

**F.Y. B. SC. (COMPUTER SCIENCE) SEM -II (CBCS - 2016  
COURSE) : SUMMER - 2018  
SUBJECT : GRAPH THEORY**

Day : **Monday**  
Date : **16/04/2018**

**S-2018-0803**

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

**N. B. :**

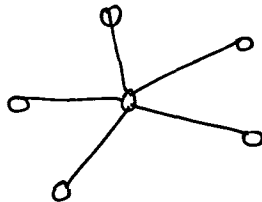
- 1) All questions are **COMPULSORY**
- 2) Figures to the right indicate **FULL** marks.

**Q. 1 A) Chose the correct alternative: (06)**

- i) If  $G \cong \bar{G}$  then  $G$  is \_\_\_\_\_
  - a) Complementary
  - b) Self-complementary
  - c) Not self-complementary
  - d) None of these
  
- ii) Degree of a complete graph  $K_n$  is \_\_\_\_\_
  - a)  $n(n-1)$
  - b)  $\frac{n(n-1)}{2}$
  - c)  $n^2$
  - d)  $\frac{n^2}{2}$
  
- iii) Let  $G$  be a simple graph then which of the following is true
  - a)  $K(G) \leq \lambda(G) \leq \delta(G)$
  - b)  $\lambda(G) \leq K(G) \leq \delta(G)$
  - c)  $\delta(G) \leq \lambda(G) \leq K(G)$
  - d)  $K(G) \leq \delta(G) \leq \lambda(G)$
  
- iv) Which of the following graph is Hamiltonian graph?
  - a)  $k_{3,2}$
  - b)  $k_{3,3}$
  - c)  $k_{3,4}$
  - d) None of these
  
- v) In a tree every edge is \_\_\_\_\_
  - a) Bridge
  - b) A part of cycle
  - c) Not a bridge
  - d) None of these
  
- vi) Degree of 5-regular graph with  $n$ -vertices
  - a)  $5n$
  - b)  $5n(n-1)$
  - c)  $5n^2$
  - d)  $5(n-1)$

**B) Attempt all the following: (06)**

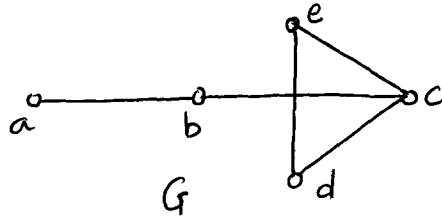
- a) Define regular graph with suitable example.
- b) Draw the complete graph which is complete bipartite.
- c) Define :    **i)** Walk        **ii)** Tour
- d) Define a tree. Give an example.
- e) Find the cut vertex for the following graph:



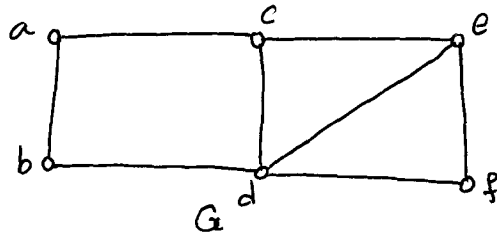
f) Define Hamiltonian graph.

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

a) For a given graph  $G$  the graph  $G^2$  is a graph whose vertex set is that of  $G$  and  $u, v$  are adjacent in  $G^2$  if  $1 \leq d(u, v) \leq 2$  in  $G$  for the following graph  $G$  find  $G^2$  and prepare a table of distances in a  $G$  and  $G^2$

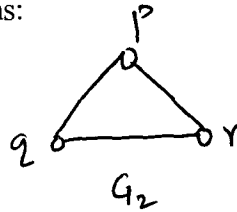
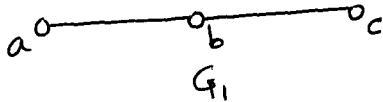


b) Find the centre and radius of following graph  $G$ .



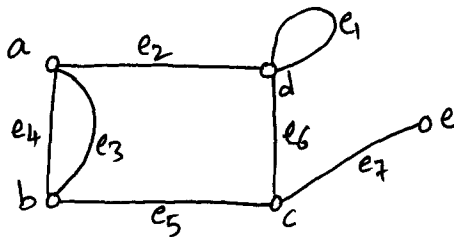
c) Explain Konigsberg seven Bridge problem.

d) Draw  $G_1 \times G_2$ , for the following two graphs:



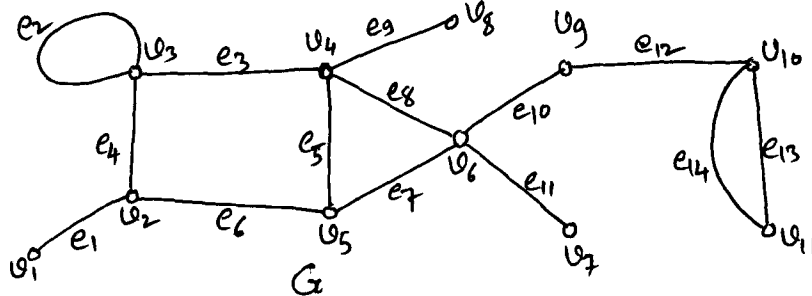
Q. 3 Attempt ANY FOUR of the following: (12)

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

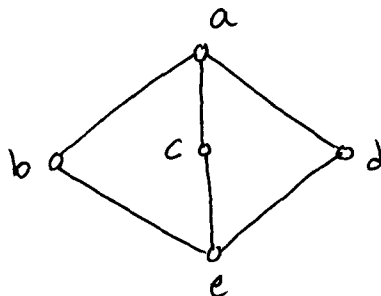


b) How many edges in a graph with 10 vertices with each of degree 6?

c) Find all bridges in the following graph :



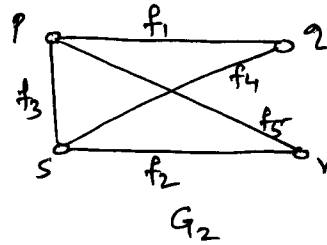
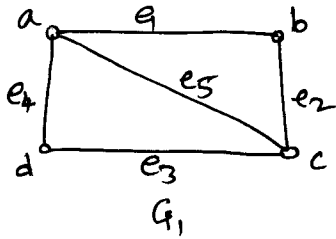
d) Show that following graph is non-Hamiltonian graph:



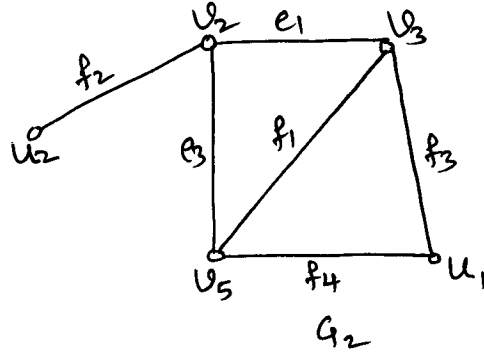
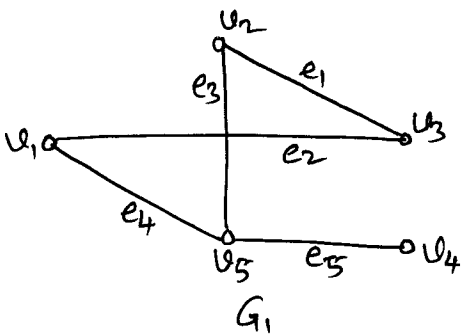
e) Can you draw a binary tree with 17 vertices of height 3? Justify.

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

a) Show that the following two graphs are isomorphic



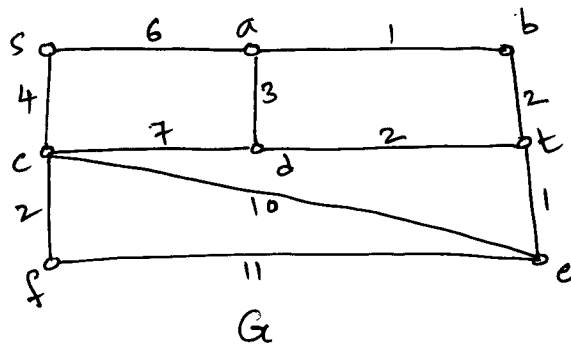
b) Find : i)  $G_1 \cup G_2$  ii)  $G_1 \cap G_2$  iii)  $G_1 \oplus G_2$   
For the following graphs  $G_1$  and  $G_2$ .



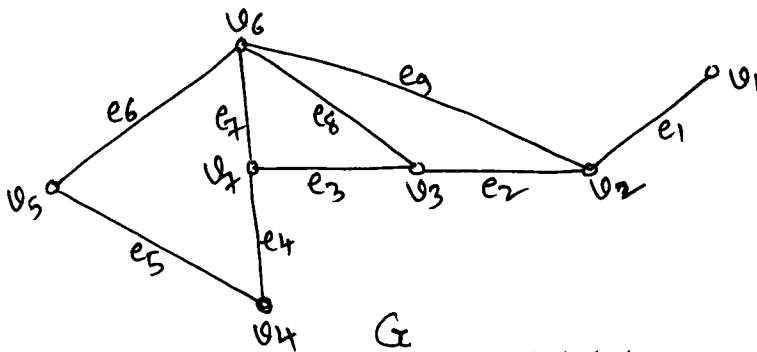
c) Write the steps of Fleury's Algorithm.

Q. 5 Attempt ANY TWO of the following: (12)

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



b) Explain travelling salesman problem in brief.  
c) Find spanning tree of the following graph G



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