



IV SEMESTER B.TECH. END SEMESTER EXAMINATIONS,

APRIL/MAY 2017

SUBJECT: OPEN ELECTIVE I - FUNDAMENTALS OF DATA STRUCTURES
AND ALGORITHMS (ICT 3283)

REVISED CREDIT SYSTEM
(02/05/2017)

Time: 3 Hours

MAX. MARKS: 50

Instructions to Candidates:

- ❖ Answer **ALL** the questions.
- ❖ Missing data may be suitably assumed.

- 1A. Write a function to create a binary search tree. Given the set of values 50, 75, 25, 65, 70, 80, 78, 68 create a Binary Search Tree. 5
- 1B. Prove or disprove the following: 3
 - i. $2^{n+1} = O(2^n)$
 - ii. $2^{2n} = O(2^n)$
- 1C. If the depth of an almost complete binary tree is 7, what is the minimum and maximum number of nodes in the tree. 2
- 2A. Write a recursive function to sort elements using quick sort. Also trace the function for the following set of elements. 5

12, 23, 7, 5, 13, 51, 19, 65, 62, 18, 65, 2
- 2B. What is an expression tree? Write an expression tree for the following infix expression 3

$A+B*(C+D)+E-A/C$
- 2C. Describe a method to represent a binary tree using an array clearly mentioning the ways to determine the position of parent and child nodes of a node with position 'i' in the tree. 2
- 3A. Write functions for the following operations on a circular doubly linked list. 5
 - i. Create the list
 - ii. Insert a node after a node pointed to by *ptr*
 - iii. Print the list in reverse order
- 3B. Evaluate the following expression using stack: $6*4-7/3+2$ 3
- 3C. Discuss the time complexity of linear and binary search algorithms 2
- 4A. Write a function to delete an element from a binary search tree(BST). Delete the root from the BST shown in Figure Q.4A and show the output. 5

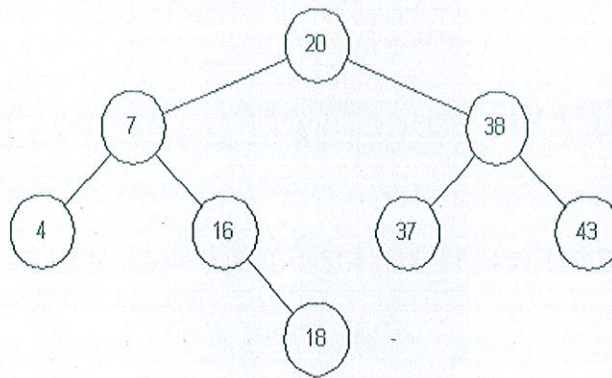


Figure Q.4A

- 4B. Represent the graph shown in Figure Q.4B using:
 a. adjacency matrix
 b. linked adjacency list

3

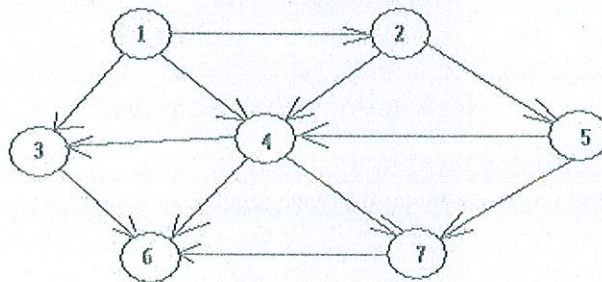


Figure Q.4B

- 4C. Write a recursive function to find the sum of all the elements of an array and compute the space complexity.

2

- 5A. What is a sparse matrix? Give an example. Discuss the practical implementation of creation of a sparse matrix with minimum space requirement. Write a function to find the transpose of a sparse matrix.

5

- 5B. Given the postorder and inorder traversal of a binary tree, construct the unique binary tree.

3

Postorder: G D B E H I F C A
 Inorder: B G D A E C H F I

- 5C. Construct a threaded binary tree for the tree shown in Figure.Q.5C

2

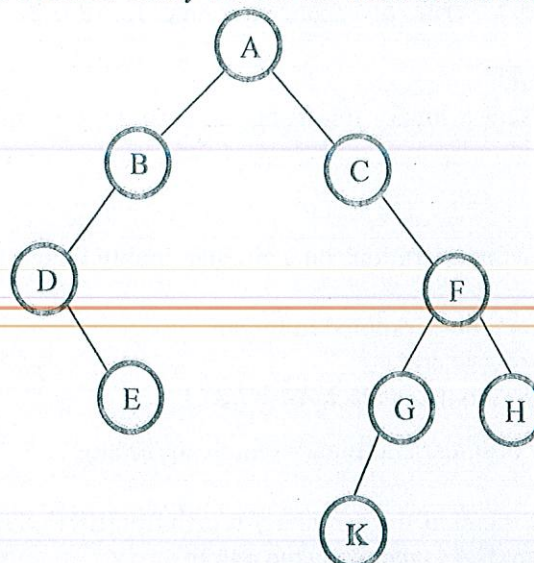


Figure.Q.5C