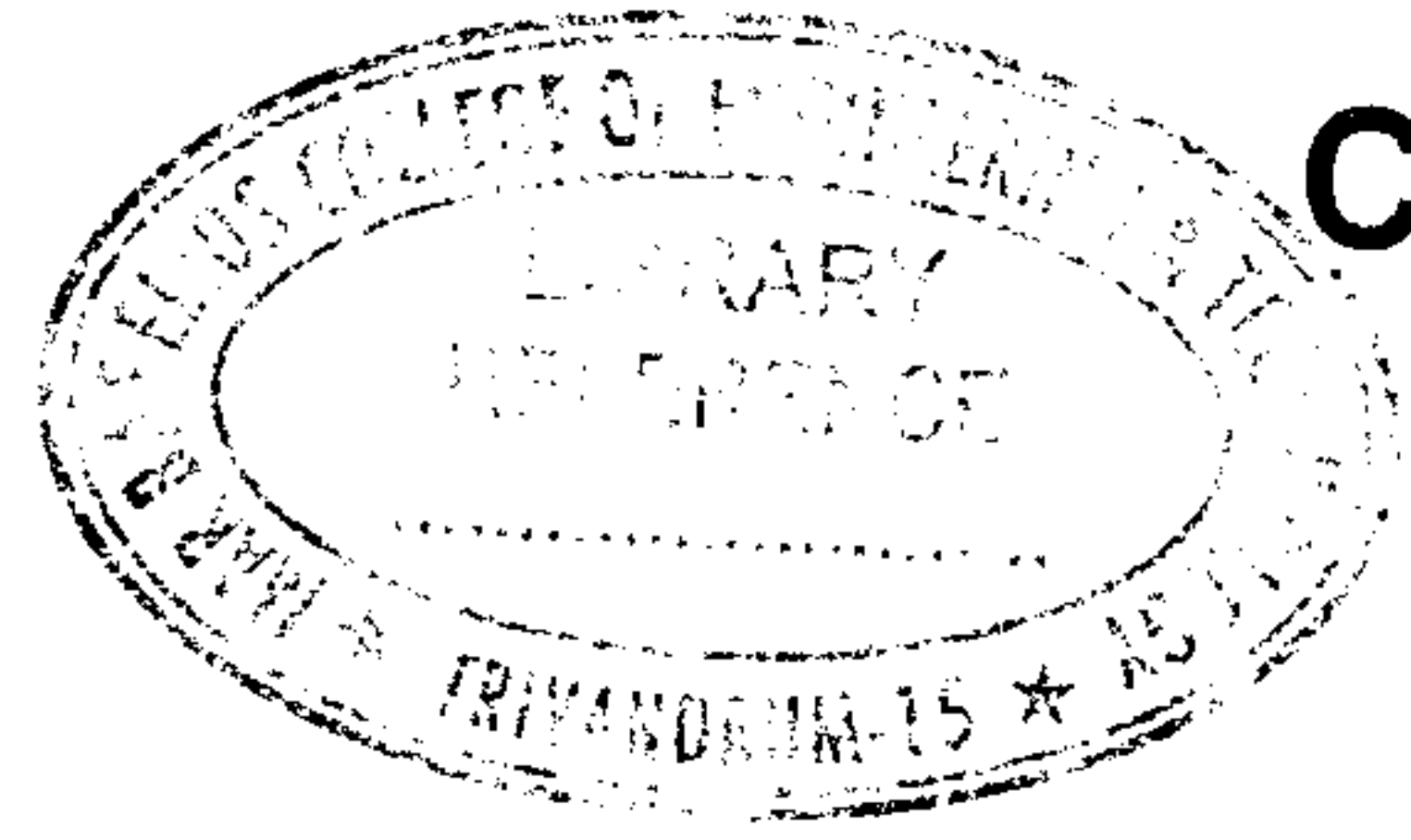




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C – 2493

Reg. No. :

Name :

**Eighth Semester B.Tech. Degree Examination, May 2017
(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. Prove that the maximum number of edges in a simple graph with n vertices is $n(n - 1)/2$.
2. Define the terms thickness and crossings with an example.
3. Define the adjacency matrix and incidence matrix representations of a graph with an example.
4. Draw all the different realizations of the switching function $F_{ab} = wx + wy + wz$.
5. Mention the difference between an Euler graph and a Unicursal graph.

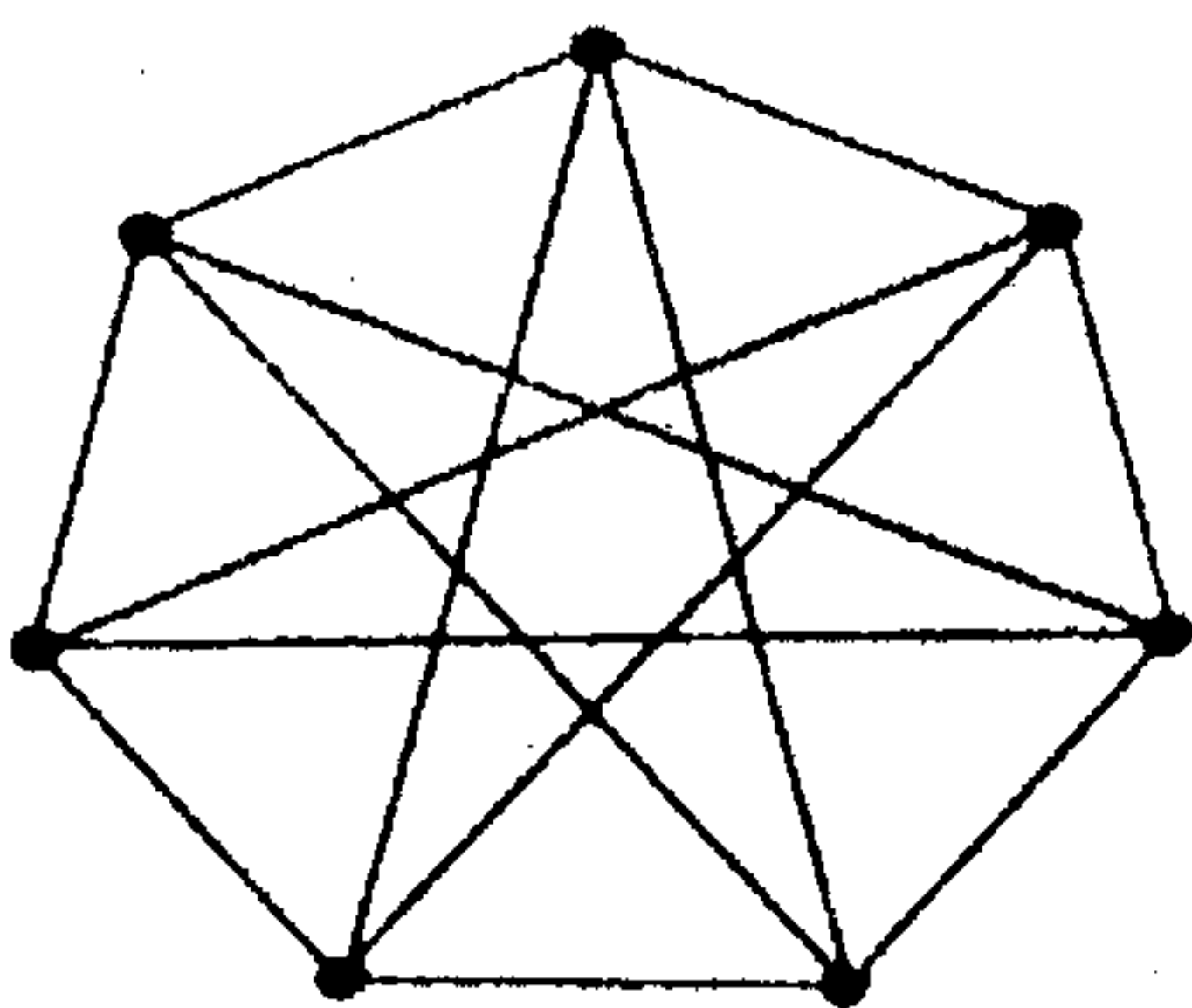
PART – B

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

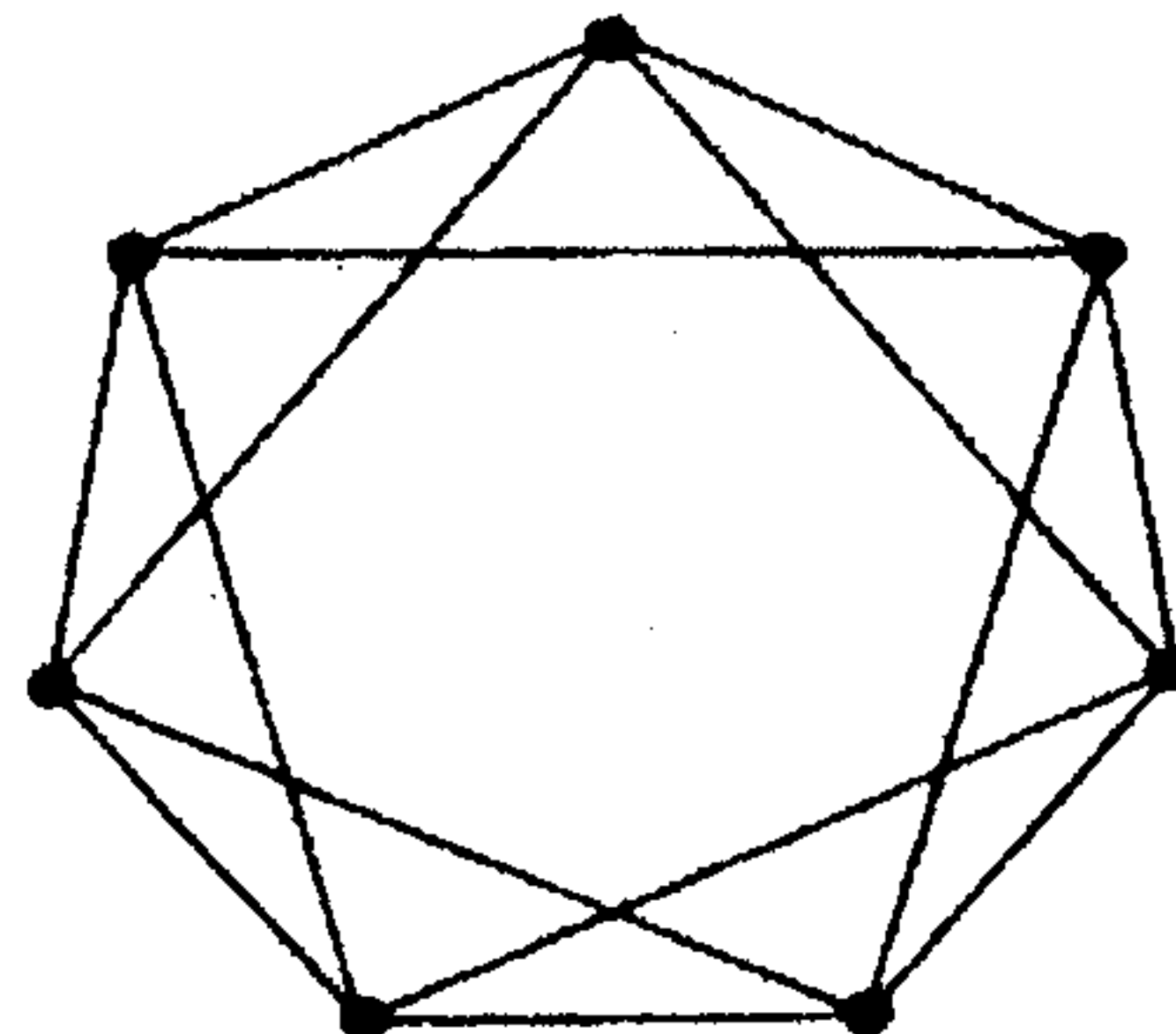
MODULE – 1

6. a) Check whether the two graphs given below are isomorphic ?

10



(a)



(b)

- b) 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

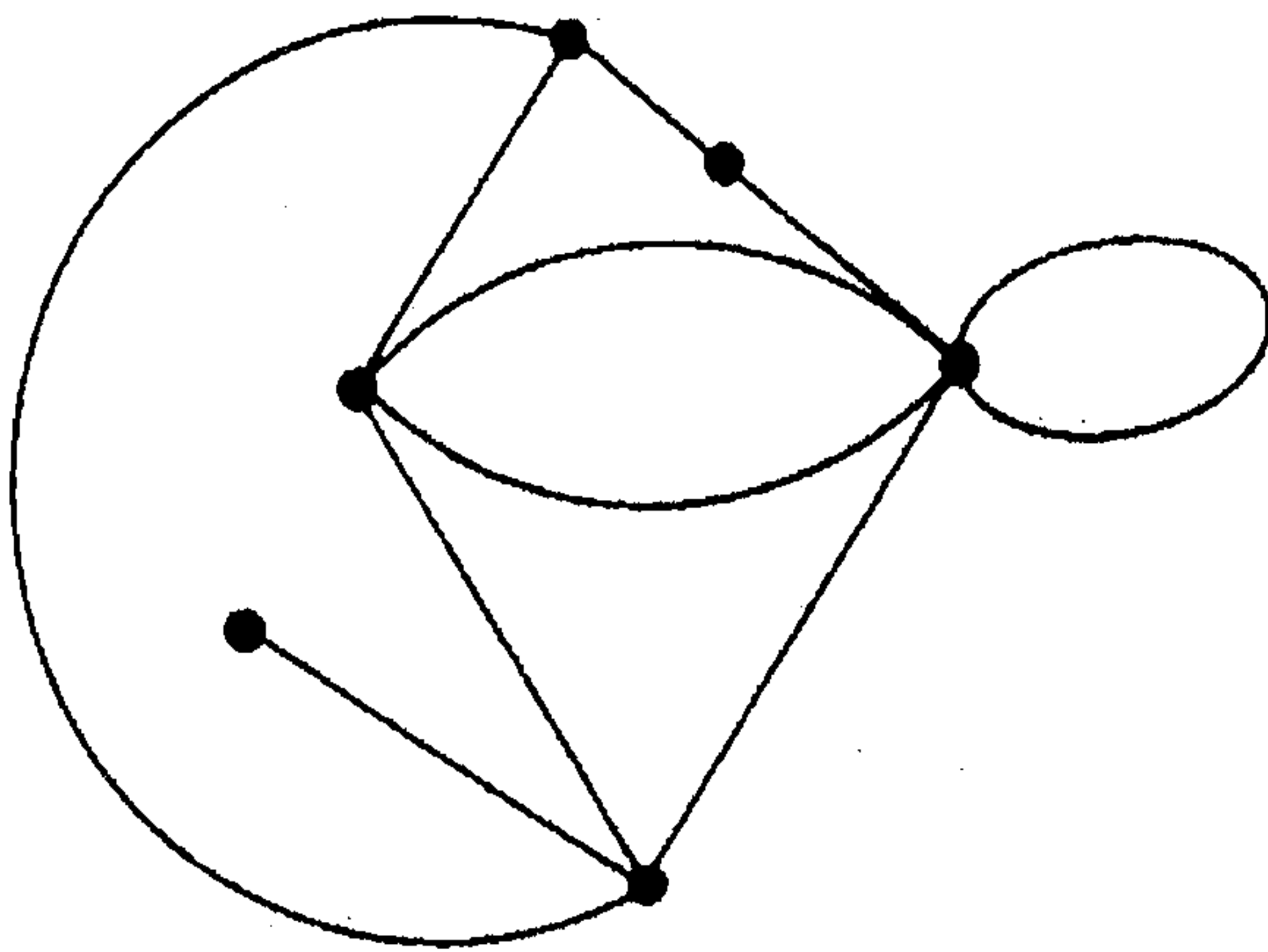
P.T.O.



7. a) Prove that a given connected graph G is an Euler graph if and only if all vertices of G are of even degree. 10
- b) Show a tree in which its diameter is not equal to twice the radius. Under what conditions does this inequality hold? Elaborate. 10

MODULE – 2

8. a) Prove that K_5 is nonplanar. 10
- b) Explain strongly connected fragment and condensation of a directed graph with an example. 10
9. a) Prove that the ring sum of two circuits in a graph G is either a circuit or an edge-disjoint union of circuits. 10
- b) What are the relationship between a planar graph G and its dual G^* ? Find the geometric dual of the following graph. 10



MODULE – 3

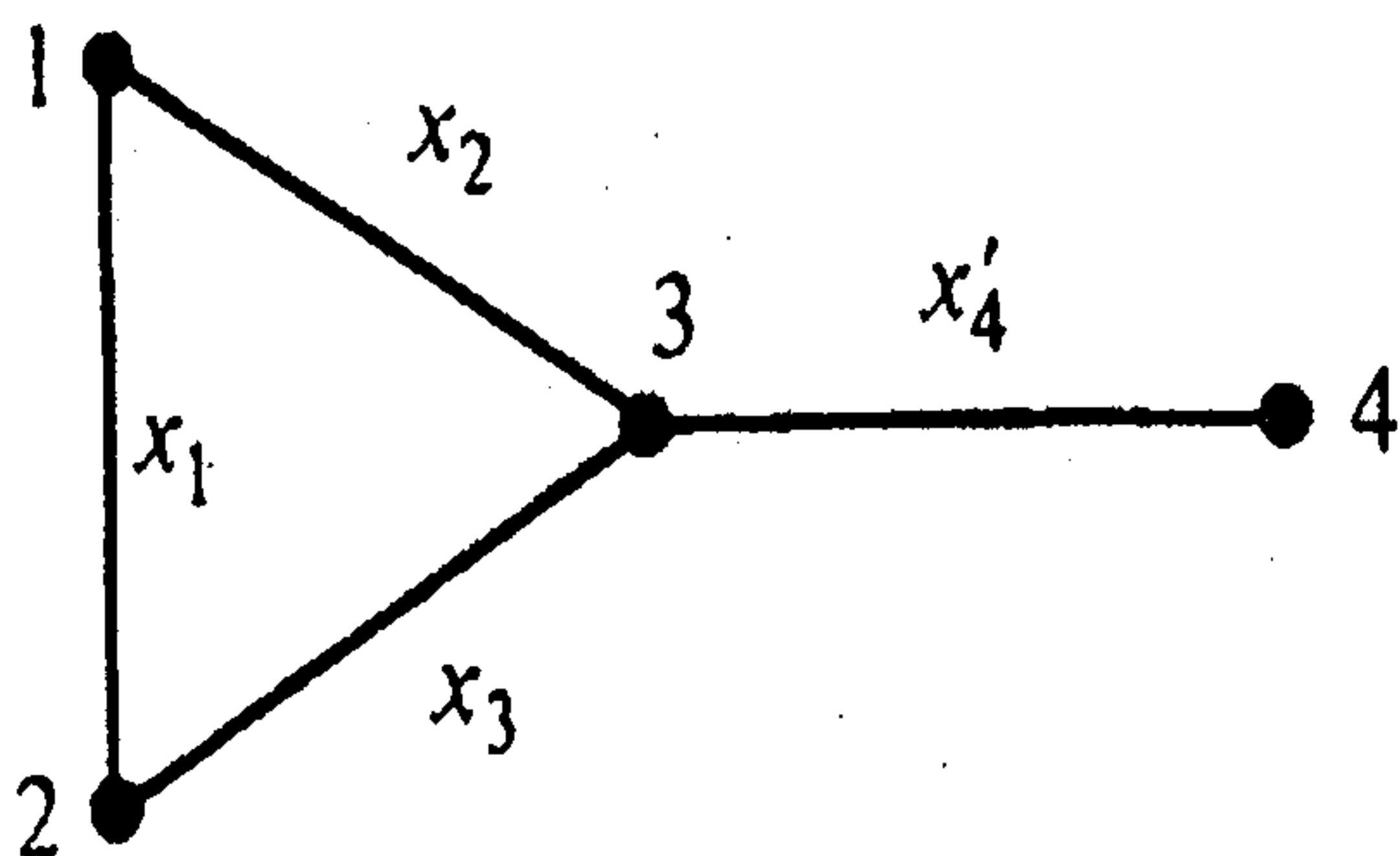
10. a) Explain the depth-first search algorithm in a graph G with an example. 10
- b) Explain the algorithm to find the shortest path from a specified vertex to another specified vertex in a graph G with an example. 10
11. Explain the algorithm to find a spanning tree of an undirected self-loop-free graph. 20





MODULE - 4

12. a) For the following contact network write its primitive connection matrix and find its transmission matrix from it. Explain the steps involved in finding the transmission matrix from the primitive connection matrix. 10



- b) Give the definition of a sequential machine with an example. What are the properties of state graphs? 10

13. Realize the following single contact function $F_{ab} = x_1x_2x_3x_5x_7 + x_1x_3x_4x_6 + x_1x_5x_6x_8 + x_2x_4 + x_2x_3x_5x_8 + x_3x_4x_6x_7x_8 + x_5x_6x_7$ to obtain a graph. 20

