

International Islamic University Chittagong

Department of Electronics and Telecommunications Engineering

Final Exam- Spring 2022

Program: B. Sc. Engineering in ETE

Course Code: ETE-2443

Course Title: Data Structure and Algorithm

Time: 2.30 Hours

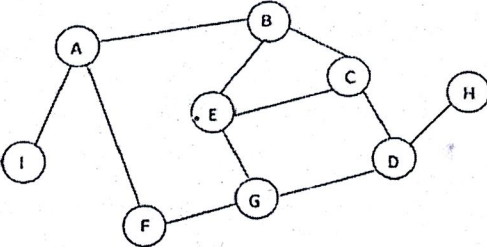
Full Marks: 50

(i) The figures in the right-hand margin indicate full marks

(ii) Course Outcomes and Bloom's Levels are mentioned in additional Columns

Course Outcomes (COs) of the Questions	
CO1	Identify various terminologies of data structures and algorithms
CO2	Implement various data structures such as arrays, records, pointers, stacks, queues, recursions, linked lists, trees and graphs
CO3	Analyze and compare various searching and sorting techniques

Bloom's Levels of the Questions						
Letter Symbols	R	U	App	An	E	C
Meaning	Remember	Understand	Apply	Analyze	Evaluate	Create

Part A					
[Answer the questions from the followings]					
1.	a)	Define linked list. Why use a linked list over an array? How will you represent a linked list in a graphical view? Explain with an example.	CO1	R, U	5
1.	b)	Write short note on: i) Connected graph ii) Internal node. iii) Height of a tree iv) Sub tree v) Depth of a node	CO1	R	5
2.	a)	Define graph. Show how Depth First Search works on the graph in figure 1 and consider A as the source. <div style="text-align: center;">  </div>	CO2	R, App	5
Fig: 1					

2.	b)	How many bits may be required for encoding the message 'qwerewyuiowetyqeyppq' using Huffman coding ?	CO2	U, App	5
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OR

2.	a)	Define binary tree. Show how Breadth First Search works on the graph in figure3 and consider A as the source	CO2	R, App	5
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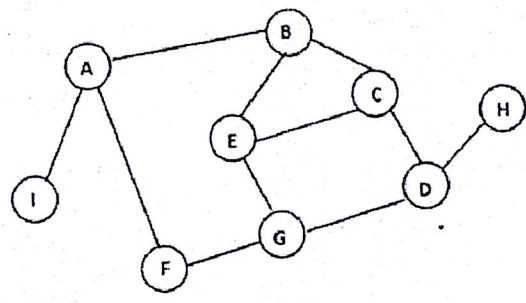


Fig: 2

2.	b)	Define tree. Write the inorder, preorder and postorder traversal sequences of the tree	CO2	U, App	5
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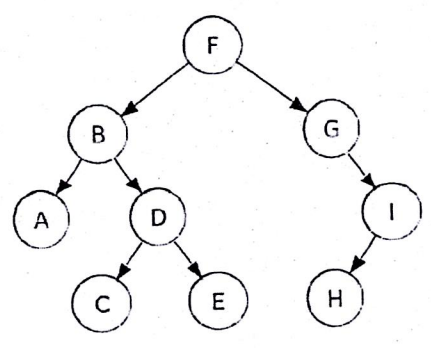
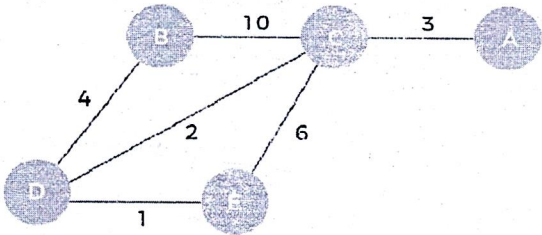
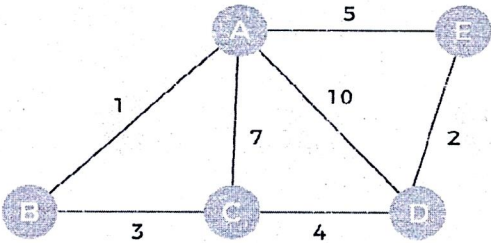
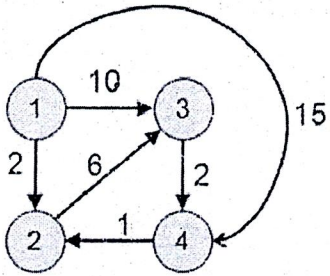


Fig: 3

Part B
[Answer the questions from the followings]

3.	a)	Suppose the following numbers are stored in an array A: 39,23,9,58,80,91,42,63,100,18,97,67 Apply insertion sort and quick sort algorithm to sort the array A and show each pass separately.	CO3	App An	6
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3.	b)	<p>Define minimum spanning tree. Consider the following graph for finding the shortest path using Prim's Algorithm</p>  <p style="text-align: center;">Fig: 4</p>	CO2	R, App	4
OR,					
3.	a)	<p>Apply merge sort algorithm for the following data and show the steps. 66, 33, 40, 22, 55, 88, 11, 80, 20, 50, 44, 77, 30</p>	CO3	App An	6
3.	b)	<p>Consider the following graph for finding the shortest pat using Kruskal's Algorithm</p>  <p style="text-align: center;">Fig: 5</p>	CO2	R, App	4
4.	a)	<p>Consider the following graph for finding shortest path using Bellman Ford Algorithm (Starting vertex=A)</p>  <p style="text-align: center;">Fig: 6</p>	CO2	App	5
4.	b)	<p>Show the intermediate steps to search the ITEM= 41 from the following list of integers using binary search algorithm</p>	CO3	U App	5

21,25,30,35,41,45,53,66,68,71,82,89,101

5. a)

Define complete graph. Find the adjacency matrix of the following graph

CO2

U

3

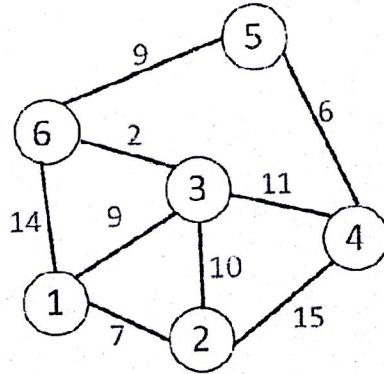


Fig: 7

5. b)

Consider the following graph for finding shortest path using **Floyd-Warshall Algorithm**

CO2

U
App

7

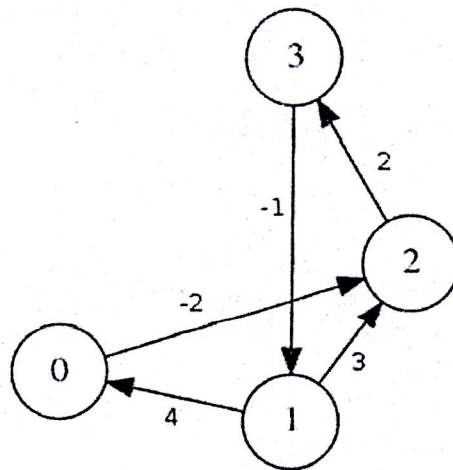


Fig: 8