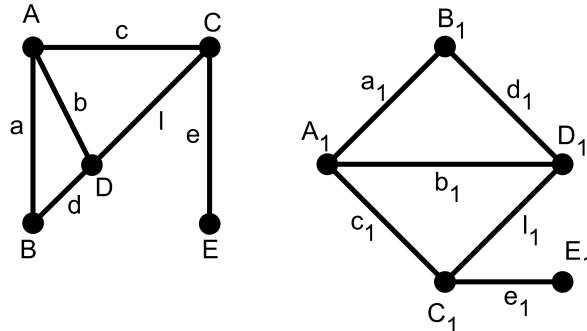


Assignment-1

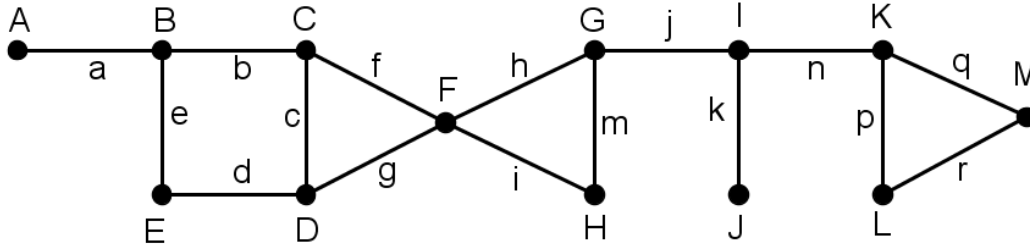
KKSJ MANINAGAR SCIENCE COLLEGE

B. Sc. (Sem-VI)
MAT-310 (Graph Theory)

1. State and prove first theorem of Graph Theory. Prove that in any graph G there is an even number of odd vertices.
2. Define isomorphism of graphs. Show that the following graphs are isomorphic.



3. Define radius and diameter of a graph. Find radius and diameter of the graph



4. Define the following terms and give an example for each.
 - (i) Self-Complementary Graph
 - (ii) Induced Subgraph
 - (iii) Edge deleted subgraph
 - (iv) Join of two graphs.
5. Let G be a graph with n vertices v_1, v_2, \dots, v_n and let A denote the adjacency matrix of G w.r.t. this listing of the vertices. Let $B = [b_{ij}]$ be the matrix $B = A + A^2 + \dots + A^{n-1}$. Then prove that G is connected iff B has no zero entries off the main diagonal.
6. If T is a tree with n vertices then prove that it has precisely $n - 1$ edges.
7. Let G be a graph with n vertices. Then prove that the following three statements are equivalent:
 - (i) G is a tree,
 - (ii) G is an acyclic graph with $n - 1$ edges,
 - (iii) G is a connected graph with $n - 1$ edges.
8. If u and v are distinct vertices of a tree T then prove that there is precisely one path from u to v .
