Aliah University

End Semester Examination(Autumn Semester) 2020

(For 2nd Year 3rd Semester B.Tech(CSE))

Paper Name: Data Structures and Algorithms **Full Marks:80**

Paper Code:CSEUGPC01 **Time:3 hours**

Group A

(Answer all questions) **5X2=10**

1. What is an Abstract Data Type? Give an example.
2. What are the applications of stack and queue?
3. Distinguish between a linear and nonlinear data structure.
4. Compare and Contrast Greedy Algorithm and Dynamic Programming.
5. What is the disadvantage of a single linked list? How can it be solved?

Group B

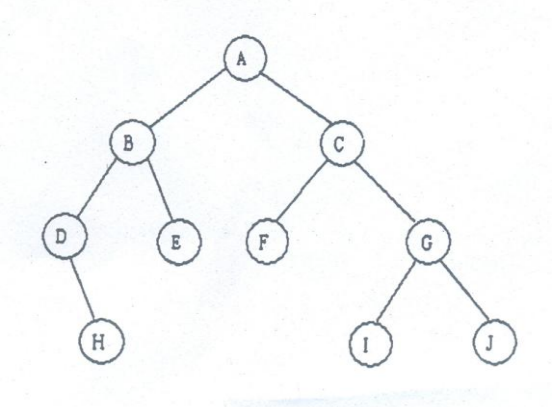
(Answer any 5 questions) **6X5=30**

1. i) Prove that the maximum number of nodes on level i of a binary tree is 2^i (i>=0).
   ii) Prove that the maximum number of nodes in a binary tree of depth k is $2^k - 1$.

2. An initial array is given as 25 57 48 37 12 92 86 33.Perform Quick Sort procedure and produce the array in an ordered form.

3.Write an algorithm to reverse the direction of all the links of a single linked list.

4. i) Trace the given tree using Inorder,Preorder and Postorder Traversals.



ii) Write an algorithm to traverse a tree using Preorder.

5.Consider the following infix expression:

A+B*(C+D)/F+D*E

Convert the above expression in postfix form using stack.

6. Write the binary search algorithm and give its time complexity.

Group C

(Answer any 4 questions) **(4X10=40)**

1.Write algorithms for inserting an element into a circular queue and deleting an element from a circular queue. (5+5)

2. What are the drawbacks of using sequential storage to represent stacks and queues? Describe the linked representation of stacks and queues. Write an algorithm for PUSH operation on stack using linked list. (3+4+4)

3. i) Given the input: {4371,1323,6173,4199,4344,9679,1989} and a hash function h(x)=x mod 10 show the resulting:

a) Separate Chaining hash table

b) Open Addressing Hash table using Linear Probing.

c) Open Addressing Hash Table using Quadratic Probing.

ii) What are the properties of good hash function? (9+1)

4. Suppose the following eight numbers are inserted in order into an empty binary search tree T : 50, 33, 44, 22, 77, 35, 60, 40. Draw the tree T. Formulate an algorithm to insert an element in a Binary Search Tree. (3+7)

5. Write short notes on: (2.5X4)

i) AVL trees

ii) Divide and Conquer

iii) Recursion

iv) Memory representation of a 2D array.