

SIXTH SEMESTER B.Sc. DEGREE EXAMINATION, APRIL 2026

(Regular/Improvement/Supplementary)

HONOURS IN MATHEMATICS

GMAH6B26T: DATA STRUCTURES USING C⁺⁺

Time: 3 Hours

Maximum: 80 Marks

Part A: Answer *all* the following questions. Each carries *one* mark.**Choose the Correct Answer.**

1. What is the index of the first element in a linear array?
A) 0 B) 1 C) -1 D) n
2. In a doubly linked list, each node contains:
A) A single pointer to the next node.
B) Two pointers, one for the previous node and one for the next node.
C) No pointers, only data.
D) A pointer to the head node only.
3. Which data structure is typically used for function calls in recursion?
A) Queue B) Stack C) Linked List D) Tree.
4. What is the topmost node in a tree called?
A) Leaf node B) Root node
C) Parent node D) Internal node
5. In a binary tree, each node has at most _____ children.
A) One B) Two C) Three D) Four

Fill in the Blanks.

6. The process of visiting each node in a linked list is called _____.
7. Overflow occurs when the linked list tries to allocate memory but the _____ is full.
8. _____ is referred to as the degree of a tree.
9. The two most common ways to represent graphs are _____ and _____.
10. Selection Sort selects the _____ element in each iteration and places it in its correct position.

(10 x 1 = 10 marks)**(PTO)**

Part B: Answer any *eight* questions. Each carries *two* marks.

11. How do linear and non-linear data structures differ?
12. What is meant by array?
13. Define a circular linked list.
14. What is a doubly-ended queue (Deque)?
15. What is the difference between a tree and a graph?
16. How is a binary tree represented using an array?
17. Explain the term "parent-child relationship" in trees.
18. How can graphs be represented in memory?
19. In which case is Linear Search preferred over Binary Search?
20. Comment on double hashing.

(8 x 2 = 16 marks)

Part C: Answer any *six* questions. Each carries *four* marks.

21. Write algorithms to implement various stack operations.
22. What is traversal in an array? Explain with an example.
23. Describe how a stack is represented in memory using an array and a linked list.
24. Explain, infix, prefix and postfix tree traversals with examples.
25. How is tree used in expression evaluation? Explain with an example.
26. Differentiate between DFS and BFS with respect to their applications.
27. Why is Binary Search not preferred for small datasets?
28. Compare quadratic probing and linear probing.

(6 x 4 = 24 marks)

Part D: Answer any *two* questions. Each carries *fifteen* marks.

29. a) Discuss the characteristics of Data Structures and their significance.
b) Draw memory representation of 2D array. Explain with example.
c) Write algorithm for array traversal.
30. a) Explain how searching is performed in a linked list. Compare the efficiency of searching in a linked list with that in an array.
b) Define a circular linked list. How does it differ from a singly linked list? What are its advantages and use cases?
31. a) Discuss different types of hashing functions and their role in mapping keys to indices in a hash table.
b) What are collisions in hashing? Explain different methods for collision handling, such as separate chaining and open addressing.

(2 x 15 = 30 marks)