

2022

COMPUTER SCIENCE**[Honours]****(B.Sc. Second Semester End Examination-2022)****PAPER-C4T****[Data Structure]****Full Marks:40****Time: 02 Hrs**

*The figures in the right hand margin indicate marks
Candidates are required to give their answers in their own words as
far as practicable*

Illustrate the answers wherever necessary

Group A**1) Answer any five questions:****5x2 = 10**

- Can we apply binary search on any array?
- Why can't we refer stack as first-in-last-out data structure?
- Given an input array which is sorted in ascending order, out of insertion sort and selection sort techniques, which one will take higher time to sort this array in ascending order?
- Consider the following binary tree given in figure 1. Does this tree satisfies binary search tree property?

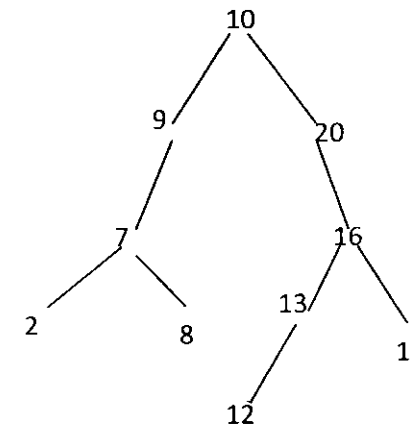


Fig. A binary tree

(2)

- e. Find the prefix expression of the arithmetic expression $a \times (b + c) \div d$
- f. Write down the difference between Binary Tree and Threaded Binary tree”.
- g. How do you build a queue using two stacks?

Group B

Answer any Four Questions:

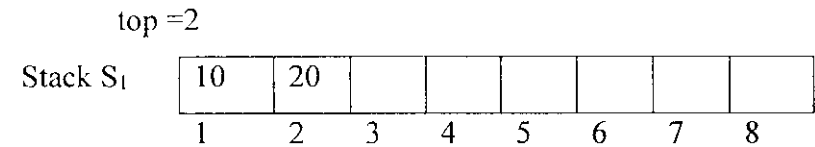
4x5 = 20

2. Write the recursive algorithm of binary search.
3. Consider the array given in below. Suppose, you are running insertion sort algorithm to sort this array in ascending order. Show the content of array after execution of every iteration of outer loop.

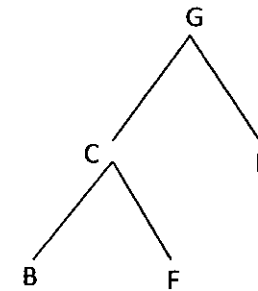
7	27	19	27	72	15	20	72	17
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4. Suppose, you are given a stack with content as shown below. Show the content of stack separately after each of the following operations:
 - a. *Push (23)*
 - b. *pop ()*
 - c. *pop ()*
 - d. *pop ()*
 - e. *pop ()*
 - f. *push (17)*

(3)



5. Write an algorithm to count number nodes present in a singly linked list.
6. Consider the binary tree shown below. Write the sequence of tree nodes visited in post order traversal.



7. Explain different types of hashing techniques. What is collision in data structure?

Group C

Answer any One Question:

1x10 = 10

8. a) Write the recursive algorithm of in-order traversal of binary tree.
- b) How does depth of a node and height of the same node differ? Illustrate by one example.
- c) What is double-ended queue?

(4)

9. a) The in-order and post-order traversals of a binary search tree are given below:

In-order Traversal: 2,7,9,10,12,13,15,16,20

Pre-order Traversal: 10,7,2,9,16,13,12,15,20

Using this information, construct the corresponding BST.

b) What do you mean by doubly linked list?

c) What is the need of using circular queue?
