

(4)

B.Tech 4th Semester Exam., 2016

DATA STRUCTURES

Time : 3 hours

Full Marks : 70

Instructions :

- (i) The marks are indicated in the right-hand margin.
- (ii) There are **NINE** questions in this paper.
- (iii) Attempt **FIVE** questions in all.
- (iv) Question No. 1 is compulsory.

1. Answer any *seven* of the following : $2 \times 7 = 14$

- (a) There are 8, 15, 13 and 14 nodes in four different trees. Which one of them can form a full binary tree?
- (b) Which data structure is used to perform recursion and why?
- (c) List out the areas in which data structures are applied extensively.
- (d) Sorting is not possible by using which of the following methods and why?
Insertion, Selection, Exchange, Deletion

8. (a) Write down the procedure for inserting and deleting elements from a circular queue implemented using arrays. 8

(b) What is a height balanced tree? Explain how the height is balanced after addition/deletion of nodes in it. 6

9. Write short notes on any *two* the following : $7 \times 2 = 14$

(a) Doubly linked list

(b) Huffman algorithm

(c) Circular queue

- (e) What is FIFO?
- (f) What is a postfix expression?
- (g) Differentiate between linear and non-linear data structures.
- (h) How do you insert a new item in a binary search tree?
- (i) Differentiate between stack and array.
- (j) What is an AVL tree?
2. (a) Write binary search algorithm and trace to search element 91 in the following list : 10
13 30 62 73 81 88 91
- (b) What are the limitations of binary search? 4
3. (a) Draw a binary tree from its inorder and preorder traversal sequences given as follows : 7
Inorder : d b g e h a c n f
Preorder : a b d e g h c f n
- (b) What is stack? How can stack be used to check whether an expression is correctly parenthesized or not? [Hint : {} is correct but {} or }{} is not] 7

(Continued)

4. (a) Convert the following infix expression into a postfix expression (show steps) : 7
 $A * (B + D) / E - F (G + H / k)$
- (b) How do you find the complexity of an algorithm? What is the relation between the time and the space complexities of an algorithm? 7
5. Write an algorithm to create a singly linked list. Explain the steps to do the following operations : 14
 (a) Insert a new node at the end
 (b) Delete the first node
6. (a) Arrange the given list of elements in ascending order using quick sort : 8
 44, 33, 11, 55, 77, 90, 40, 60, 99, 22, 88, 66
- (b) Define an array. How does an array differ from an ordinary variable? How are arrays represented in the memory? 6
7. Define hashing. Describe any two commonly used hash functions. Describe one method of collision resolution. 14