	<u>Unech</u>
Name:	\$
Roll No.:	An Alaman Williams Staff Excellent
Inviailator's Sianature :	

CS/B.Tech (EIE) (N)/SEM-5/EI-504A/2012-13

2012 DATA STRUCTURES & ALGORITHMS

Time Allotted: 3 Hours Full Marks: 70

The figures in the margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable.

GROUP - A (Multiple Choice Type Questions)

	$10\times1=10$
i)	The in-order and post-order traversal of a binary tree
	are DBEAFC and DEBFCA respectively. What will be the
	total number of nodes in the left subtree of the given
	tree 2

Choose the correct alternatives for any *ten* of the following :

- a) 1b) 4c) 5d) None of these.
- ii) The linear probing technique for collision resolution can lead to
 - a) efficient storage utilization
 - b) primary clustering
 - c) secondary clustering
 - d) overflow.

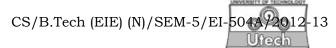
1.

- iii) Any connected graph with n vertices must have at least
 - a) n + 1 edges
- b) n-1 edges
- c) n edges
- d) n/2 edges.

5421(N) [Turn over

CS/B.Tech (EIE) (N)/SEM-5/EI-504A/2012-13

в.те	en (E	IE) (N)/SEM-5/EI-504A	./201	Utech			
iv)							
·	_	O (n ⁴)		O $(n \log_2 n)$			
	c)	O(2 n)	d)	none of these.			
v)	ted from						
	a) in-order traversal sequence only						
	b)	b) pre-order traversal sequence only					
	c) post-order traversal sequence only						
	d) both in-order and pre-order traversal sequences.						
vi)	Linked lists are not suitable for						
	a)	Dequeue	b)	Binary search			
	c)	Stack	d)	AVL tree.			
vii)	In a binary search tree, if the number of nodes of a tre						
	is 9, then the minimum height of the tree is						
	a)	9	b)	4			
	c)	3	d)	2.			
viii)	iii) Row major representation of a 2D Array stores						
	a)						
	b) elements of both row and column						
	c)	elements of column first					
	d)	none of these.					
ix)	The searching technique that takes O (1) time to fin						
	data	a is					
	a)	Linear Search	b)	Binary Search			
	c)	Hashing	d)	Tree Search.			
x)	Whi	ich one is the best	time	among the following			
	_	orithms?					
	a)	O(n)		O $(\log_2 n)$			
	c)	O (2^{n})	d)	O $(n \log_2 n)$.			
xi) A linear list that allows elements to be removed at either end but not in the middle							
	a)	stack	b)	queue			
	c)	dequeue	d)	priority queue.			



- xii) The ratio of items present in a hash table to the total size is called
 - a) balance factor
- b) load factor
- c) weight factor
- d) item factor.

GROUP - B

(Short Answer Type Questions)

Answer any *three* of the following.

 $3 \times 5 = 15$

- 2. What is hashing? What is the use of it? Write about different functions of hashing. 1 + 1 + 3
- 3. Write about different ways of implementing priority queue.
- 4. Write on adjacency matrix and adjacency list.
- 5. Show how the following characters can be inserted in an empty binary search tree in the order they are given:

Draw the tree in each step.

6. Explain with a suitable example, principle of operation of quick sort.

GROUP - C

(Long Answer Type Questions)

Answer any three of the following.

 $3 \times 15 = 45$

7. a) What is a binary tree? Define level and depth of a tree.

2 + 2

b) Construct a binary tree whose nodes in in-order and pre-order are given as follows:

In-order: 10, 15, 17, 18, 20, 25, 30, 35, 38, 40, 50

Pre-order: 20, 15, 10, 18, 17, 30, 25, 40, 35, 38, 50

Now find the post-order traversal sequence. 7 + 3

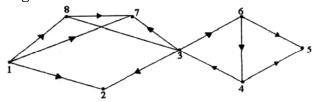
c) What is complete binary tree?

1

5421(N) 3 [Turn over



- 8. a) Write the algorithm for BFS & DFS with example 4 + 4
 - b) Show the result of running BFS and DFS on the directed graph given below using vertex 3 as source. Show the status of the data structure used at each stage.



- 9. a) Write a comparative study of all known file structures including B+ tree and inverted files. Compare them in terms of advantages, disadvantages and use.
 - b) In which cases, does Quick Sort become a Slow Sort ? What is the remedy in those cases ?
 - c) Write an algorithm to append a node before a node with a specific data item in a doubly linked list.

$$(5 + 2) + (2 + 2) + 4$$

- 10. a) Write a recursive function for in-place merge sort. What is the complexity of this function?
 - b) Write the recursive function for the problem of Tower of Hanoi. Draw the recursion tree of Fib (6) considering Fib (n) is a recursive function to calculate Fibonacci series.
 - c) Compare recursion and iteration. What is tail recursion? In which case will you prefer iteration in comparison to recursion? (4+1)+(3+2)+(2+1+2)
- 11. Write short notes on any *three* of the following: $3 \times 5 = 15$
 - a) DAG
 - b) Time Complexity, Big O notation
 - c) Sparse Matrix
 - d) Spanning Tree
 - e) Depth First Traversal.