

Total No. of Questions : 3]

SEAT No. :

P5132

[Total No. of Pages : 3

[5823]-204

F.Y.B.Sc. (Computer Science)

MATHEMATICS

MTC-122 : Graph Theory

(2019 Pattern) (Semester-II) (Paper-II)

Time : 2 Hours]

[Max. Marks : 35

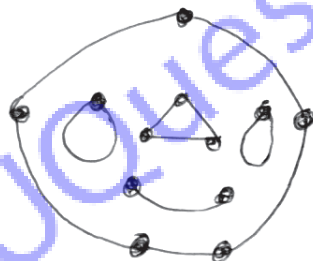
Instructions to the candidates:

- 1) All questions are compulsory.
- 2) Figures to the right indicate full marks.
- 3) Neat diagrams must be drawn wherever necessary.

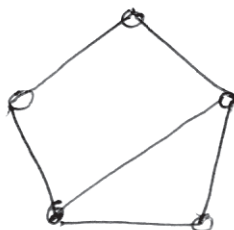
Q1) Attempt any five of the following

[10]

- a) Draw  $K_6$ , the complete graph on 6 vertices.
- b) Define regular graph. Also draw one example of a 2-regular graph.
- c) What is the number of connected components in the following graph?

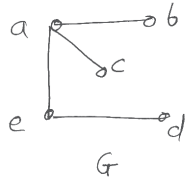


- d) Determine whether the following graph is a bipartite graph. Justify.



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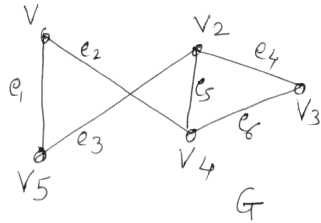
e) Draw the complementary graph  $\bar{G}$  of the following graph G.



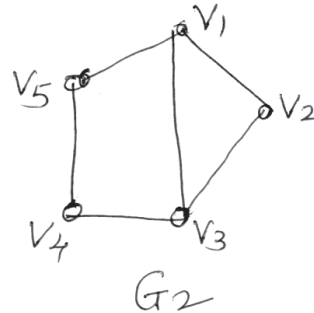
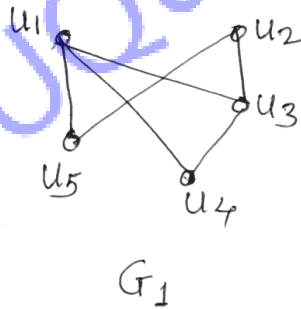
- f) How many edges are there in a regular graph of degree 3 with 6 vertices?  
 g) Define : Tree. Draw an example of a tree.

**Q2)** Attempt any three of the following. [15]

a) Write the adjacency matrix and incidence matrix for the following graph G.



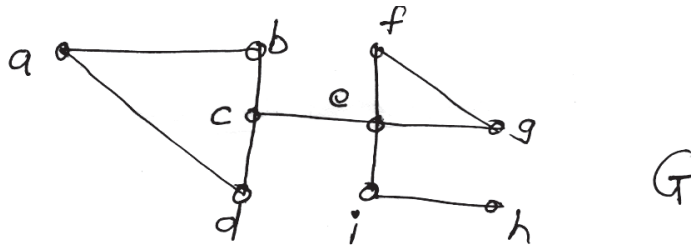
b) Show that the following graphs  $G_1$  and  $G_2$  are isomorphic.



- c) Draw 10 nonisomorphic simple graphs with 4 vertices.  
 d) Give an example of a graph which has-  
 i) Euler circuit but not Hamilton circuit.  
 ii) Euler circuit as well as Hamilton circuit.  
 e) Construct a complete binary tree of height 4. How many leafs it has?

**Q3)** Attempt any one of the following. [10]

a) For the given graph G answer the following questions



- ii) List all cutvertices in G.
- iii) List all cycles in G.
- iv) List any two distinct paths from the vertex  $a$  to vertex  $h$  in G.
- v) Verify Handshaking lemma for this graph.

- b) i) Explain the “ seven bridges problem of Konigsberg”.
- ii) Use Kruskal’s algorithm to find a minimum spanning tree in the following weighted graph given below.

