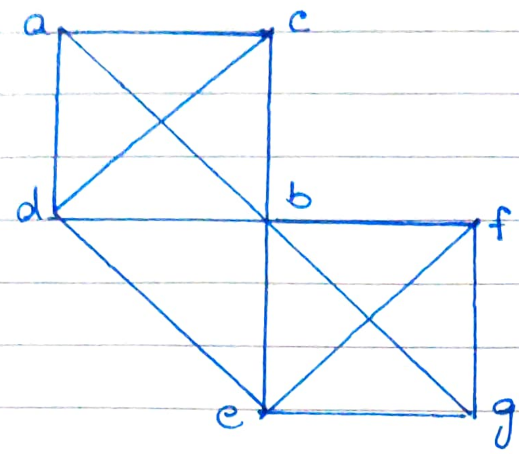
Junaid Girkar
60004190057

DISCRETE STRUCTURES SEC-B TT2

Q1



There are 4 vertices a, c, f, g with odd degree 3.

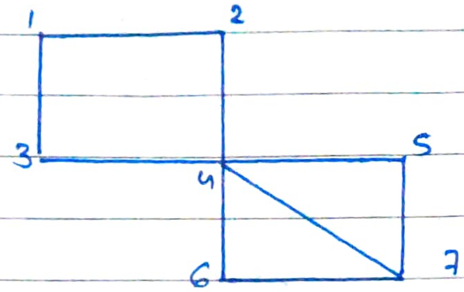
By theorem 1, since there are four vertices of odd degree, there can be no Eulerian circuit.

By theorem 2, since there are more than 2 vertices of odd degree there can be no Eulerian path

THEOREM 1: A connected graph G is an Eulerian graph if and only if all vertices of G are of even degree

THEOREM 2: If G is a connected graph having exactly two vertices u and v of odd degree then there is a Eulerian path from u to v which includes all the edges and all the vertices of G.

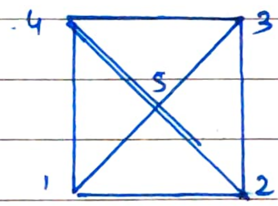
Q2 a)



- It is a simple graph with $n = 7$ vertices. The degree of vertex 1 is 2 and of vertex 7 is 3
- The sum of these degrees is 5 and is not greater than number of vertices 7.
- Hence by theorem 1, the graph is not Hamiltonian. There is no Hamiltonian circuit.
- But there is an Hamiltonian path

π : 3, 1, 2, 4, 6, 7, 5

b)



- The graph is simply connected. There are $n = 5$ vertices. But the degree of each of the vertices 1, 2, 3, 4 is 3 and the degree of the vertex 5 is 4.
- Since the degree of each vertex is greater than $n/2 = 2$, there is by theorem 2, a Hamiltonian circuit
- The Hamiltonian circuit is π : 1, 2, 5, 3, 4, 1
- The graph is Hamiltonian
- ∴ There is a Hamiltonian path

π : 1, 2, 5, 3, 4