Roll No…….. **Total No. of Printed Pages: [1]**
Total No. of Questions: [09]

B. Tech. (AI & Machine Learning) (Semester – 3rd)
DATA STRUCTURE & ALGORITHMS
Subject Code: BCSES1302
Paper ID: [22113103]

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

Instruction for candidates:

1. Section A is compulsory. It consists of 10 parts of two marks each.
2. Section B consist of 5 questions of 5 marks each. The student has to attempt any 4 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 **(2 marks each)**

Q1. Attempt the following:
   a. Define Graphs with the help of example.
   b. Explain space and time complexity trade off.
   c. What are the advantages of linked list over arrays?
   d. Define linear search technique with the help of example.
   e. What is hashing?
   f. Define AVL Trees.
   g. Difference between BFS and DFS traversal techniques.
   h. What are the applications of stack?
   i. Define priority queues.
   j. What is garbage collection?

Section – B **(5 marks each)**

Q2. How insertion and deletion operations are performed on singly linked list. Explain it with the help of an example.
Q3. Write an algorithm to perform bubble sort. Discuss it briefly with the help of an example.
Q4. Explain the different asymptotic notations in data structure along with their graphs.
Q5. What are the different operations performed on stack?
Q6. Write an algorithm to perform Breadth first search (BFS) on graphs.

Section – C **(10 marks each)**

Q7. Briefly explain Preorder, Inorder and Postorder tree traversal on binary tree with the help of an example.
Q8. Define queues. What are the different operations that can be performed on queues?
Q9. Write an algorithm to implement merge sort. Also sort the below elements in increasing order using merge sort
   15, 10, 17, 20, 25, 30, 16, 70, 6, 42