

Total No. of printed pages = 6

CS 131305 OR

Roll No. of candidate

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2019

B.Tech. (CSE) 3rd Semester End-Term Examination

DATA STRUCTURE AND ALGORITHMS

(Old Regulation)

Full Marks – 100

Time – Three hours

The figures in the margin indicate full marks
for the questions.

Answer Question No. 1 and any *six* from the rest.

1. Answer the following questions : (1 × 10 = 10)
 - (i) Define the term Algorithm.
 - (ii) Why we need data structure?
 - (iii) What is the condition of stack overflow?
 - (iv) What is the expression tree?
 - (v) The number of edges from the node to the deepest leaf is called _____ of the tree.

[Turn over

- (vi) What structure is known as FIFO and why?
- (vii) The Ω notation in asymptotic evaluation represents _____
- (viii) What is the 'next' field of structure node in the Link list?
- (ix) The height of a BST is given as h . Consider the height of the tree as the no. of edges in the longest path from root to the leaf. The maximum no. of nodes possible in the tree is _____
- (x) The no. of external nodes in a full binary tree with n internal nodes is _____

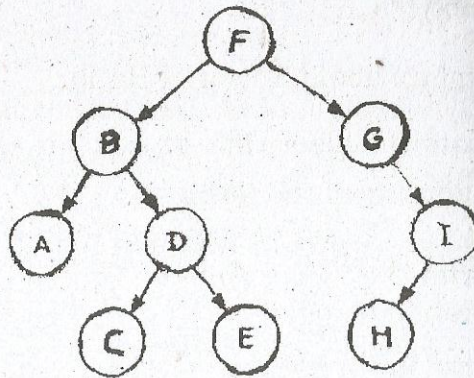
2. (a) What are characteristics of good algorithm?
(3 + 3 + 6 + 3)
- (b) What do you mean by time space trade off?
- (c) Write the Algorithm for sum of n numbers and find its complexity in terms of Big Oh.
- (d) Prove that $f(n) = n^2 + 2n = O(n^2)$.
3. (a) Given an empty stack, after performing push (i) push (ii) Pop, push (iii) push (iv) Pop, Pop, push (v) pop, what is the value of the top of the stack? Draw the diagram.

- (b) What is the value of the postfix expression?
 $F = a + b * c / d$ (where $a = 8$, $b = 4$, $c = 2$ and $d = 8$)
- (c) Explain about Tower of Hanoi.
- (d) Write an algorithm to add an element at the beginning of the link list. (4 + 4 + 3 + 4)
4. (a) Write the algorithm for queue insertion and deletion using array. (4 + 3 + 2 + 6)
- (b) What are the types of queue? Explain.
- (c) What is the advantage of circular queue over linear queue?
- (d) Draw the queue structure in each case of linear queue size 6.

- (i) Add A, B, C, D, E and F
- (ii) Delete two letters
- (iii) Add G
- (iv) Add H
- (v) Delete four letters
- (vi) Add I

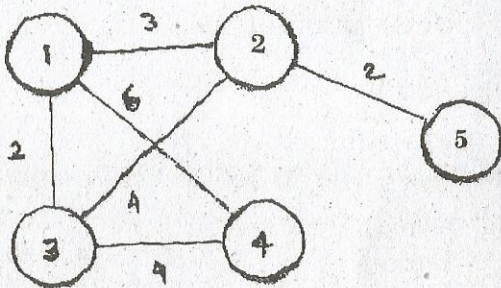
5. (a) Define the following term with diagram.
(6 + 6 + 3)
- (i) Forest
- (ii) BST
- (iii) Expression Tree.

- (b) Find the Preorder, Post order and In order for the following tree.

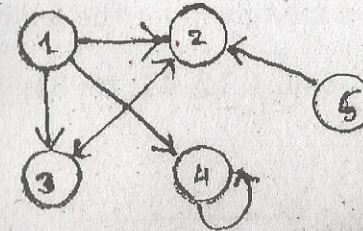


- (c) Draw the binary expression tree that represent following postfix expression AB+C*D-

6. (a) What do you mean by Max Heap and Min Heap? (3 + 5 + 7)
- (b) Construct a BST from the following elements
2, 3, 4, 1, 11, 9, 8, 7, 24, 51
- (c) Find the MST using Kruskal's or Prim Algorithm (Step by Step)

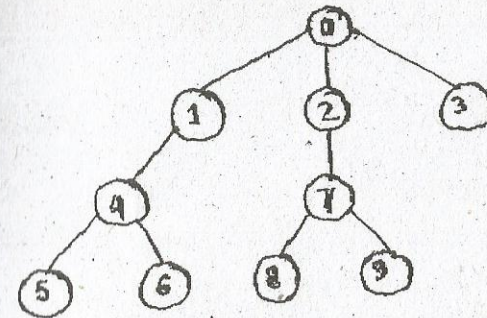


- (a) Explain the logic of binary search with an example. (4 + 3 + 4 + 4)
- (b) Define the adjacency matrix for the following graph.



- (c) Write the algorithm for linear search.
- (d) Consider the following element and construct the AVL.
8, 3, 12, 10, 7, 9, 2, 1

- (a) Explain the BFS algorithm for the following example. (8 + 4 + 3)



- (b) Explain about 4 queen problem.
- (c) Explain about B tree with an example.

9. (a) Write the algorithm for bubble sort. (5 + 5 + 5)
- (b) Sort the following list of element using merge sort.
1, 2, 3, 8, 3, 12, 10, 7, 9, 2, 1.
- (c) Construct max heap for the following elements
1, 2, 3, 7, 8, 6, 4, 12, 41, 26, 31.
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