# M. Tech Odd Semester Examination, February, 2023

## Computer Science & Engineering

(1st Semester)

Course No.: MCSE-102

**(Advanced Data Structures)**

*Full Marks: 70*

*Pass Marks: 28*

*Time: 3 hours*

**Note:**
1. Attempt 05 (Five) questions by taking one form each unit.
2. Begin each answer in a new page.
3. Answer parts of a question at a place.
4. Assume reasonable data wherever required.
5. The figures in the right margin indicate full marks for the question.

### UNIT-III

1. What is hashing function? Describe various hashing functions with examples. 2+12=14

2. What is hash collision? Discuss the different collision resolution techniques in hashing with examples. 2+12=14

### UNIT-II

3. (a) What is data structure? Write down the difference between linear and non-linear data structures. 1+2=3

   (b) What is a linked list? How to insert a new node in a linked list? Explain all the cases and also write an algorithm for the same. 2+9=11

4. (a) Write an algorithm for adding a node in a queue. 4

(b) Explain with an example the procedure for conversion of infix to prefix expression. Also, write an algorithm for the same. 10

**UNIT-III**

5. (a) Explain with an example how a deletion operation is performed in Binary Search Tree. Also, write an algorithm for the same. 9

(b) Construct an AVL tree having the following elements

H, I, J, B, A, E, C, F, D, G, K, L

6

6. Write down the properties of Red Black Tree. Write the algorithm for insertion operation in Red Black Tree. Create a Red Black Tree by inserting the following sequence of number

8, 18, 5, 15, 17, 25, 40, 80 3+6+5=14

**UNIT-IV**

7. A file contains the following characters with the frequencies as shown. If Huffman Coding is used for data compression, determine-

a) Huffman Code for each character

b) Average code length

c) Length of Huffman encoded message (in bits)

4+5+5=14

| Characters | Frequencies |
|---|---|
| a | 10 |
| e | 15 |
| i | 12 |
| o | 3 |
| u | 4 |
| s | 13 |
| t | 1 |

8. Explain the Longest Common Subsequence problem with an example. Also, write an algorithm for the same. (14)

**UNIT-V**

9. Explain with a suitable example the working principle of merge sort. Also, write an algorithm for the same. 14

10. (a) Sort the following array in ascending order using quick sort algorithm. 6

| | | | | | |
|---|---|---|---|---|---|
| 25 | 10 | 30 | 15 | 20 | 28 |

(b) Write the algorithm for binary search and explain it with a suitable example. 8

****