



Name :
Roll No. :
Invigilator's Signature :

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)

1. Choose the correct alternatives for any *ten* of the following : $10 \times 1 = 10$
- i) The in-order and post-order traversal of a binary tree are DBEAFB and DEBFCA respectively. What will be the total number of nodes in the left subtree of the given tree ?
 - a) 1
 - b) 4
 - c) 5
 - d) 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.
 - 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.



- 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 :

J,F,M,A,S,O,N,D

Draw the tree in each step.

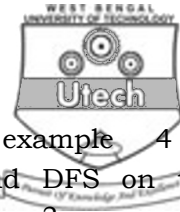
6. Explain with a suitable example, principle of operation of quick sort.

GROUP – C

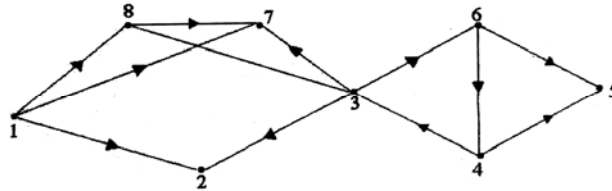
(Long Answer Type Questions)

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



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. 7



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 × 5 = 15
 a) DAG
 b) Time Complexity, Big O notation
 c) Sparse Matrix
 d) Spanning Tree
 e) Depth First Traversal.