

Code: 19CS3304, 19IT3303

II B.Tech - I Semester – Regular Examinations – MARCH 2021**DATA STRUCTURES**
(Common for CSE & IT)

Duration: 3 hours

Max. Marks: 70

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- Note: 1. This question paper contains two Parts A and B.
 2. Part-A contains 5 short answer questions. Each Question carries 2 Marks.
 3. Part-B contains 5 essay questions with an internal choice from each unit. Each question carries 12 marks.
 4. All parts of Question paper must be answered in one place
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PART – A

1. a) What is an algorithm? Write the characteristics of an algorithm.
- b) What is the necessity of linked lists?
- c) What are the applications of Queue?
- d) When a tree is said to be a complete binary tree?
- e) Define Graph? Give an example.

PART – B**UNIT – I**

2. a) What is Time complexity? What are the different ways to evaluate the time complexity of an algorithm? Explain with an example. 6 M
- b) Solve the following recurrence relation for the towers of honai problem 6 M

$$T(N) = 0, \text{ if } N=0$$

$$= 2 T(N-1) + 1, \text{ if } N>0$$

OR

3. a) Apply binary Search for the following set of elements. 6 M
10,20,30,35,40,45,50,55,60.
- b) Apply the merge sort algorithm for the following list of 6 M
elements to arrange them in ascending order or
descending order. {55, 7, 99, 990,45, 69, 78, 87,107}

UNIT – II

4. a) Define linked list? Explain how the memory allocation 6 M
and garbage collection is done for linked lists?
- b) Write the algorithm to delete a node from front end in 6 M
single linked list.

OR

5. a) What is circular linked list? What are the advantages of 6 M
circular linked list compared to single linked list?
- b) Write the algorithms to insert a node at front and rear 6 M
ends into circular linked list?

UNIT-III

6. a) What is queue data structure? Explain the operations of 6 M
queue?
- b) What is circular Queue? Explain the different 6 M
operations on circular queue?

OR

7. a) Write the steps to convert infix to prefix expression? 6 M

- b) Convert the following infix expression into prefix expression 6 M
 $(a - (b / (c * (d - e))))$

UNIT – IV

8. a) What is binary tree? Explain the properties of binary tree? 6 M
b) Write the preorder and post order traversal algorithms of a binary tree. 6 M

OR

9. a) Write and explain an algorithm to delete a node from BST? 6 M
b) Construct the BST for the given values 6 M
34,5,65,33,677,33,553,22,7,4 and 69. Reconstruct the same after deleting the Root node.

UNIT – V

10. a) Write a short note on the following with example 6 M
i) Directed Graph
ii) multi graph
iii) Connected Graph
iv) Cycle of graph
b) Explain the different ways to represent graphs? 6 M

OR

11. a) Write and Explain the BFS algorithm of a graph. 6 M
b) What is minimum cost spanning tree? Write the Prims algorithm for it. 6 M