Part A
(Answer All questions, Each Question carries 4 marks)

1. Differentiate a Walk, Path & Circuit in a Graph.
2. State and prove Euler's theorem involving number of regions, edges and vertices in a planar graph.
3. What is eccentricity of a node? How is it used in finding the center of a graph?
4. Name any two methods used to represent a graph in computers? What are its advantages/disadvantages?
5. How is the transmission between two vertices specified in contact networks. Give an example.

Part B
(Answer Any One question from each module, Each Question carries 20 marks)

Module I

6. a) Prove that the number of vertices of odd degrees will be even. (10)
   b) What are the steps involved in finding a spanning tree of any given graph G(V,E). (10)
7. a) Prove that all trees will have either one or two centers. (10)
   b) Given any graph how can you prove/disprove it to be having a Euler path. Is K_{3,3} Eulerian ? (10)

Module II

8. a) What is a vector space of Graph? Explain with an example. (10)
   b) Differentiate Geometric dual with Combinatorial dual. (10)
9. a) What are strongly connected components? Write a method to find it. (10)
   b) Prove that the complete graph K_5 is non planar. (10)

Module III

10. a) Write an algorithm to find out the number of components in a given graph G(V,E). (10)
    b) What are the steps involved in proving that two graphs are isomorphic or not ? (10)
11. a) Explain how the spanning tree algorithm can be used in generating the fundamental circuits in a given graph. (20)

Module IV
12. a) What are m-cubes? Draw the graphs of 3-cube and 4-cube. (10)
   
   b) Write notes on sequential switching networks. (10)

13. a) Draw a contact network with at least 4 vertices and 4 edges. Write its primitive connection matrix and find the transmission matrix from it. Explain the steps involved in finding the transmission matrix from the primitive connection matrix. (20)