Mid semester Examination (Monsson 2023)

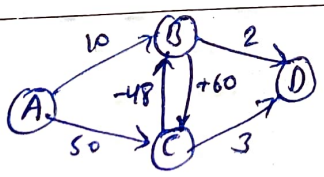
Department of Computer Science & Engineering, IIT (ISM), Dhanbad

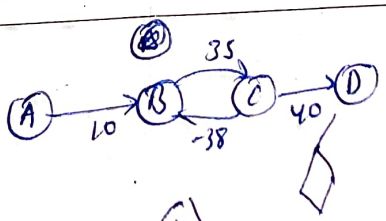
Discipline: M.Tech. (CSE) & Research Scholar

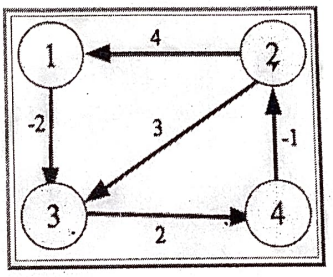
Subject: Algorithmic Graph Theory (CSC503) **Time:** 2 hours, Marks: 50

Instructions: *Answer all questions*

Q. No		Marks
1	a. Suppose want to schedule some final exams for CS courses with following call numbers: 1007, 3137, 3157, 3203, 3261, 4115, 4118, 4156 and also suppose also that there are no common students in the following pairs of courses because of prerequisites: 1007-3137 1007-3157, 3137-3157 1007-3203 1007-3261, 3137-3261, 3203-3261 1007-4115, 3137-4115, 3203-4115, 3261-4115 1007-4118, 3137-4118 1007-4156, 3137-4156, 3157-4156 How many exam slots are necessary to schedule exams?	6
	b. Illustrate with an example that any graph is a subgraph of a r-regular graph.	4
2	a. If a graph G is maximal planar graph with n vertices ($n>=3$) and m edges then show that $m = 3n - 6$.	4
	b. For a planar graph G with n number of vertices and e number of edges with r regions, prove by method of induction that $n - e + r = 2$.	3
	c. Illustrate the situation when Dijkstra's Algorithm may fail to find the shortest path but Bellman-Ford Algorithm may succeed. And	3





	also mention the situation when Bellman-Ford Algorithm may fail (illustrate with an example).	
3	a. Illustrate with suitable example (considering a labelled tree T with at least 9 vertices) and converting T into its equivalent Prufer Sequence S and vice versa.	6
	b. Mention the important differences between BFS and DFS	4
4	a. Prove that Peterson Graph is non-planar using Kuratowski's and Wagner's Theorem as well.	6
	b. Prove that every planar graph has a dual.	4
5	a. Find the all pairs shortest paths among all vertices for the following graph using Floyd-Warshall Algorithm (showing all intermediate steps) 	6
	b. Also describe Floyd-Warshall Algorithm to find the shortest paths among all vertices.	

End