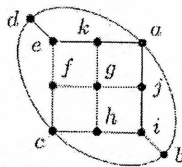# National Institute of Technology Hamirpur

Computer Science & Engineering

Graph Theory and Network Algorithm (CSE-709)
B. Tech. (Dual Degree (CSE)), 9th Semester (5th Year)
Final Exam (December 2022)
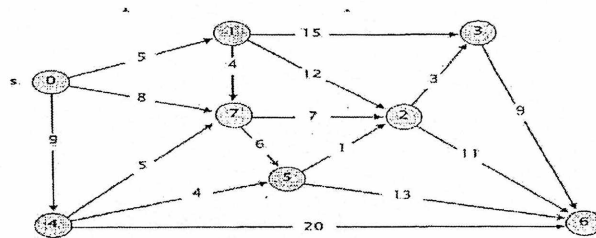
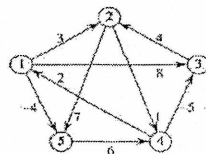Max Marks: 50   Time: 3 Hours

1. (a) Prove that every n-vertex graph with n edges contains a cycle.
   (b) How many simple labelled graphs with n vertices can be formed?   (10)
   (c) What is chromatic number? Find chromatic number of the given graph.

2. What are negative weight cycles? Why Bellman-Ford algorithm is not fit for negative weight cycles? Find the shortest path from source s using Bellman-Ford algorithm. Also verify the relaxation procedure at each step.   (10)

3. Find shortest path between all pairs of the following graph using Floyd-Warshall algorithm.   (10)

4. Find minimum cost spanning tree of the given cost matrix using Prims algorithm.   (10)

	A	B	C	D	E	F	G	H
A	0	12	0	14	11	0	17	8
B	12	0	9	0	12	15	10	9
C	0	9	0	18	14	31	0	9
D	14	0	18	0	0	6	23	14
E	11	12	14	0	0	15	16	0
F	0	15	31	6	15	0	8	16
G	17	10	0	23	16	8	0	22
H	8	9	9	14	0	16	22	0

5. You are given a 10-pices domino set whose titles have the following set of dots: (1,2); (1,3); (1,4); (1,5); (2,3); (2,4); (2,5); (3,4); (3,5); (4,5). Discuss the possibility of arrangement of the tiles in a connected series such that one number on the tiles always touches the same number of its neighbor.   (10)