PART – A

Answer all questions:
1. Define algorithm. What are the features of an efficient algorithm?
2. Explain the importance of dynamic programming.
3. Define non-linear data structure. Briefly explain the advantages of the same.
4. Define complete binary tree.
5. What is a graph? Distinguish between simple and weighted graphs.
6. What are the two main classifications of sorting based on the source of data?
7. What is Garbage collection?
8. Explain the various applications of Depth First Search.
9. Write the postfix form of the expression \(-A+B-C/D\)?
10. What is a circular queue? How do you test for an empty queue? (10x4=40 Marks)

PART – B

Answer any one from each Module:

Module – I

11. a) Write an algorithm to check whether the given expression contains balanced parenthesis or not.
   b) Write an algorithm to create a stack and perform push and pop operations in it.

OR

P.T.O.
12. a) Write an algorithm for insertion and deletion operation in a circular queue. 10
   b) Write a discussion on applications of queues with examples. 10

   **Module – II**

13. a) Write an algorithm to convert infix to prefix expression and explain it with an example. 10
   b) Define a binary tree. Explain with suitable examples. 10

   OR

14. a) Explain the boundary tag method. 14
   b) What are a full and complete binary tree? Explain with examples. 6

   **Module – III**

15. a) State and explain the algorithm to perform merge sort. Also analyze the time complexity of the algorithm. 10
   b) Write an algorithm to initialize a hash table and perform insertion in a separate chaining. 10

   OR

16. a) Explain the following with examples:
   i) Heap sort. 10
   ii) Insertion sort. 10