Roll No……..….. **Total No. of Printed Pages: 1**
Total No. of Questions: [11]

M. Tech CSE (Semester – 1st)
ADVANCED DATA STRUCTURES
Subject Code: MCSES1102
Paper ID: [23190202]

Time: 03 Hours **Maximum Marks: 60**

Instruction for candidates:

1. Section A is compulsory. It carries 16 marks. It consists of 4 questions of 4 marks each.
2. Section B consist of 4 questions of 8 marks each. The student has to attempt any 3 questions out of it.
3. Section C consist of 3 questions of 10 marks each. The student has to attempt any 2 questions.

Section – A **(4 marks each)**

Q1. Explain abstract data type.
Q2. Explain in detail splay tree with an example and diagram.
Q3. What are the different types of string operations, explain in detail.
Q4. What are the recent trends on hashing techniques?

Section – B **(8 marks each)**

Q5. Explain rehashing and extendible hashing techniques in detail with an example.
Q6. Write an algorithm for Huffman coding and the complexity of Huffman coding
Q7. Given the Post-order and In-Order traversals, construct the Binary tree. Write the steps clearly for construction.
Post-Order: 18 26 34 42 30 15 10
In-Order: 18 10 30 15 42 26 34.
Q8. Differentiate between one dimensional range searching and two dimensional range searching.

Section – C **(10 marks each)**

Q9. List the operations, rotations, and applications of an AVL tree. Explain step-by-step construction of the AVL tree for the given sequence 21, 26, 30, 9, 4, 14, 28, 18, 15, 10, 2, 3, 7.
Q10. Suppose a data file has the following characters and the frequencies. If huffman coding is used, calculate: Huffman Code of each character, average code length, length of Huffman encoded data

Symbol	Frequencies
A	12
B	15
C	7
D	13
E	9

Q11. The keys 12, 18, 13, 2, 3, 23, 5 and 15 are inserted into an initially empty hash table of length 10 using open addressing with hash function h(k) = k mod 10 and quadratic probing. What is the resultant hash table