



Name :

Roll No. :

Invigilator's Signature :

**CS/B.TECH/CSE (N)/IT (N)/SEM-3/CS-302/2012-13
2012**

DATA STRUCTURE & 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)

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

10 × 1 = 10

i) Reserve Polish notation is often known as

- | | |
|------------|-------------------|
| a) Infix | b) Prefix |
| c) Postfix | d) none of these. |

ii) Which of the following algorithm should execute the slowest for large values of N ?

- | | |
|------------------|-------------------|
| a) $O(N)$ | b) $O(N^2)$ |
| c) $O(\log^2 N)$ | d) None of these. |



xii) Which method of traversal does not use stack to hold nodes that are waiting to be processed :

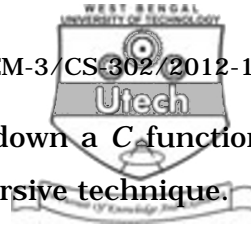
- a) Breadth-first
- b) Depth-first
- c) D-search
- d) None of these.

GROUP - B

(Short Answer Type Questions)

Answer any *three* of the following. $3 \times 5 = 15$

2. a) Define big O notations.
b) $T(n) = 4n^2 + 3n \log n$, express $T(n)$ in Big (O) notations. $2 + 3$
3. a) How the polynomial $4x^3 - 10x^2 + 3$ can be represented using a linked list ?
b) Compare and contrast between an array and a single linked list. $2 + 3$
4. a) Consider the array `int a [10] [10]` and the base address 2000, then calculate the address of the array `a [2] [3]` in the row and column major ordering.
b) Write the advantage of circular queue over linear queue. $3 + 2$



5. What do you mean by recursion ? Write down a C function to find out the GCD of two nos. using recursive technique.

1 + 4

6. What is binary tree ? Construct a binary tree using the inorder and postorder traversal of the node given below :

Inorder : D B F E A G C L J H K

Postorder : D F E B G L J K H C A

1 + 4

GROUP - C

(Long Answer Type Questions)

Answer any *three* of the following. 3 × 15 = 45

7. a) Draw a minimum heap tree from the below list :

12, 11, 7, 3, 10, - 5, 0, 9, 2

Now do the heap sort operation over the heap tree which you have formed. Write the insertion sort algorithm.

2 + 2 + 3

- b) What is a minimum spanning tree ? Describe Huffman's Algorithm.

3 + 4

- c) What are the differences between AVL Tree & Binary Search Tree ?

1



8. a) Radix Sort the following list :

189, 205, 986, 421, 97, 192, 535, 839, 562, 674

Write the Radix sort algorithm.

3 + 5

b) Find the time complexity of Binary Search Algorithm. 4

c) What is hashing ? 3

9. a) Construct an AVL tree using the below list. Show all the steps 12, 11, 13, 10, 09, 15, 14, 18, 7, 6, 5, 4. 5

b) What is a priority queue ? 3

c) Write the recursive algorithm to find $x \wedge n$. 4

d) Find the postfix notation of

$(a + b * x) \setminus (a! - d) s - c * y$ (show all steps). 3

10. a) Write the advantage of circular queue over linear queue. 4

b) What is a self referential structure ? 2 + 2

c) Describe a string reversal algorithm. 3

d) Write the difference between $a[][]$ and $**a$. 2

e) What is difference between Union & Structure ? 2



11. Write short notes on any *three* of the following : 3×5

- a) Abstract Data type
- b) BFS
- c) BTree
- d) Tail recursion
- e) Merge Sort.

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