

Code No: G-5074/N/BL/AICTE

FACULTY OF ENGINEERING

B.E. (IT) III - Semester (AICTE) (Backlog) (New) Examination, July/ August 2025

Subject: Data Structures

Max. Marks: 70

Time: 3 Hours

Note: (i) First question is compulsory and answer any four questions from the remaining six questions. Each question carries 14 Marks.
(ii) Answer to each question must be written at one place only and in the same order as they occur in the question paper.
(iii) Missing data, if any, may be suitably assumed.

1.
 - a) Define a class in C++, and how is it related to an object?
 - b) Explain the different types of access modifiers in C++ and their uses.
 - c) Define space and time complexity of an Algorithm.
 - d) Distinguish between Binary search tree and AVL tree.
 - e) Discuss briefly about any two Hash Functions used in Hashing technique.
 - f) What is the drawback of a linear queue and how it is overcome using circular queue?
 - g) Explain briefly different polynomial representations.
2.
 - a) Discuss in detail about private, public and protected access specifiers in C++.
 - b) Define Sparse Matrix. Explain how sparse matrix is represented using an example.
3.
 - a) Write and explain the ADT for string. Discuss KMP string pattern matching algorithm with a suitable example.
 - b) Define Big Oh, Omega, and Theta Notations.
4.
 - a) Illustrate how stack is used to convert the below infix expression into its postfix equivalent $((A/B)-C)+(D*E)-(F*G)$. Show the contents of the stack in each scan of Infix expression.
 - b) Discuss about sub typing and inheritance in C++.
5.
 - a) Explain priority queues in detail. Also discuss about Min-Heap and Max-Heap with suitable Examples.
 - b) Justify how Hashing technique is efficient than linear and binary search.
6.
 - a) Explain the working of Quick sort in detail. Discuss its time complexity in best, worst and Average case scenarios.
 - b) Write Binary Search Algorithm for searching a key element in a list.