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N – 5784

Reg. No. :

Name :

Eighth Semester B.Tech. Degree Examination, April 2022

(2013 Scheme)

13.805.2 : GRAPH THEORY (FR)

Time : 3 Hours

Max. Marks : 100

PART – A

(Answer all questions. Each question carries 4 marks.)

1. Give examples of
 - (a) Graph that is Euler and Hamiltonian
 - (b) Graph that is Euler but not Hamiltonian.
2. Define a planar graph. Show that K_5 is not a planar graph.
3. Prove that a pendent edge in a connected graph G is contained in every spanning tree of G .
4. Define 1-isomorphic graph and 2-isomorphic graphs.
5. Differentiate gate networks from contact networks.

(5 × 4 = 20 Marks)

PART – B

(Answer **any one** question from **each** Module. Each question carries **20** marks.)

Module – I

6. (a) For a connected graph G prove that the following statements are equivalent.
 - (i) G is Eulerian.
 - (ii) The degree of each vertex of G is even.
 - (iii) G is an edge disjoint union of cycles.Hence show that the Konigsberg bridge problem has no solution. **10**

P.T.O.

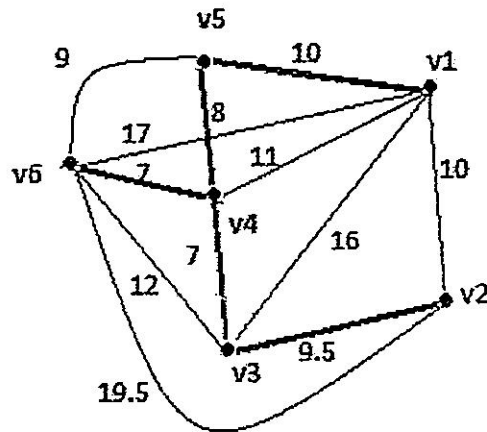


(b) Prove the following theorems

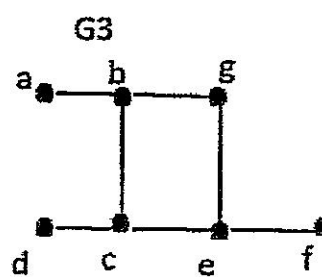
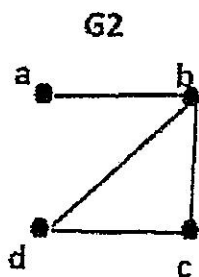
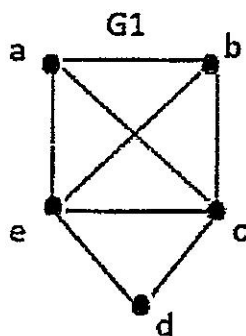
- (i) Prove that in any tree, there are atleast two pendant vertices. 5
- (ii) Show that a Hamiltonian path is a spanning tree. 5

OR

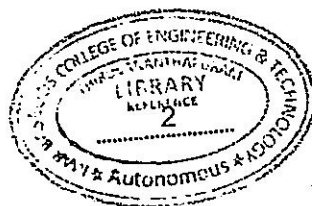
7. (a) Using the algorithm of Kruskal, find the shortest spanning tree in the following graph. 10



- (b) Which of the following simple graphs have a Hamilton Circuit or if no, a Hamilton Path? 5



- (c) Explain traveling salesman problem. Express the problem in terms of graph terminology. 5

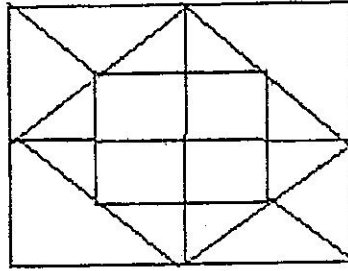


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Module – II

8. (a) Prove the graphs K_5 , and $K_{3,3}$ are non-planar. 10
(b) Find the number of vertices, edges and regions for the following planar graph and verify that Euler's Theorem for connected planar graphs is satisfied. 10



OR

9. (a) How binary relations are closely related to theory of graphs? Explain in detail. 10
(b) Explain the steps involved in testing for planarity of graphs. 10

Module – III

10. (a) Discuss about the different computer representation of a graph. 10
(b) With suitable examples, illustrate the method to find out the number of components or blocks in a given graph. 10

OR

11. (a) Explain about fundamental cut set and fundamental circuit in a graph with an example. 10
(b) Write an algorithm for finding shortest path between two specified vertices. 10

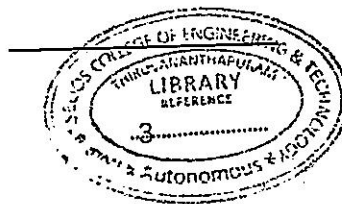
Module – IV

12. (a) Discuss in detail about different methods used to describe a sequential machine with a suitable example. 10
(b) Illustrate the applications of graphs in coding theory. 10

OR

13. (a) How do you express a given switching function on the m-cube? Explain with an example. 10
(b) For a given n-vertex graph, how do you find the cut set code? Explain with an example. 10

(4 × 20 = 80 Marks)



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