CHAROTAR UNIVERSITY OF SCIENCE & TECHNOLOGY

Fourth Semester of B.Tech Examination (IT)

Nov-Dec 2016

IT214 Data Structures and Files

Date: 05.12.2016, Monday **Time: 01:30 pm to 04:30 pm** **Maximum Marks:70**

Instructions:

1. The question paper comprises of two sections.
2. Section I and II must be attempted in separate answer sheets.
3. Make suitable assumptions and draw neat figures wherever required.

SECTION-I

Q-1 Choose Most Appropriate Answer from the following. **[07]**

1. Binary Tree with Threads are called as _____

(a) Binary Search Tree (b)Full Binary Tree
(c) Threaded Binary Tree (d) Special Pointer Tree

2. Which of the following indicates pre-order traversal?

(a) left subtree, right subtree and root
(b) right subtree, left subtree and root
(c) root, left subtree and right subtree
(d) root, right subtree and left subtree

3. To represent hierarchical relationship between elements, which data structure is suitable?

(a) Priority queue (b) Tree (c) Graph (d) Stack

4. For a given array of 6 elements [5, 4, 12, 23, 3, 45], how many times comparison is performed to search 23 using linear search algorithm?

(a) 4 (b) 2 (c) 5 (d) 3

5. To arrange *n* elements using selection sort, number of comparisons required _____

(a) n (b) $n \times (n-1) / 2$ (c) $n \times (n+1) / 2$ (d) $n \times n$

6. Which data structure is used to implement BFS?

(a) Stack (b) Queue (c) Tree (d) None of the above

7. A _____ is a binary tree in which every level, except possibly the last, is completely filled, and all nodes are as far left as possible.

(a) Binary Search Tree (b) Full Binary Tree
(c) Heap Tree (d) Complete Binary Tree

Q-2 Attempt the following questions. **[14]**

(a) Define data structure. Explain different types of data structures with suitable example. [04]

(b) Answer following questions.(Any Two) [10]

1. Construct the Binary Search Tree using following data. Show each steps.

32, 45, 12, 11, 13, 92, 78, 66, 17, 70, 98, 108.

Show its Preorder, Inorder and Postorder traversing sequences.

2. Define the terms : full binary tree, path, isolated node, spanning tree, AVL tree

3. Sort the following data using Radix sort. Trace the algorithm.

103, 12, 150, 1405, 145, 1450, 130, 1045

Q-3 Attempt Any Two. **[14]**

(a) Define graph. Explain storage representation of a graph.

(b) Apply Bubble Sort on below data and find out the number of comparison and number of exchanges.

2,8,7,6,15,16,5,10,1

(c) What is Minimum Heap Tree? Perform ascending order sorting for following data using Minimum Heap Tree.

15, 19, 10, 7, 17, 16

SECTION-II

Q-4 Choose Most Appropriate Answer from the following. **[07]**

1. Identify the data structure which allows deletions at both ends of the list but insertion at only one end. [01]

(a) Input restricted dequeuer (b) Output restricted dequeuer
(c) Priority queue (d) Stack

2. Which data structure allows deleting data elements from front and inserting at rear? [01]

(a) Stacks (b) Queues (c) Deques (d) Binary search tree

3. An algorithm that calls itself directly or indirectly is known as [01]

(a) Sub algorithm (b) Recursion (c) Polish notation (d) Traversal algorithm

4. Inserting an item into the stack when stack is not full is called ____ operation and deletion of item form the stack, when stack is not empty is called ____operation. [01]

(a) push , pop (b) pop, push (c) insert, delete (d) delete, insert

5. Which of the following data structure is linear data structure? [01]

(a) Trees (b) Graphs (c) Arrays (d) None of above

6. Evaluate given postfix expression using stack. Show all steps. 3 4 2 * + 1 2 / - [02]

Q-5 Attempt following questions. **[14]**

(a) Given a 2D array A(3:10, 10:20) stored in row major order with base address of 200 and data type is float. Find the address of element A(5,15). [04]

(b) **Attempt Any Two.** [10]

1. Differentiate: (1) array vs linked list (2) stack vs queue

2. Explain circular queue with insert and delete operations. How does it differ from simple queue?

3. Write recursive steps to solve Tower of Hanoi problem. Which data structure is used for Tower of Hanoi problem?

Q-6 Attempt Any Two. **[14]**

(a) Covert the below expression into its equivalent postfix expression using stack.

a / b + d * e – a * c

(b) Explain different methods used for defining hash functions.

(c) Explain the insert at front and insert at end operation of singly linked list with diagram.

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