



Name :
Roll No. :
Invigilator's Signature :

CS / B. TECH (BME) / SEM-5 / CS-502 / 2010-11

2010-11

DATA STRUCTURE AND ALGORITHM

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) Stack is
 - a) a linear data structure
 - b) LIFO data structure
 - c) abstract data type
 - d) all of these.



- ii) Which is not representation of a graph ?
- a) Adjacency matrix b) Edge list
- c) Adjacency list d) All of these.
- iii) The complexity of selection to sort an array of n elements is
- a) $O(n)$ b) $O(n \wedge 2)$
- c) $O(n \log n)$ d) $O(\log n)$.
- iv) The complexity of Bubble sort in the worst case is
- a) $O(n)$ b) $O(n \wedge 2)$
- c) $O(n \log n)$ d) $O(\log n)$.
- v) A vertex of in-degree zero in a direct graph is called
- a) sink b) articulation point
- c) isolated vertex d) root vertex.
- vi) In a height balanced tree the height of two sub-tree of every node never differ by more than
- a) 2 b) 0
- c) 1 d) - 1.



vii) A vertex, removal of which makes a graph disconnected is called

- a) Pendent vertex
- b) Bridge
- c) Articulation point
- d) Coloured vertex.

viii) A linear list in which elements can be added or removed at either end but not in the middle is known as

- a) queue
- b) dequeue
- c) priority queue
- d) none of these.

ix) In a circular linked list, insertion of a record involves the modification of

- a) no pointer
- b) 1 pointer
- c) 2 pointer
- d) 3 pointer.

x) A B-tree is

- a) always balanced
- b) an ordered tree
- c) a directed tree
- d) all of these.

xi) Which of the following is not a requirement of good hashing function ?

- a) Avoid collision
- b) Reduce the storage space
- c) Make faster retrieval
- d) None of these.



GROUP - C

(Long Answer Type Questions)

Answer any *three* of the following. $3 \times 15 = 45$

7. a) Write an algorithm of Quick sort.
- b) Define AVL tree. Construct one AVL tree from the following data :
- 55, 66, 77, 15, 11, 33, 22, 35, 25, 44, 88, 99.
- c) Construct a BST from the following data :
- 50, 70, 90, 93, 100, 20, 10, 12, 9, 25, 51, 15, 95.

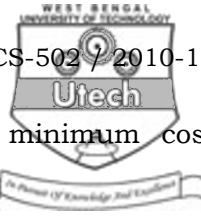
5 + 5 + 5

8. a) Write an algorithm to delete the last node from a single linked list.
- b) Evaluate the following postfix expression
- $P; 3, 16, 2, +, *, 12, 6, /, -$
- (commas are used as separator)
- c) Construct a binary search tree with the help of the following expressions

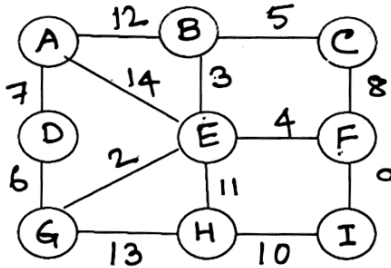
Postorder : D F E B G L J K H C A

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

5 + 5 + 5



9. a) What is a graph ? Find out the minimum cost spanning tree by Kruskal's Algorithm



- b) Convert the following infix expressions into postfix expression using a stack

$$A + (B * C - (D / E \wedge F) * G) * H \quad (1 + 7) + 7$$

10. a) Write an algorithm to insert an element in a circular queue.

- b) Sort the elements using Merge Sort of the following :

20, 30, 1, 5, 55, 62, 23, 79

- c) What is the Max Heap ? Construct a Max Heap using the following data :

9, 6, 8, 7, 21, 14, 15, 19, 13, 12 5 + 5 + 5



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

- a) Threaded binary tree
- b) Dequeue
- c) BFS
- d) Towers of Hanoi problem
- e) Calculate the Complexity of Merge sort.

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