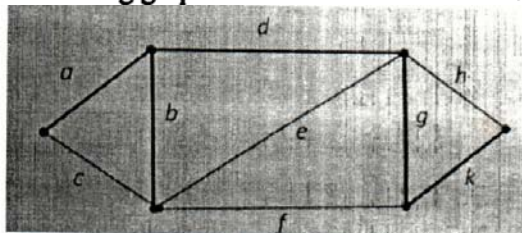




Q.1. Solve the following:

(6x5=30)

- Write degree sequence of wheel graph  $W_5$  and verify that the handshaking lemma holds.
- Show that in a gathering of six people, there are either three people who all know each other or three people none of whom know each other.
- Which complete bipartite graphs and  $k$ -cube  $Q_k$  are Hamiltonian? Give reasons.
- Find the cycle rank, cutset rank and fundamental sets of cycles associated with all the spanning tree of the following graph.

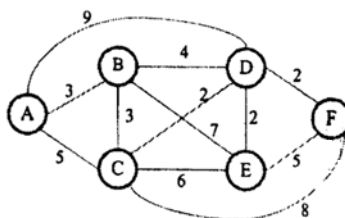


- Write a note on Eulerian Graph.
- Prove that a forest with  $n$  vertices and  $k$  components has  $n - k$  edges.

Q.2. Solve the following:

(5x6=30)

- Prove that a simple graph and its complement cannot both be disconnected.
- Prove that in bipartite graphs each cycle has even.
- Write a note on vertex and edge connectivity of a graph. Also find a graph for which  $\kappa(G) < \lambda(G) < k$ , where  $\kappa(G)$ ,  $\lambda(G)$  and  $k$  are vertex connectivity, edge connectivity and minimum degree of graph  $G$ , respectively.
- Find the shortest path from vertex  $A$  to vertex  $F$ .



- Write a note on isomorphism of graphs. Determine whether the following two graphs are isomorphic or not? If yes then also write the mapping and show edge preservation and if no then explain the reason.

