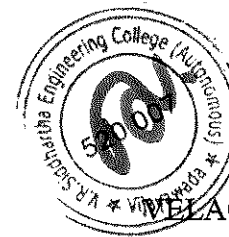


**VR20**



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**MELAGAPUDI RAMAKRISHNA**  
**SIDDHARTHA ENGINEERING COLLEGE**  
(AUTONOMOUS)

II/IV B.Tech. DEGREE EXAMINATION, JANUARY, 2023  
Third Semester

**INFORMATION TECHNOLOGY**

**20IT3303 DATA STRUCTURES**

*Time: 3 hours*

*Max. Marks: 70*

*Part-A is compulsory*

*Answer One Question from each Unit of Part - B*

*Answer to any single question or its part shall be written at one place only*

**PART-A**

10 x 1 = 10M

1. a. What is Algorithm? (CO1 K1)
- b. Distinguish between Linear array and Linked Lists. (CO2 K2)
- c. What are the applications of queues? (CO1 K1)
- d. What are the relationships between linear and non-linear data structure? (CO2 K1)
- e. List any four applications of stack. (CO2 K1)
- f. write the properties of binary tree? (CO3 K1)
- g. List out few of the Applications of tree data-structure. (CO3 K1)
- h. What is AVL Tree? (CO3 K1)
- i. Show the structure property of heap. (CO4 K2)
- j. Construct open addressing in hash function. (CO4 K2)



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**PART-B**

**4 x 15 = 60M**

**UNIT-I**

2. a. Explain in details about Linear search algorithm. Discuss its time complexity. **(CO2 K2) 8M**
- b. Survey which is the best algorithm to sort a linked list and discuss time complexity. **(CO2 K4) 7M**
- (or)
3. a. Apply the principle of stack in a real life example is a stack of plates and explain. **(CO2 K3) 5M**
- b. Write an algorithm to convert infix to postfix expression. Apply the algorithm and shows the contents of stack during conversion for the expression :  $(A + B) * C - (D - E) * (F + G)$ . **(CO2 K3) 10M**

**UNIT-II**

4. a. Given an list 10,20,30,40 generalize the steps to delete a node from the beginning of the linked list, deletion of last node in a deletion of middle node in a list. **(CO2 K3) 8M**
- b. Explain the addition and deletion operations performed on a circular queue with necessary algorithms. **(CO2 K1) 7M**
- (or)
5. a. Demonstrate the operation of stack in data structure. **(CO2 K2) 5M**
- b. Describe the algorithm to insert, delete operations in double linked list. **(CO2 K2) 10M**

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**UNIT-III**

6. a. Construct an expression tree for the expression  $(a+b*c) + ((d*e+f)*g)$ . Give the outputs when you apply inorder, preorder and postorder traversals. **(CO3 K6) 10M**
- b. Explain an algorithm to insert a node into a binary search tree. **(CO3 K2) 5M**
- (or)
7. a. Describe an algorithm to delete a node from a binary search tree. **(CO3 K2) 8M**
- b. Explain AVL tree rotation operations with suitable example. **(CO3 K2) 7M**

**UNIT-IV**

8. a. Explain various Hash functions. **(CO4 K2) 5M**
- b. Demonstrate heap sort processes the input 142, 543, 123, 65, 453, 879, 579, 434, 111, 242, 811, 102 **(CO4 K2) 10M**
- (or)
9. a. Solve the following keys in to a B-Tree of order 3 and draw the final tree: 10, 24, 23, 11, 31, 16, 26, 36, 29, 20, 46, 28, 13, 27, 33 and 21. **(CO4 K3) 10M**
- b. Illustrate heap sort algorithm. **(CO4 K2) 5M**

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