(Pages : 3) **A – 2394**

Reg. No. : .....

Name : .....

Eighth Semester B.Tech. Degree Examination, April 2016
(2008 Scheme)
08.805(4) : GRAPH THEORY (Elective) (R)
(Common with F–08.805 C)

Time : 3 Hours Max. Marks :100

PART – A

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

1. Explain the terms :
   a) Null Graph
   b) Complete Graph and
   c) Pendant Vertex with examples.

2. State Seating problem and find all its solutions.

3. Prove that in any undirected graph, the number of vertices of odd degree should be even.

4. Define a Metric and prove that distance is a metric.

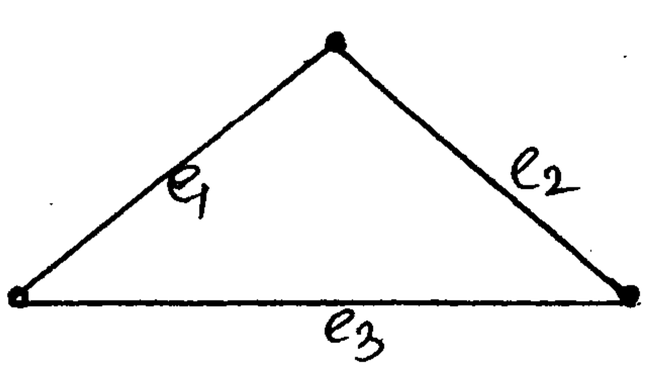
5. Explain Planar Graph and show that K_5 is not planar.

6. Explain Center and radius of a tree.

7. Show that a graph can be embedded in the surface of a sphere if and only if it can be embedded in a plane.

8. Define $W_r \vee W_s$ and $W_r \cap W_s$.

   Find $W_r \vee W_s$ and $W_r \cap W_s$ for the following graph.



P.T.O.

9. What is meant by rank and nullity of a graph ? What is their significance ?

10. What is a unit cube ? Give the graphical representation of it.

PART – B

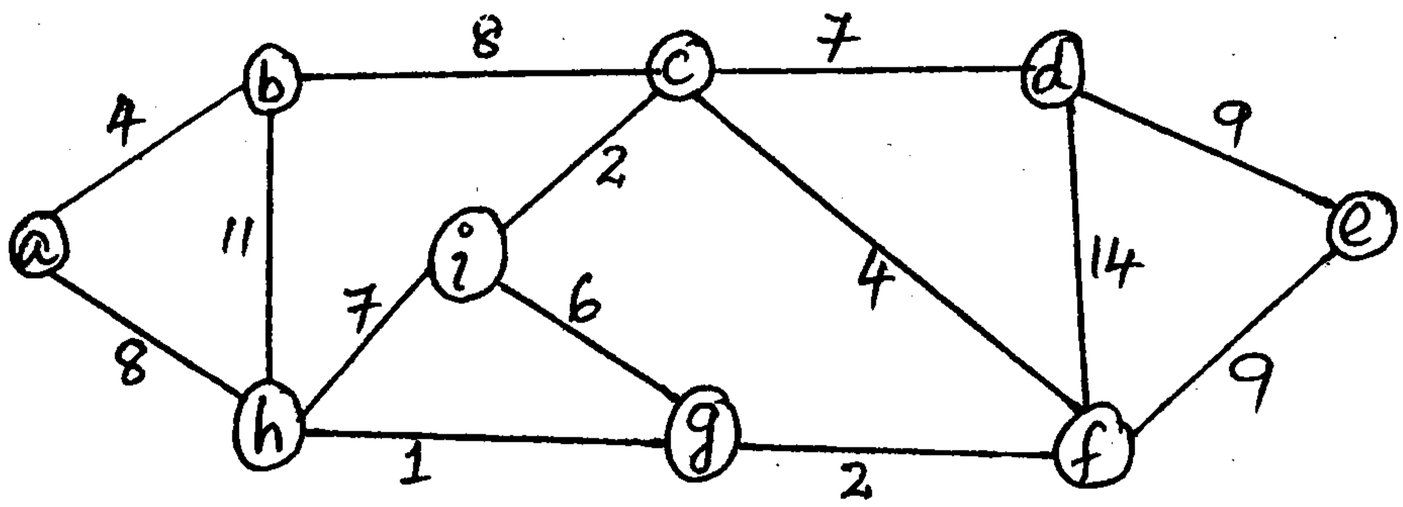
Answer **one** question from **each** Module. **One** full question carries **20** marks.

Module – I

11. a) Define Euler Graph. **3**

b) Prove that "a given connected graph is an Euler Graph if and only if all vertices of G are of even degree". **7**

c) Consider the following weighted graph.



Find the minimal spanning tree of the graph using Kruskal's algorithm. **10**

OR

12. a) Define Connected Graph and Components of a graph. **5**

b) Prove that "a simple graph with n vertices and k components can have at most $(n - k)(n - k + 1)/2$ edges". **6**

c) Is it possible to have simple graphs with the following degree sequences ? If yes, draw the graphs. **9**

i) 2, 3, 3, 3, 3, 3, 4, 5

ii) 1, 3, 3, 4, 5, 6, 6

iii) 1, 2, 3, 3, 4, 5, 6.

Module – II

13. a) Show that the number of labeled tress with n vertices is n^{n-2}. **10**

    b) State and prove Euler Theorem. **10**

OR

14. a) What do you mean by geometric dual of a graph ? Illustrate with examples. **10**

    b) A necessary and sufficient condition for two planar graphs G1 and G2 to be duals of each other is as follows : There is one-to-one correspondence between the edges in G1 forms a circuit if and only if the corresponding set in G2 forms a cut – set. Prove it geometrically (consider a graph with at least 6 vertices and 6 faces). **10**

Module – III

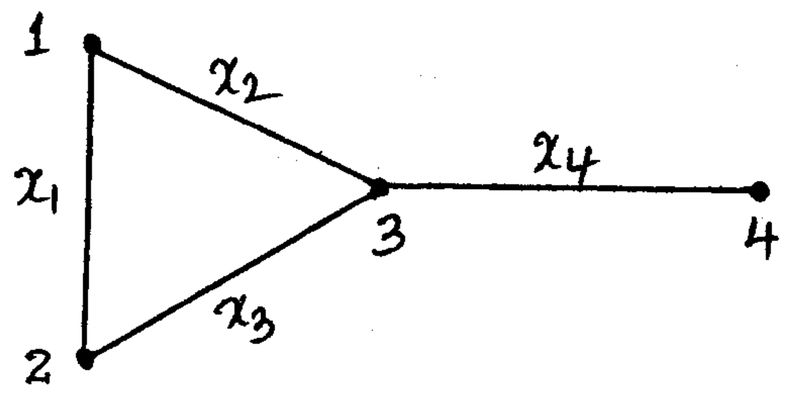
15. a) Write an algorithm to find the fundamental circuits in a graph. **10**

    b) What is meant by contact network ? Write notes on the analysis of contact networks. **10**

OR

16. a) Explain Sequential Switching Networks. Explain the properties of State Graphs. **6**

    b) Find the transmission matrix for the following contact network. **6**



    c) Write and explain Djkstra's Algorithm. **8**