

**F.Y. B. SC. (COMPUTER SCIENCE) SEM –II (CBCS - 2016  
 COURSE) : WINTER - 2017  
 SUBJECT : GRAPH THEORY**

Day : Friday  
 Date : 27/10/2017

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

**W-2017-0711**

**N.B.:**

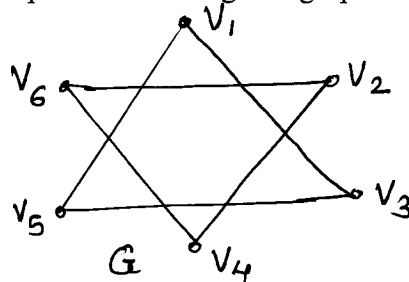
- 1) All questions are **COMPULSORY**.
- 2) Figures to the right indicate **FULL** marks.

**Q.1 A) Choose the correct alternative [06]**

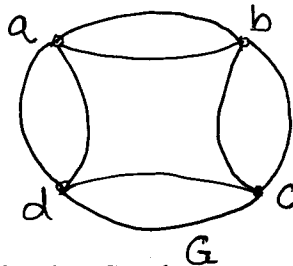
- a) Which of the following is a complete graph?  
 i)  $K_{1,1}$       ii)  $K_{2,1}$       iii)  $K_{1,2}$       iv)  $K_{2,2}$
- b)  $G$  is a tree with  $n$ -vertices then  $G$  is \_\_\_\_\_.  
 i) Connected and Cyclic      ii) Connected and  $n - 1$  edges  
 iii) Cyclic      iv) None of these
- c) If  $G$  is 5-regular graph then it has \_\_\_\_\_ vertices.  
 i) 6      ii) 7      iii) 9      iv) 11
- d) Every path is a \_\_\_\_\_.  
 i) Trail      ii) Cycle      iii) Walk      iv) Trail as well as walk
- e)  $T$  is tree with 19 vertices then it has \_\_\_\_\_ edges.  
 i) 18      ii) 17      iii) 19      iv) 21
- f) Every complete graph is a \_\_\_\_\_ graph.  
 i) Simple      ii) Regular      iii) Bipartite      iv) None of these

**B) Attempt all the following. [06]**

- a) Define Bipartite graph with suitable example.
- b) Draw self-complementary graph on five vertices.
- c) Draw the complement of the given graph  $G$ .



- d) Define vertex induced subgraph.
- e) Find edge connectivity in the following graph  $G$ .



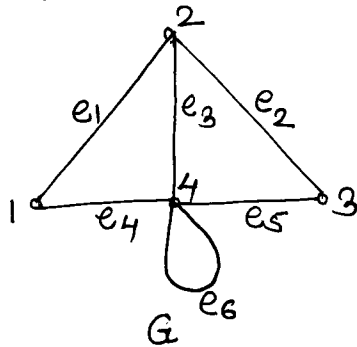
- f) Define Hamiltonian Graph.

**P.T.O.**

Q.2 Attempt ANY FOUR of the following:

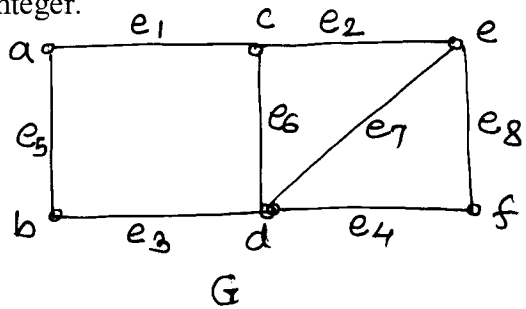
[12]

a) Find the adjacency matrix and incidence matrix for the following graph.



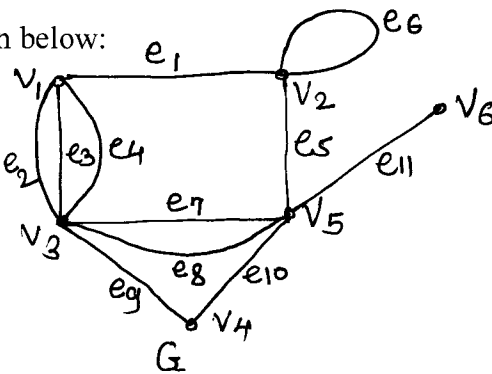
b) Prove that the number of vertices in a self-complementary graphs is of the type  $4k$  or  $4k + 1$ , where  $k$  is a positive integer.

c) Find: i) All paths joining a to f.  
 ii) Which path is shortest path?  
 iii) What is  $d(a, f)$ ?  
 For the given graph G.



d) Give example of graph which is Eulerian and Hamiltonian.

e) For the graph G given below:

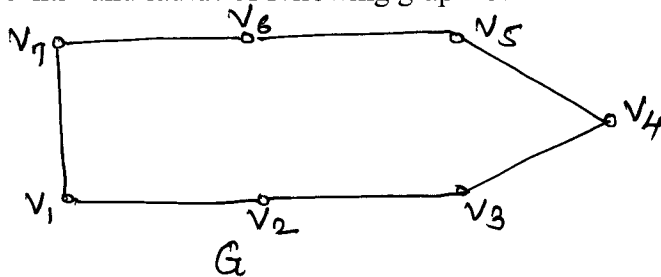


Find: i)  $G - v_3$     ii)  $G - F$ ;  $F = \{e_1, e_2, e_3, e_{11}\}$     iii)  $\langle H \rangle$ ;  $H = \{v_2, v_3, v_5\}$

Q.3 Attempt ANY THREE of the following:

[12]

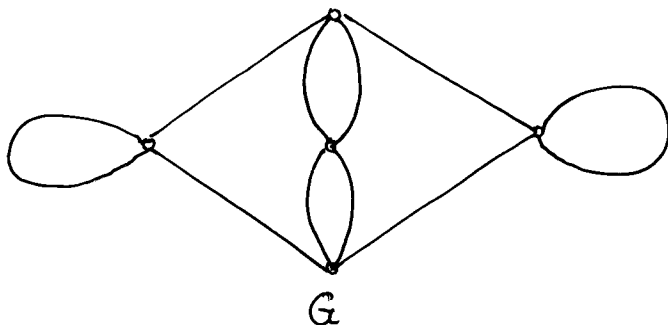
a) Find the centre and radius of following graph G:



b) Find the diameter of Peterson's graph?

c) Explain Chinese Postman Problem.

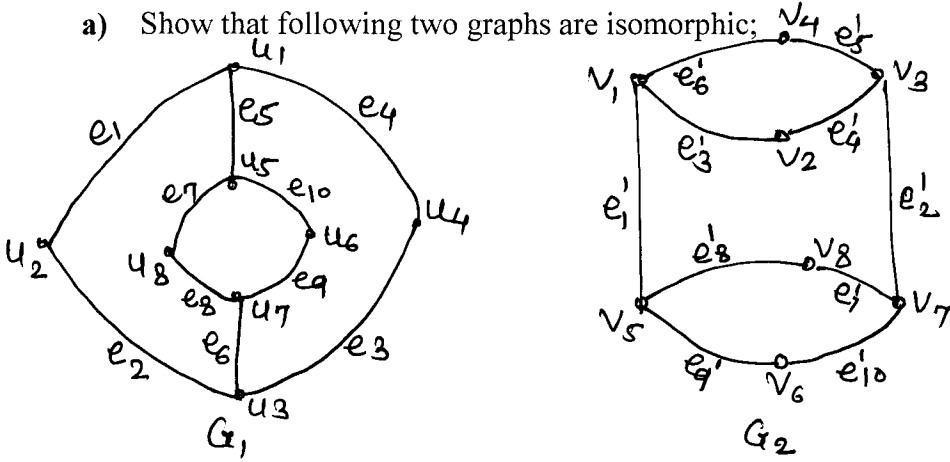
d) Draw any two non-isomorphic spanning subgraphs of the following:



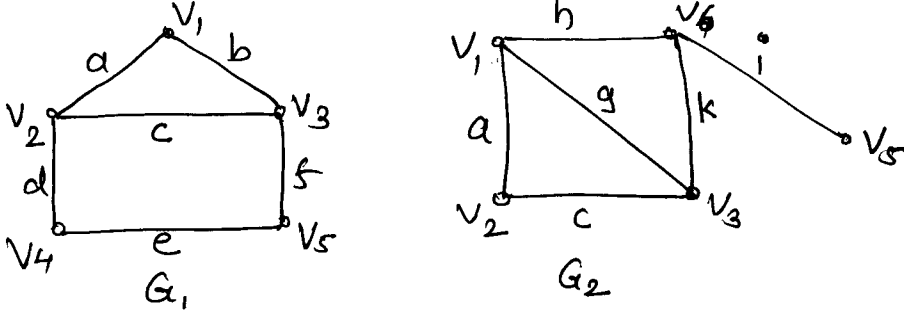
Q.4 Attempt ANY TWO of the following:

[12]

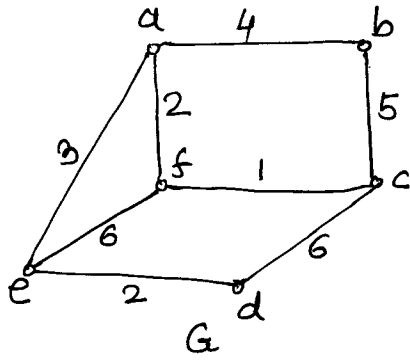
a) Show that following two graphs are isomorphic;



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  $G_2$ .



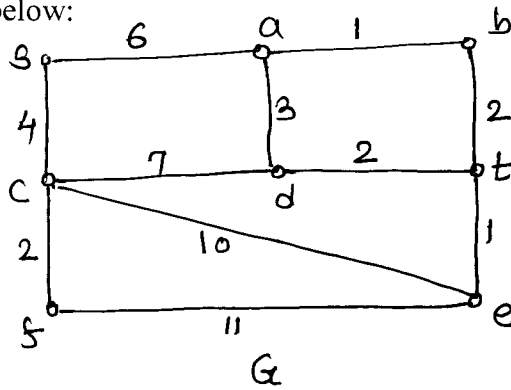
c) Find shortest spanning tree of the following weighted graph using Kruskal's algorithm.



Q.5 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:



b) Explain Konigsberg seven Bridge problem in brief.

c) Find all the spanning tree of the graph given below:

