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K-5609

Reg. No. : .....

Name : .....

Eighth Semester B.Tech. Degree Examination, February 2021

(2013 Scheme)

13.805.2 : GRAPH THEORY (FR) (ELECTIVE IV)

Time : 3 Hours

Max. Marks : 100

PART – A

Answer all questions. Each question carries 4 marks.

1. In any graph  $G$ , show that the number of vertices with odd degree is even.
2. Show that a connected graph with  $n$  vertices and  $n-1$  edges is a tree.
3. Prove that any two simple connected graphs with  $n$  vertices, all of degree two, are isomorphic.
4. Prove that every connected graph has at least one spanning tree.
5. What are the difficulties encountered in the theory of sequential machine?

(5 × 4 = 20 Marks)

PART – B

Answer any one questions from each Module. Each question carries 20 marks

Module – I

6. Prove the following theorems (6+8+6)
  - (a) The total number of different, not edge disjoint, Hamiltonian circuits in a complete graph of  $n$  vertices is  $(n-1)!/2$ .
  - (b) A connected graph  $G$  is a Euler graph if and only if it can be decomposed into circuits.
  - (c) Prove that in any tree, there are atleast two pendant vertices.

OR

P.T.O.



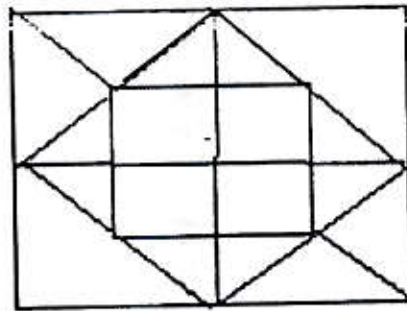
7. (a) In a complete graph having odd number of vertices, how many edge disjoint Hamiltonian circuits exist? Explain. 10
- (b) Show a tree in which its diameter is not equal to twice the radius. Under what condition does this inequality hold? Elaborate. 10

### Module – II

8. (a) Explain Euler digraph along with its properties. 10
- (b) Discuss about some types of digraph with suitable examples. 10

OR

9. (a) How binary relations are closely related to theory of graphs? Explain in detail. 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



### Module – III

10. (a) Write an algorithm to find a Hamiltonian path in a given undirected graph. 10
- (b) How do you determine whether or not the two graph  $G_1$  and  $G_2$  are isomorphic? Explain with example. 10

OR



11. (a) How do you generate the fundamental circuits in a given graph? illustrate the procedure with a suitable example. 10
- (b) Illustrate DFS algorithm with an example. 10

**Module – IV**

12. How do you construct state table and state graph for sequential machines? Illustrate with suitable example. 20

OR

13. Illustrate the analysis and synthesis of contact network with suitable examples. 20

