(or)

9. a. Compare closed and open Hashing techniques. **(CO4 K2) 8M**

b. Consider a hash table with 7 positions and a hash function h(X)=X mod 7. Keys are inserted in the following order: 8,9,1, 6, and 2.
i) Draw the resultant hash table(Use hashing with linear probing).
ii) How many positions will be probed (i.e. Compared with the given key) in order to find the key 2 in the table? Specify the positions probed.
(CO4 K3) 7M

* * *

Reg. No: | | | | | | | | | | |

VELAGAPUDI RAMAKRISHNA

SIDDHARTHA ENGINEERING COLLEGE

(AUTONOMOUS)

II/IV B.Tech. DEGREE EXAMINATION, DECEMBER - 2023

Third Semester

AI&DS

20AI&DS3305 DATA STRUCTURES AND 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. Define Big O notation. **(CO1 K1)**

b. What happens when you pop an empty stack? **(CO1 K2)**

c. Find the time complexity of inserting a node at the beginning of a linked list with 'N' elements. **(CO2 K2)**

d. List QueueADT operations. **(CO2 K1)**

e. Show the logical representation of linked list queue. **(CO2 K1)**

f. Define a leaf node in tree. **(CO3 K1)**

g. What is the height of a complete binary tree with 'N' nodes? **(CO3 K2)**

h. Distinguish between a min-heap and a max-heap. **(CO3 K2)**

i. Define the term "degree" of a vertex in a graph. **(CO4 K1)**

j. What is the role of a hash function in a hash table? **(CO4 K2)**

PART-B

4 x 15 = 60M

UNIT-I

2. a. Explain linear search algorithm with suitable example. **(CO1 K2) 8M**

   b. Analyze the time complexity of linear search in the best-case, worst-case, and average-case scenarios. **(CO1 K3) 7M**

(or)

3. a. Explain the implementation of Stack ADT with pseudocode. **(CO1 K2) 8M**

   b. Apply Stack data structure to convert the following infix expression into postfix expression.
   Infix Expression: (5 + 2) * 4 - 3 **(CO1 K3) 7M**

UNIT-II

4. a. Explain the operations of a singly linked list and write suitable pseudocode for each operation. **(CO2 K2) 8M**

   b. Compare singly linked list and doubly linked list. **(CO2 K2) 7M**

(or)

5. a. Explain the operations of Circular Queue with pseudocode. **(CO2 K2) 8M**

   b. Examine the advantages of circular queue compared to linear queue. **(CO2 K2) 7M**

UNIT-III

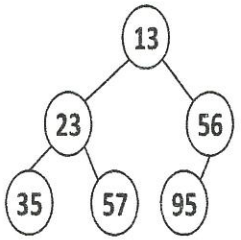
6. a. Build a Binary search tree by inserting the following numbers in the given order.Also, determine the height of the constructed tree.40,30,50,45,25,10,5,15,60 and 20. **(CO3 K3) 8M**

   b. Explain the three types of Binary Tree traversals. **(CO3 K2) 7M**

(or)

7. a. Write an algorithm for the Heapify operation and analyze its time complexity. **(CO3 K2) 8M**

   b. Insert the values 14 and 5 into the given Min Heap and show the resulting heap after each insertion. **(CO3 K3) 7M**



UNIT-IV

8. a. Explain the Breadth-First Search (BFS) traversal algorithm. **(CO4 K2) 8M**

   b. Illustrate the step-by-step process of performing BFS traversal on the following graph. Consider the starting node of the graph is 0. **(CO4 K3) 7M**