

SIXTH SEMESTER B.Sc. DEGREE EXAMINATION, APRIL 2025

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. Which of the following is a characteristic of a good data structure?
 - a) High time complexity
 - b) Efficient memory usage
 - c) Redundant data storage
 - d) Unorganized data access
2. What is the purpose of traversal in an array?
 - a) To insert a new element
 - b) To remove an element
 - c) To access each element in the array
 - d) To sort the elements
3. Which of the following is a characteristic of a stack?
 - a) FIFO (First In First Out)
 - b) LIFO (Last In First Out)
 - c) Random Access
 - d) None of the above
4. Binary Search can only be applied to:
 - a) Unsorted arrays
 - b) Sorted arrays
 - c) Linked lists
 - d) Randomized data
5. Which of the following hashing techniques uses a secondary hash function?
 - a) Linear Probing
 - b) Quadratic Probing
 - c) Double Hashing
 - d) Chaining

Fill in the Blanks.

6. A contiguous data structure stores elements in _____ memory locations.
7. Arrays can be of different types, such as one-dimensional and _____ arrays.
8. A binary tree is a tree where each node has at most _____ children.
9. Linear Search is preferred when the dataset is _____.
10. Quick Sort partitions the array around a _____.

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

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

11. How is a stack represented in memory using an array?
12. Define sorting.
13. What is the difference between a singly linked list and a doubly linked list?
14. What are the linear and non-linear data structures? Give one example of each.
15. Define double hashing in hashing.
16. Mention any two operations that can be performed on a linked list.
17. What is the degree of a node? Explain with an example.
18. How do we find the height of a binary tree?
19. Compare one dimensional and multi-dimensional arrays.
20. Define Linear Search and Binary Search.

(8 x 2 = 16 marks)

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

21. Write DFS algorithm of graph traversal.
22. Compare singly linked lists, doubly linked lists, and circular linked lists
23. What are the advantages of a circular queue over a linear queue? Explain with an example.
24. Explain the terms degree of a node, branch, internal node, and path with examples.
25. What are the characteristics of data structures?
26. Describe the insertion and deletion operation in an array. How does it affect performance?
27. Explain how row major and column major order of representing 2D array.
28. Explain the Insertion Sort algorithm with an example

(6 x 4 = 24 marks)

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

29. a) What is a queue? Explain its operations.
b) How is a queue represented in memory? Explain with a diagram.
c) What is stack? Explain operations of stack.
30. a) Write BFS algorithm and explain operation with example.
b) Define graph. List and explain the different types of graphs.
31. a) Compare different collision handling techniques.
b) Discuss the advantages and disadvantages of hashing.

**(2 x 15 = 30
marks)**