Daffodil International University

Faculty of Science & Information Technology

Department of Information Technology & Management

Final Examination, Fall 2024

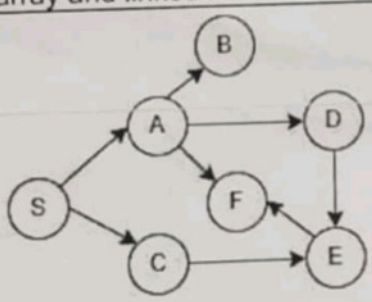
Course Code: ITM 217; Course Title:Data Structure and Algorithms

Sections & Teachers: MA

Time: 2:00 Hrs **Marks: 40**

Answer ALL Questions

[The figures in the right margin indicate the full marks and corresponding course outcomes. All portions of each question must be answered sequentially.]

1.	*a)*	Define graph data structure with a real life example. **Explain** the properties of tree data structure.	[Marks-5]	CLO-3 *Level-2*
	b)	What is BST? **Write** down an algorithm to delete a node from a BST where both children are present.	[Marks-5]	CLO-3 *Level-1*
2.	*a)*	Explain different types of linked lists. **Differentiate** between array and linked list.	[Marks-5]	CLO-3 *Level-4*
3	*a)*	 Consider this graph. Represent the graph using both adjacency matrix and adjacency list. Which representation is better in terms of space for this graph? **justify** your answer.	[Marks-8] 3+3+2	CLO-4 *Level-5*
	b)	**Calculate** the discovery time d, finish time f and previous node prev for all the nodes in the given graph using appropriate graph traversal algorithm.Show step by step implementation.	[Marks-7]	CLO-4 *Level-3*
4.	*a)*	**Array**= [12, 7, 19, 4, 22, 15, 3, 10, 6, 18] Consider the array and **apply** merge sort for ascending order. Illustrate the whole process step by step.	[Marks-5]	CLO-4 *Level-3*
	b)	**B**= [12, 10,7,5,2,1] **Apply** insertion sort on the given array and demonstrate each step.	[Marks-5]	