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Reg. No. : .....

Name : .....

Eighth Semester B.Tech. Degree Examination, November 2015

(2008 Scheme)

08.805(4) : GRAPH THEORY (Elective – III) (R)

(Common with F 08.805 C)

Time: 3 Hours Max. Marks: 100

PART – A

Answer **all** questions. **Each** question carries **4** marks.

1. Define Simple Graph, Multi Graph and Pseudo Graph with examples.
2. Draw two isomorphic graphs with 6 vertices and 9 edges.
3. Prove the following :

   "A Graph G is disconnected if and only if its vertex set V can be partitioned into two non empty disjoint subsets V_1 and V_2 such that there exists no edge in G whose one end vertex is in V_1 and the other in V_2."
4. Define Euler Line, Euler Graph and Hamiltonian Circuit.
5. Prove that a graph with n vertices, n – 1 edges and no circuits is connected.
6. What is meant by chord, branch and fundamental circuit in the context of a spanning tree ?
7. Define Vector Space of a Graph.
8. Write the properties of incidence matrices.
9. What is meant by m-cube ? Mention the properties of m – cubes.
10. Write brief notes on state graphs of sequential machines with a proper example.

P.T.O.

PART – B

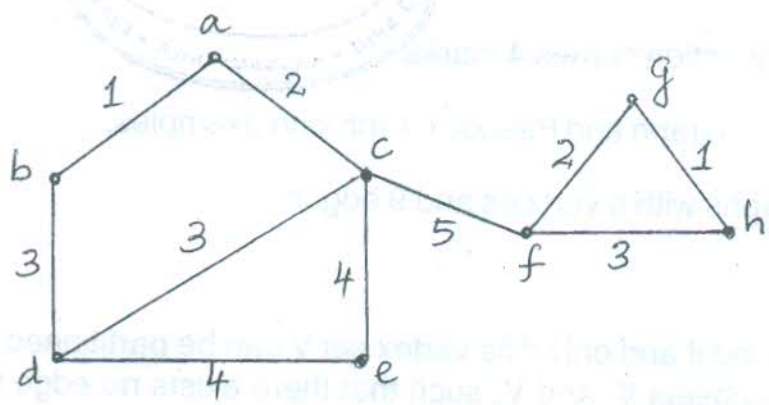
Answer **one** question from **each** Module. **One full** question carries **20** marks.

Module – I

11. a) Prove that "All cycles in a graph are of even length if and only if the graph is a bipartite graph". **5**

    b) Explain Prim's Algorithm. **5**

    c) Consider the following graph. **10**



Draw all MSTs starting from a using Prim's algorithm.

OR

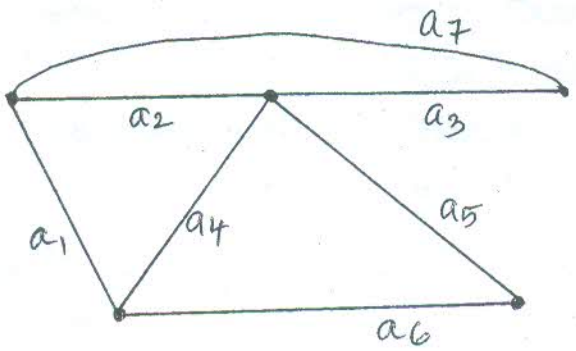
12. a) Prove that "in a complete graph with n vertices, there are $(n-1)/2$ edge disjoint Hamiltonian Circuits, if n is an odd number ≥ 3". **10**

    b) Explain the travelling salesman problem using the concept of Hamiltonian Circuit. **10**

Module – II

13. a) If a connected planar graph G has n vertices, e edges and r regions, then prove that $n - e + r = 2$. **5**

b) For the graph given below, check whether the circuit vector space Wr is orthogonal complement to cutest vector space Ws. 7



c) Prove that the set of circuit vector corresponding to the set of fundamental circuits with respect to any spanning tree forms a basis for the circuit subspace Wr. 8

OR

14. a) Describe the methods used to determine the planarity of a graph. 10

b) What is the necessary condition for a graph to have a geometric dual ? List the characteristics of graphs that are geometric duals of each other. Give two examples of graphs having geometric duals. 10

Module – III

15. a) Discuss about the different computer representations of a graph. 10

b) Write brief notes on the application of graphs in coding theory. 10

OR

16. a) Write an algorithm to find the connected components of a graph and analyze the complexity of the algorithm. 10

b) Define Single Contact Network. Explain the procedure for realizing a given SC function of m variables $x_1, x_2 \ldots, x_m$. 10