

VR20



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VELAGAPUDI RAMAKRISHNA
SIDDHARTHA ENGINEERING COLLEGE
(AUTONOMOUS)

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

AI&DS

20AI&DS3305 DATA STRUCTURES & ALGORITHMS

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 the time complexity of insertion sort in the worst case? (CO1 K1)
- b. Write the logic for binary search. (CO1 K1)
- c. List the applications of circular queue. (CO2 K1)
- d. How to create stack using arrays? (CO2 K1)
- e. What are binary tree traversals? (CO3 K1)
- f. Define complete binary tree. (CO3 K1)
- g. What is a graph? How is it represented? (CO4 K1)
- h. Differentiate between BFS and DFS. (CO4 K2)
- i. What is hashing? (CO4 K1)
- j. Differentiate between linear and binary search methods. (CO3 K2)



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PART-B

4 x 15 = 60M

UNIT-I

2. a. Sort the following list of elements by using Quick sort, show the contents of the list at the end of each pass. {75, 10, 20, 70, 80, 90, 100, 40, 30, 50}. **(CO1 K3) 8M**

- b. What is a stack? Explain all the primitive operations performed on a stack. **(CO1 K2) 7M**

(or)

3. a. Convert the following infix expression into postfix form $a+b*c-e/f$. **(CO1 K3) 8M**

- b. Describe the asymptotic notations with an example. **(CO1 K2) 7M**

UNIT-II

4. a. Define circular linked list. Illustrate various operations that can be performed on a circular linked list. **(CO2 K1) 8M**

- b. Write a program to implement stack using linked list. **(CO2 K3) 7M**

(or)

5. a. Write an algorithm to insert and delete elements in singly linked list. **(CO2 K4) 8M**

- b. What is queue? Explain the operations of queue with an example. **(CO2 K2) 7M**

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UNIT-III

6. a. Explain how insertion and deletion can be performed in a Max Heap with example. **(CO3 K2) 8M**
b. Construct the binary search tree for the following data
25, 30, 10, 9, 62, 5, 18, 43, 53 **(CO3 K3) 7M**

(or)

7. a. Sort the following list of elements using heap sort
35, 48, 20, 80, 22, 36, 100, 5, 15 **(CO3 K2) 8M**
b. Write an algorithm to construct expression tree. **(CO3 K2) 7M**

UNIT-IV

8. a. Insert the following elements into a hash table of size 10.
30, 45, 28, 65, 26, 77, 40, 11.
Resolve collisions also. **(CO4 K3) 8M**

- b. Explain any one graph traversal technique with an example. **(CO4 K2) 7M**

(or)

9. a. Write about various hash functions with examples. **(CO4 K2) 8M**
b. Explain with an example the adjacency matrix representation of a graph also mention its complexities. **(CO4 K3) 7M**

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