

Code: 23CS3201, 23IT3201, 23AM3201, 23DS3201

**I B.Tech - II Semester – Regular / Supplementary Examinations  
JUNE 2026****DATA STRUCTURES  
(Common for CSE, IT, AIML, DS)****Duration: 3 hours****Max. Marks: 70**

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**Note:** 1. This question paper contains two Parts A and B.

2. Part-A contains 10 short answer questions. Each Question carries 2 Marks.

3. Part-B contains 5 essay questions with an internal choice from each unit. Each Question carries 10 marks.

4. All parts of Question paper must be answered in one place.

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**BL – Blooms Level****CO – Course Outcome**

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**PART – A**

|      |                                                         | BL | CO  |
|------|---------------------------------------------------------|----|-----|
| 1.a) | Identify the key idea behind Insertion Sort.            | L2 | CO1 |
| 1.b) | Compare linear and non linear data structure.           | L2 | CO1 |
| 1.c) | Write an algorithm for traversing a singly linked list. | L2 | CO1 |
| 1.d) | List the advantage of linked list over array.           | L2 | CO1 |
| 1.e) | List the applications of stack.                         | L2 | CO1 |
| 1.f) | Explain overflow condition in stack.                    | L2 | CO1 |
| 1.g) | List the applications of queue.                         | L2 | CO1 |
| 1.h) | What is the condition for queue underflow?              | L2 | CO1 |
| 1.i) | Define collision in hashing.                            | L2 | CO1 |
| 1.j) | Explain complete binary tree with an example.           | L2 | CO1 |

## PART – B

|                |    |                                                                                                                                                      | BL | CO  | Max.<br>Marks |
|----------------|----|------------------------------------------------------------------------------------------------------------------------------------------------------|----|-----|---------------|
| <b>UNIT-I</b>  |    |                                                                                                                                                      |    |     |               |
| 2              | a) | Illustrate the Binary Search technique with an example.                                                                                              | L2 | CO2 | 5M            |
|                | b) | Demonstrate the time and space complexity analysis.                                                                                                  | L2 | CO1 | 5M            |
| <b>OR</b>      |    |                                                                                                                                                      |    |     |               |
| 3              | a) | Apply selection Sort algorithm to sort these 22,37,45,9,10,67,2 numbers in ascending order.                                                          | L3 | CO2 | 5M            |
|                | b) | What is Abstract Data Types (ADTs)? Determine the importance of Abstract Data Types.                                                                 | L2 | CO1 | 5M            |
| <b>UNIT-II</b> |    |                                                                                                                                                      |    |     |               |
| 4              | a) | Write algorithms to perform following operations on a circular singly linked list.<br>i) Delete at first<br>ii) Delete at last                       | L3 | CO3 | 5M            |
|                | b) | Write algorithms to perform following operations on singly linked list.<br>i) Insert at first<br>ii) Insert at last<br>iii) Insert at given position | L3 | CO3 | 5M            |
| <b>OR</b>      |    |                                                                                                                                                      |    |     |               |
| 5              | a) | Compare Arrays and Linked List insertion and deletion operation with an example.                                                                     | L4 | CO4 | 5M            |

|                 |    |                                                                                                                                                        |    |     |    |
|-----------------|----|--------------------------------------------------------------------------------------------------------------------------------------------------------|----|-----|----|
|                 | b) | Write algorithms to perform following operations on a doubly linked list.<br>i) Delete at first<br>ii) Delete at last<br>iii) Delete at given position | L3 | CO3 | 5M |
| <b>UNIT-III</b> |    |                                                                                                                                                        |    |     |    |
| 6               | a) | Evaluate the given postfix expression using stack <b>934*8+4/-</b>                                                                                     | L3 | CO3 | 5M |
|                 | b) | Compare stack and queue.                                                                                                                               | L4 | CO4 | 5M |
| <b>OR</b>       |    |                                                                                                                                                        |    |     |    |
| 7               | a) | Describe how stacks are used to check balanced parentheses. Explain with an example.                                                                   | L2 | CO3 | 5M |
|                 | b) | Write pseudocode for the array implementation of stack operations.                                                                                     | L3 | CO3 | 5M |
| <b>UNIT-IV</b>  |    |                                                                                                                                                        |    |     |    |
| 8               | a) | Discuss operations on Circular Queue for the following operations with an algorithm.<br>i) Enqueue operation<br>ii) Dequeue operation                  | L3 | CO3 | 5M |
|                 | b) | What is Linear Queue? Compare how linear queue and circular queue utilize memory.                                                                      | L4 | CO4 | 5M |
| <b>OR</b>       |    |                                                                                                                                                        |    |     |    |
| 9               | a) | Develop an algorithm for implementing enqueue and dequeue operations of a                                                                              | L3 | CO3 | 5M |

|               |    |                                                                                                                    |    |     |    |
|---------------|----|--------------------------------------------------------------------------------------------------------------------|----|-----|----|
|               |    | queue using linked list by checking necessary conditions.                                                          |    |     |    |
|               | b) | Develop algorithm for implementation of Queue using array for enqueue and dequeue operations.                      | L3 | CO3 | 5M |
| <b>UNIT-V</b> |    |                                                                                                                    |    |     |    |
| 10            | a) | Write an algorithm for Level Order tree traversal using iteration and give an example.                             | L3 | CO3 | 5M |
|               | b) | Construct hash table for the following keys 50,700,76,85,92,73,10 using separate chaining where $h(k)=k \bmod 7$ . | L3 | CO3 | 5M |
| <b>OR</b>     |    |                                                                                                                    |    |     |    |
| 11            | a) | Develop an algorithm for implementing the linear probing collision resolution technique and give an example.       | L3 | CO3 | 5M |
|               | b) | Construct a Binary Search Tree for the given preorder traversal sequence 22,12,8,20,30,25,40.                      | L3 | CO3 | 5M |