Question Paper

Exam Date & Time: 29-Jul-2022 (02:00 PM - 05:00 PM)

MANIPAL ACADEMY OF HIGHER EDUCATION

FOURTH SEMESTER B.TECH MAKEUP EXAMINATIONS, JULY 2022

FUNDAMENTALS OF DATA STRUCTURES AND ALGORITHMS [ICT 4303]

Marks: 50 **Duration: 180 mins.**

Instructions to Candidates: Answer ALL questions Missing data may be suitably assumed

1) Consider the min heap given in FigureQ1.A Show the steps when (5)

A)
- a new element 5 is inserted.
- On the newly formed heap, element 15 is deleted.

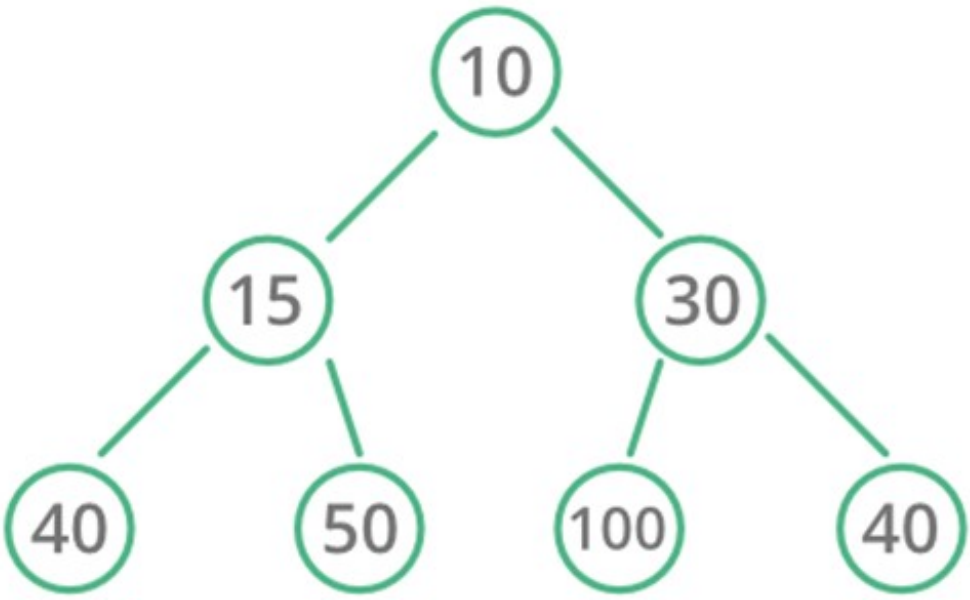

Figure Q1.A.

Draw the graph for each phase.

B) For a complete undirected graph having 3 nodes, find all the spanning trees possible. (3)

C) Write a C++ code snippet to count the number of even numbers in an array. (2)

2) Write a code snippet which inserts an element at the end and removes the first element in a singly linked list. (5)

A)

B) Write an algorithm to find any given element in an array of numbers using linear search technique. What is the time complexity of this search? (3)

C) What are the different types of data structures? Give examples and justify why they belong to a particular category. (2)

3) For the given sequence of numbers, apply quick sort technique to sort the numbers in an ascending order.Sequence: 18, 11, 12, 6, 36, 27 (5)

A)

B) Write the steps involved in the insertion and deletion of an element in the queue. (3)

C) What is the minimum number of nodes that a binary tree can have? Justify the statement with an example. (2)

4) For the graph given in Figure Q4.A, show the traversal of the graph by Breadth First Search. Show the steps of your work clearly. (5)

A)

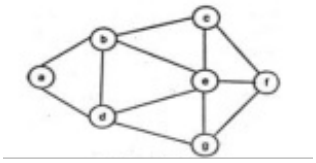

Figure Q4.A.

B) Explain how a stack can be implemented using singly linked list? (3)

C) What two criteria should be taken into consideration for selecting an appropriate data structure to implement any algorithm? (2)

5) Evaluate the given expression using stack data structure. Expression: a+b-c*d. Show the stack contents at each step. (5)

A)

B) Traverse the tree given in Figure Q5.B using preorder tree traversal technique. (3)

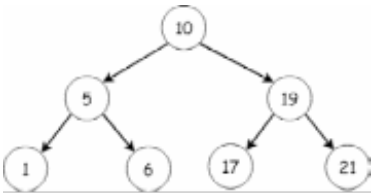

Figure Q5.B

C) Explain circular queue as an abstract data type. (2)

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