



Reg. No. :

Name :

**Eighth Semester B.Tech. Degree Examination, December 2016
(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 from Part – A. **Each** question carries **4** marks.

1. Draw all simple graph of one, two, three and four vertices.
2. Prove that, if a graph has exactly two vertices of odd degree, then there must be a path joining these two vertices.
3. a) Draw a graph which is Hamiltonian but not Eulerian.
b) Draw a graph which is Eulerian but not Hamiltonian.
4. Prove that a tree with n vertices has $n - 1$ edges.
5. Explain the difference between a general tree and a binary tree.
6. Let G be a planar graph with $v \geq 3$ vertices and e edges. Then prove that $e \leq 3v - 6$.
7. Explain the different types of digraphs.
8. Explain any two methods to store a graph in computer memory.
9. Discuss different types of shortest path problems in graph.
10. State the properties of M cube. **(4×10=40 Marks)**

P.T.O.



PART – B

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

Module – I

11. a) Does there exist a graph with 28 edges and 12 vertices each of degree 3 or 4? **6**
 b) Explain the travelling salesman problem. **7**
 c) Prove that every connected graph has at least one spanning tree. **7**

OR

12. a) What is the largest possible number of vertices in a graph with 19 edges and all vertices are of degree at least 3. **7**
 b) Prove that every tree has either one or two centers. **7**
 c) Draw two different binary tree with 5 vertices having maximum number of leaves. **6**

Module – II

13. a) Prove that a complete graph of five vertices is non-planar. **6**
 b) Explain the procedure to obtain the geometric dual of a given graph. **7**
 c) Prove that an arborescence is a tree in which every vertex other than the root has an in-degree of exactly one. **7**

OR

14. a) Prove that every planar graph contains at least one vertex of degree ≤ 5 . **5**
 b) Define a vector space W_G associated a graph G . **5**
 c) Prove that a graph has a dual if and only if it is planar. **10**

Module – III

15. a) Write an algorithm to yield a spanning tree in a connected graph. Also draw the flow chart of the algorithm. **10**
 b) Explain primitive connection matrix with example. Give a method of determining a transmission matrix from primitive matrix. **10**

OR

16. a) Write an algorithm to find all directed circuits in a given graph. **10**
 b) Define single contact network. Write a procedure for realising a given SC function of m variables x_1, x_2, \dots, x_m . **10**