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TCS/TIT–604

B. Tech. (CS/IT) (Sixth Semester)
Mid Semester EXAMINATION, 2017
GRAPH THEORY

Time : 1:30 Hours] [*Maximum Marks : 50*

Note : (i) This question paper contains two Sections.

(ii) Both Sections are compulsory.

Section—A

1. Fill in the blanks/True-False : (1×5=5 Marks)

   (a) Draw the star graph K_{14}.

   (b) Complement of a complete graph is trivial graph. (True/False)

   (c) A Tree with n vertices had $\frac{n(n-1)}{2}$ edges. (True/False)

   (d) K_5 contain a Hamiltonian circuit. (True/False)

   (e) Write the condition for a graph to be a Eulerian graph.

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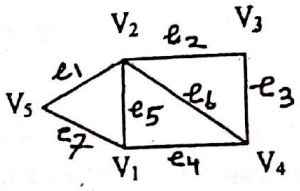
2. Attempt any *five* parts : (3×5=15 Marks)

(a) Draw/State a Unicarsal line in the following graph :



(b) Define Hamiltonian circuit with example.

(c) Prove that number of odd vertices in a graph is always even.

(d) Explain the full Binary Tree with an example.

(e) Show that number of vertices in Binary Tree is always odd.

(f) Write a relation between a complete graph and a regular graph.

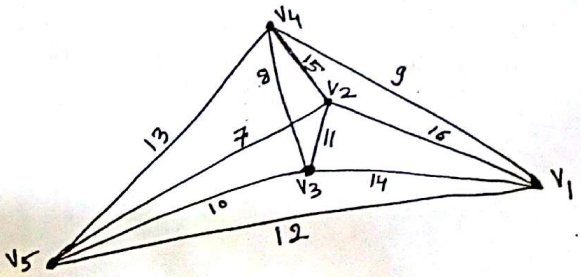
Section—B

3. Attempt any *two* parts of choice from (a), (b) and (c). (5×2=10 Marks)

(a) A tree has two vertices of degree 2, one vertex of degree 3 and three vertices of degree 4. How many pendant vertices does it have ?

(b) Write the Dijkstra's algorithm for finding the Minimal Spanning Tree.

(c) Solve the following Travelling-Salesman Problem :

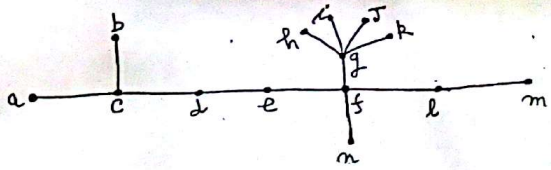


4. Attempt any *two* parts of choice from (a), (b) and (c). (5×2=10 Marks)

(a) Prove that a disconnected graph without self loops and parallel edges with n-vertices and k components can have at most $\frac{(n-k)(n-k+1)}{2}$ edges.

(b) Show that there is one and only one path between every pair of vertices in a tree.

(c) Find the centre, radius and diameter for the following graph :



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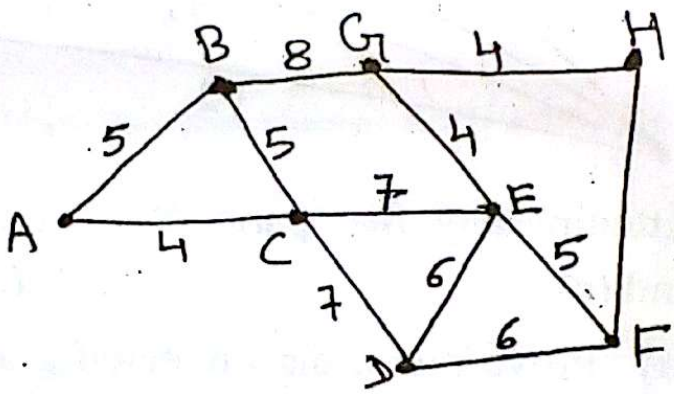
5. Attempt any *two* parts of choice from (a), (b) and (c). (5×2=10 Marks)

(a) Prove that number of pendant vertices in a Binary Tree with n vertices is given by $\frac{n+1}{2}$.

(b) Draw the Minimal Spanning Tree by Kruskal's algorithm for the following graph :



(c) Explain fundamental circuits in a tree with an example.

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