

B.E. 3rd Semester (CST) Odd Semester EXAMINATION 2012
Data Structure and Algorithms
CS – 302

F. M. = 70

Time –3 Hrs

Use separate Answer script for each half.

First Half

Answer Question 1 and any two from the First Half.

1. a) Define LIST ADT and identify two operations on it.
b) At what stage of problem solving is the ADT used? What are the other stages of problem solving?
c) What is the difference between cycle and loop of a graph?
d) Compare recursion and iteration in terms of execution time.
e) The initial configuration of a queue is A, B, C, D where 'A' is in front end. How many minimum number of deletion and insertion one needs to get the configuration D,C,B,A?
f) How stack can behave as priority queue? Give brief explanation.

[(2+2)+(1+2)+2+2+2+2]

2. a) Evaluate the following postfix expression:
6 2 3 + - 3 8 2 / + * 2 \$ 3 +
b) Write pseudo code for the above problem using stack.
c) Show all the intermediate values in stack for the evaluation. Explain each step.

[2+6+2]

3. Write the following functions for doubly linked list :
a) insert right (for inserting a node at right)
b) delete left (for deleting a node from left)

[5+5]

4. a) Write the function of link list implementation of DEQUE for queue.
b) Identify the portion of the function which is different from POP operation of stack implemented by link list.

[6+4]

5. Write short notes on the following:
a) Dijkstra's shortest path algorithm
b) Linear lists

[5+5]

Second Half

Answer any FIVE Questions

6. What are pre-conditions for Binary Search? Write an algorithm for Binary Search. [2+5]
7. Define: Worst case time complexity and average case time complexity. Show that average case time complexity of sequential search in an ordered list is $n/2$ assuming that there is 50:50 chance that the element sought is in the list of size n . [2+5]
8. Prove that: a) Any function is Big O of itself. b) Big O is transitive. c) All logs grow at the same rate. [2+3+2]
9. Write algorithms for: a) Selection Sort. b) Insertion Sort. [3.5x2]
10. Consider the following keys: 941, 50, 788, 294, 548, 285, 91, 465, 744, 918, 440. Show the working of Radix Sort with these keys. Obtain time complexity of Radix Sort. [5+2]
11. a) Consider the following keys: 45, 58, 97, 32, 12, 65, 23, 43. Show the working of the partitioning algorithm of Quick Sort to place the first key in its proper position.
b) Derive time complexity of Merge Sort. [3.5x2]
12. a) Consider the following keys: MANAB, KAMAL, AMAL, BIMAL, VIMAL, NIRMAL, RAJIB, ASHOK. Construct a Binary Search Tree with these keys. Traverse the resulting BST in preorder, inorder and postorder. Delete the key MANAB from the BST and draw the resulting BST.
b) What do you mean by a pivot node? [(1+3+1)+2]
13. Breadth First Traversal of an almost complete binary tree is: J,G,U,Y,K,B,I,R,S. Draw the tree. Write an algorithm for Breadth First Traversal of a binary tree. [2+5]
14. Define: Priority Queue, Heap. Write appropriate algorithm for deletion from a priority queue that is implemented using a heap. [2+5]