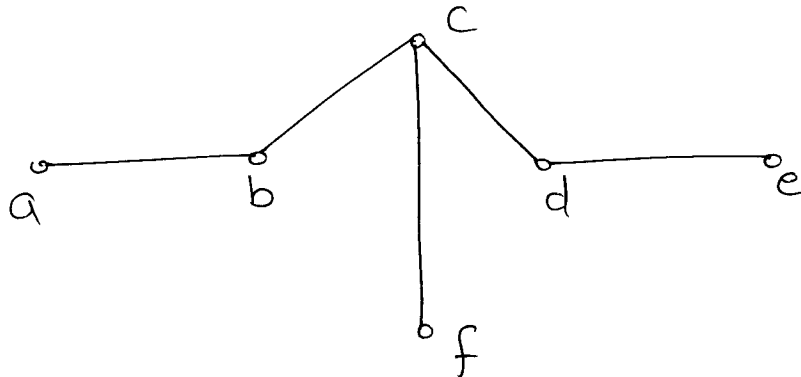
Q.2 Attempt ANY THREE of the following:

(12)

- a) Give the steps of Fleury's algorithm to find Eulerian tour in a Eulerian graph.
- b) Give an example of graph:
 - i) which is Eulerian but not Hamiltonian
 - ii) which is Hamiltonian but not Eulerian
- c) Find all spanning trees of the following graph:



- d) Find eccentricity of each vertex in the following tree. Hence find centre of the tree.



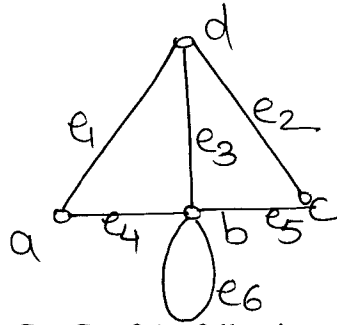
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Q.3

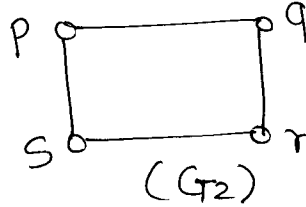
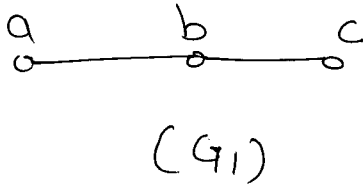
Attempt **ANY THREE** of the following:

(12)

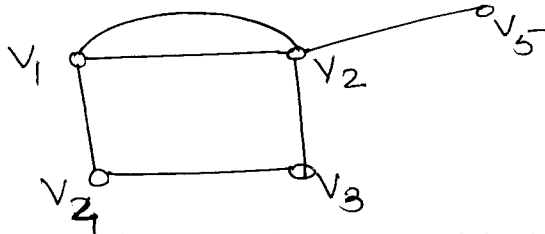
- a) State and prove Handshaking lemma.
 b) Find the adjacency matrix and incidence matrix for the following graph:



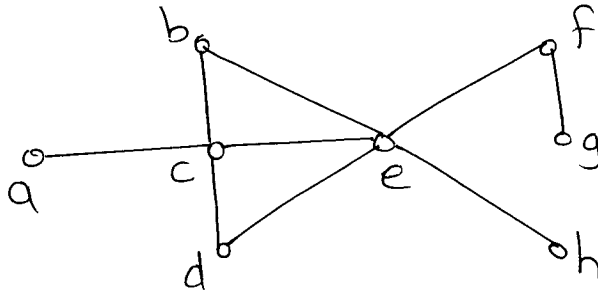
- c) Find the product $G_1 \times G_2$ of the following graphs:



- d) Find the fusion of vertices v_1, v_2, v_3 in the following graph:



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

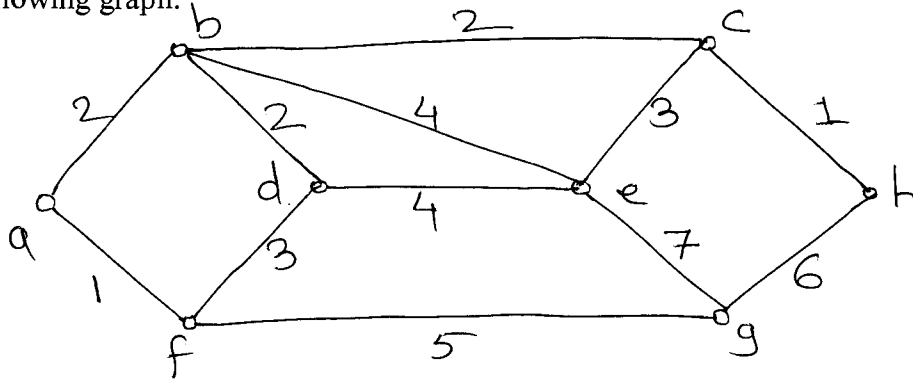


Q.4

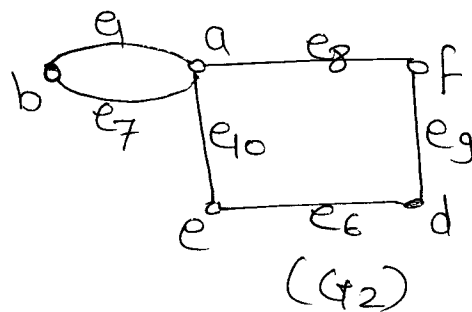
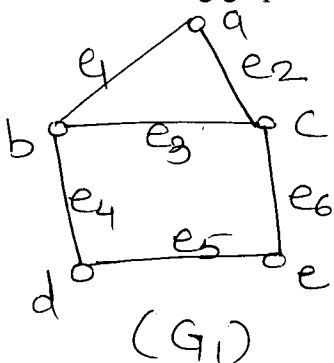
Attempt **ANY TWO** of the following:

(12)

- a) By using Dijkstra's algorithm, find shortest path from vertex a to vertex h of the following graph:

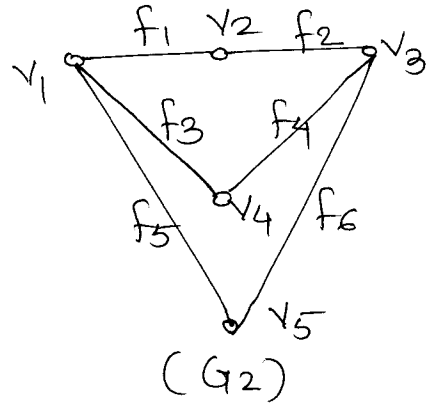
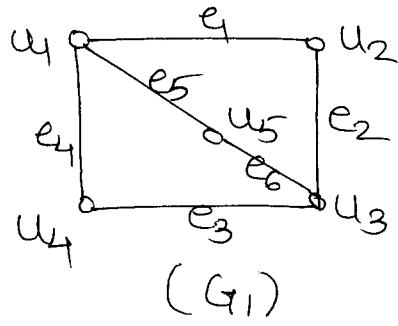


- b) Find : i) $G_1 \cup G_2$ ii) $G_1 \cap G_2$ iii) $G_1 \oplus G_2$
 For the following graphs G_1 and G_2



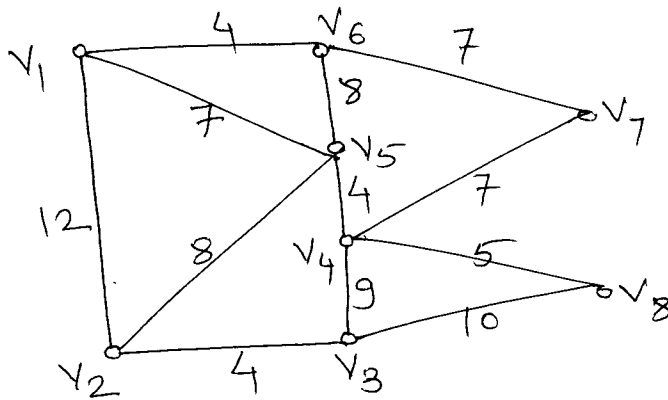
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c) Determine following pair of the graphs are isomorphic. Justify.



Q.5 Attempt ANY TWO of the following:

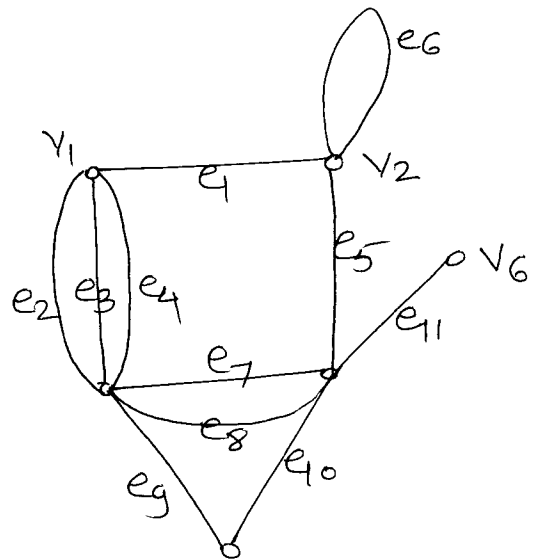
a) Find the shortest spanning tree of the graph given below by Kruskal's algorithm



b) Explain Konigsberg seven bridge problem.

c) For the graph G given below, find

- i) $G - v_3$
- ii) $G - e_3$
- iii) $G - u ; U = \{v_2, v_2, v_5\}$



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