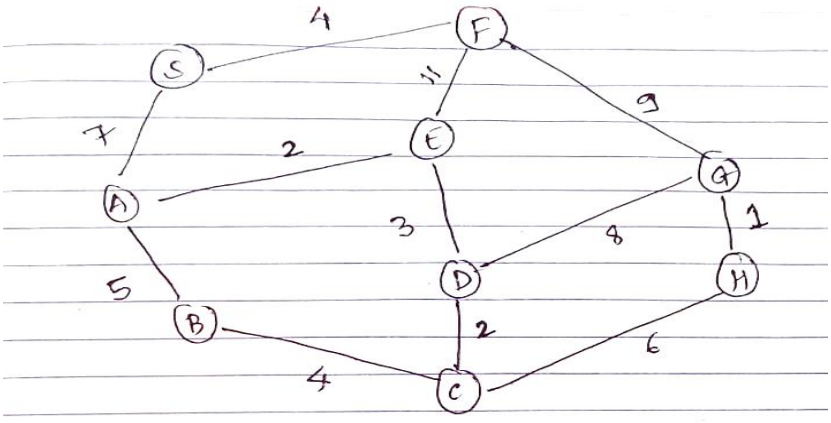
SVKM's
D. J. Sanghvi College of Engineering

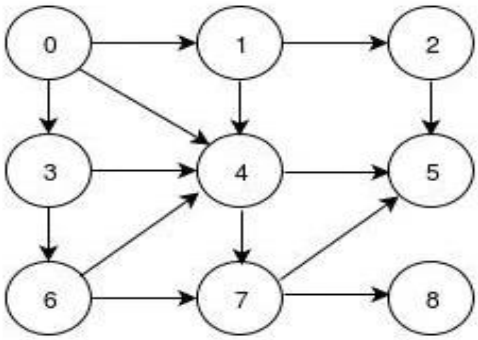
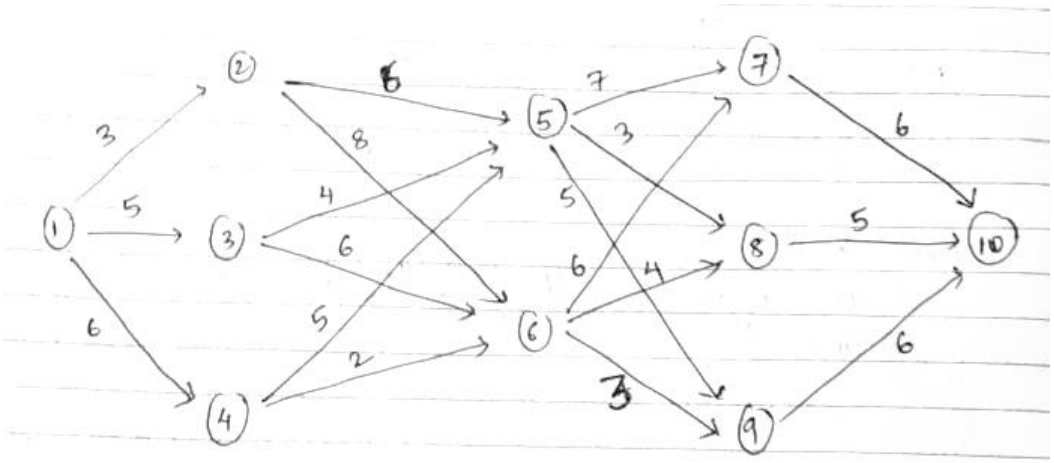
Program: B.Tech in AIML & AIDS **Academic Year: 2022** **Duration: 3 hours**

Date: 21.01.2023
Time: 09:00 am to 12:00 pm
Subject: Data Structures and Algorithms (Semester III) **Marks: 75**

Instructions: Candidates should read carefully the instructions printed on the question paper and on the cover page of the Answer Book, which is provided for their use.

(1) This question paper contains two pages.
(2) All Questions are Compulsory.
(3) All questions carry equal marks.
(4) Answer to each new question is to be started on a fresh page.
(5) Figures in the brackets on the right indicate full marks.
(6) Assume suitable data wherever required, but justify it.
(7) Draw the neat labelled diagrams, wherever necessary.

Question No.		Max. Marks
Q1 (a)	Implement Singly Linked list with the help of following functions • Insert before • delete beginning • sum of all even positioned nodes **OR** Implement queue using linked list	[10]
Q1 (b)	Explain Master's theorem. Calculate time complexity for the following recurrence relation using Master Theorem $T(n)=3T(n/9)+n^2$	[05]
Q2 (a)	Implement conversion of an infix expression to postfix expression **OR** Determine the shortest distance from from the source vertex S to all the other vertices using Dijkstra Algorithm for the following graph 	[10] [10]
Q2 (b)	Write short note on Asymptotic notations	[05]
Q3 (a)	Implement Binary Search Tree with following functions: • deletion of a node • preorder display of all the nodes	[10] [

	OR Implement DFS traversal of a graph. Find DFS Traversal for following graph  	[10]
Q3 (b)	Implement Binary Search for searching an element	[05]
Q4 (a)	Demonstrate step by step insertion of the following element in an AVL tree. 10, 52, 5, 25, 13, 17, 70, 60, 34, 40. Mention the type of imbalance if any. **OR** Determine the shortest distance from the source vertex 1 to the sink 10 for the following multistage graph  	[10] [10]
Q4 (b)	What is hashing? Hash the following data in table of size 20 using linear probing. Also find the number of collisions. {96, 48, 63, 29, 87, 77, 48, 65, 69, 94, 61}	[05]
Q5 (a)	Implement merge sort . Show how the following array will be sorted using Merge Sort {38, 27,43, 3,9,82,10}	[10]
Q5 (b)	Short Note on Heap **OR** Short note on B Tree	[05] [05]