Course Name: Data Structures & Algorithms

Course Outcome

CO1- Understand the basic concepts of the Data Structures and Algorithms.
CO2- Understand the complexity representation in terms of Big Oh, Theta and Omega notations.
CO3- Apply the associated operations in Linear Data Structures like Stack, Queue and Linked List.
CO4- Apply the associated operations in Binary Search Tree, AVL Tree, and M-Way Search Tree.
CO5- Understand the basic algorithms such as Heap sort, Graph traversal, Quick sort, AVL Tree and Hashing.
CO6- Select the appropriate data Structures to solve the problem.
CO7- Apply the Shortest path algorithms to solve real life problems.

Printed Pages: 3   **University Roll No.** ....

End Term Examination, Even Semester 2021-22
B. Tech. CS (Hons.), I - Year, II - Semester
BCSC 0006 : Data Structures & Algorithms

Time: 3 Hours   **Maximum Marks: 45**

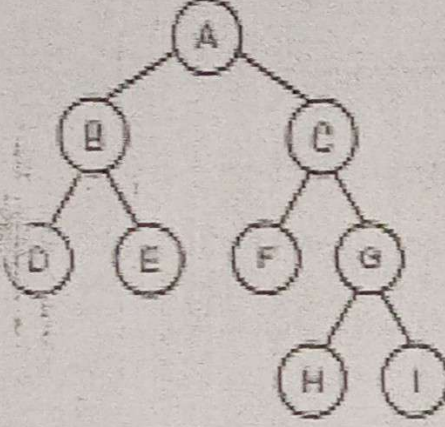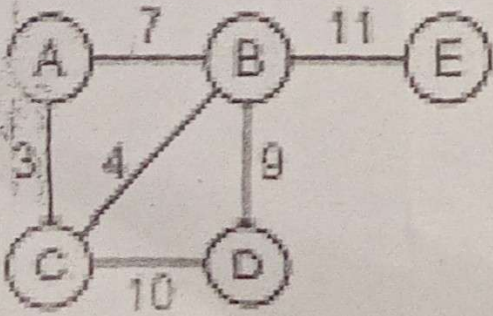### Section – A

Attempt All Questions   4 X 5 = 20 Marks

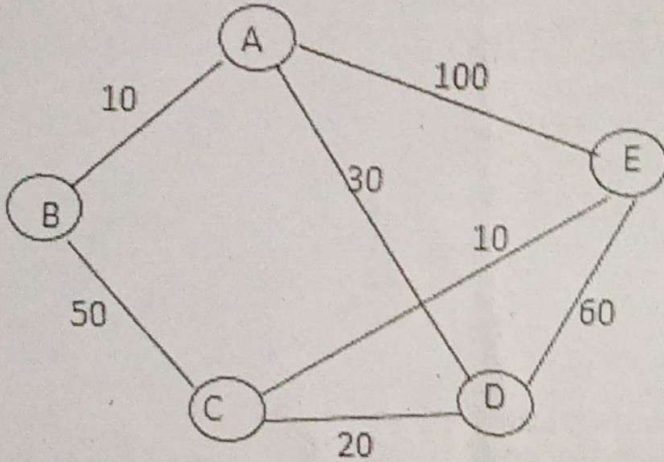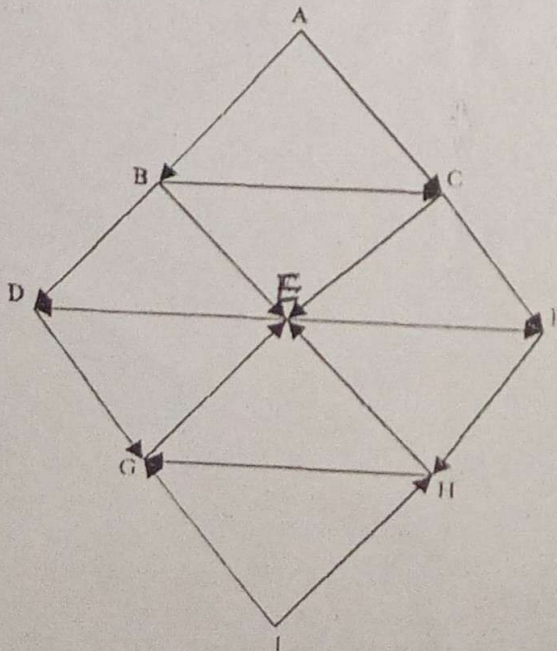| No.	Detail of Question	Marks	CO	BL	KL
1	i) Define complexity of an algorithm. What is meant by time-space trade off? **(2 Marks)** ii) Define and explain Big O notation? **(2 Marks)**	4	CO1	KL	F
2	Write the properties of B-Tree. Construct the B-Tree of order 3 for following elements: 10, 20, 30, 40, 50, 60, 70, 80, 90, 100 **Or** Define an ADT for a list of integers. First, decide what functionality your ADT should provide. Then, specify your ADT showing its functions, their parameters, and return types.	4	CO3	C	PC
3	Write an algorithm for Quick sort. Apply the partition algorithm for a single pass: 2, 13, 4, 21, 7, 56, 51, 85, 59, 1, 9, 10.	4	CO5	K	D
4	Distinguish between adjacency matrix and adjacency list? Explain the method of representing graphs by using matrices?	4	CO7	An	M
5	A certain sorting technique was applied to the following data set, 15, 1, 7, 9, 16, 18 After two passes, and the rearrangement of the data set is given as below: 1, 7, 15, 9, 16, 18. Identify the sorting algorithm that was applied and then sort the complete data set. - Selection Sort	4	CO6	An	F

Attempt All Questions   3 X 5 = 15 Marks

No.	Detail of Question	Marks	CO	BL	KL
1	Consider the tree given below. i) Find the height of the tree. – 3 ii) Find the level of node G. – 2 iii) Find the in-order, pre-order, post-order traversal sequence of nodes.	3	CO4	An	C
2	Construct the Max-Heap sort for the initial key set: 42, 23, 74, 11, 65, 58, 94, 36, 99, 87	3	CO5	C	D
3	If the Inorder traversal of a binary tree is B,I,D,A,C,G,E,H,F and its Postorder traversal is I,D,B,G,C,H,F,E,A, determine the binary tree.	3	CO5	An	C
4	Construct a minimum spanning tree of the graph given in figure below using Prim's algorithm (Start Vertex =D): 	3	CO5	A	C
5	Consider a hash table of size 10. Using linear probing, insert the keys 72, 27, 36, 24, 63, 81, 92, and 101 into the table.	3	CO5	A	C

Section – C

5 X 2 = 10 Marks

No.	Detail of Question	Marks	CO	BL	KL
1	Explain the AVL Tree insertion cases. Construct the AVL tree for following elements: 10, 20, 30, 40, 50, 60, 70, 80, 90	5	CO3	U	PC
	Describe Dijkstra's algorithm for finding shortest path. Trace its step by step working for the graph given below. Consider A as the source vertex. **Or**				
2	Apply Depth First Search (DFS) and Breadth First Search (BFS) Graph Traversal algorithm on the following graph (Start the traversal with the vertex named "G") **(5 Marks)**.	5	CO5	KL	C