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 : 7×2=14

(a) Doubly linked list

(b) Huffman algorithm

(c) Circular queue

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Code : 051403

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 : 2×7=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

(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

(Turn Over)