Code No: 113BP

R13

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech II Year I Semester Examinations, December-2014
DATA STRUCTURES
(Common to CSE, IT)

Time: 3 Hours

Max. Marks: 75

Note: This question paper contains two parts A and B.
Part A is compulsory which carries 25 marks. Answer all questions in Part A.
Part B consists of 5 Units. Answer any one full question from each unit.
Each question carries 10 marks and may have a, b, c as sub questions.

Part- A   (25 Marks)

1.a) Find upper bound for f(n) = 3n+8.   [2M]
  b) Write a recursive function which converts any integer value to its equivalent Binary value.   [3M]
  c) Give a postfix notation of the following infix expression
       A * (B + C / (D + E)) – F * (G / H + I).   [2M]
  d) A letter means enqueue and an asterisk means dequeue in the following sequence. Give the sequence of values returned by the get operation when this sequence of operations is performed on an initially empty FIFO queue.
       J N T * U * H Y D * * * E R * * * A B * A * * B   [3M]
  e) Explain the applications of a Binary Tree.   [2M]
  f) Give the inorder and postorder traversal for the tree whose preorder traversal is A B C - - D - - E - F - -. The letters correspond to labelled internal nodes; the minus signs to external nodes.   [3M]
  g) What is overflow handling?   [2M]
  h) How many comparisons are required to find 73 in the following array using binary search 12, 25, 32, 37, 41, 48, 58, 60, 66, 73, 74, 79, 83, 91, 95?   [3M]
  i) Define a Splay tree and explain its properties.   [2M]
  j) Draw the binary search tree that results from inserting the integers 57, 85, 35, 9, 47, 20, 26, 99, 93, 10 starting with 57 and ending with 10.   [3M]

Part-B   (50 Marks)

2. An algorithm takes 0.5ms for input size 100. How long will it take for input size 500 if the running time is the following?
    a) Linear
    b) O (N log N)
    c) Quadratic
    d) Cubic.

OR

3. Given a singly linked list, write a function swap to swap every two nodes e.g. 1->2->3->4->5->6 should become 2->1->4->3->6->5.

4.a) Write a program that reads in a sequence of characters and prints them in reverse order. *Hint: Use a stack*
  b) Show how to implement a stack using two Queues? Analyse the run time of the stack operations?

OR

5.a) Evaluate the following postfix expression 5 9 3 + 4 2 * * 7 + * using stack show the content of the stack at each step.
  b) Show how to implement a queue using two stacks? Analyse the running time of the Queue operations.

6.a) Consider the following array representation of a priority queue (i.e., the tree structure used in heap sort): 55, 50, 70, 110, 90, 120. Draw the corresponding priority queue (tree structure). If you see something wrong please explain.

 b) Describe two methods of storing edges in a graph. Which requires more space.

OR

7. Given a min-heap, give an algorithm for finding the maximum element and find the complexity of the algorithm.

8. What is the complexity of Quicksort? Show the tree of calls for the quick-sort algorithm using the final element as a pivot on the array 4, 2, 3, 9, 5, 8, 6, 1.

OR

9.a) What is a hash function? Name two desirable properties of a hash function.

 b) Show the steps in the in-place heap sort of 4, 7, 2, 1, 3: show the steps in heap construction and show the steps as the sort proceeds.

10. Given a Binary Search Tree write an algorithm to Tree check whether the tree is an AVL tree or not and discuss the run time complexity.

OR

11.a) Consider the following B-tree with a minimum branching factor of t = 2:
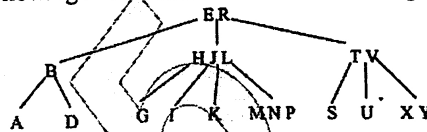
Show the B-tree that results from inserting Q into the above B-tree.

 b) Explain the concept of Tries with suitable examples.

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