

Mid-West University
Examinations Management Office

End Semester Examination 2081

Bachelor level/ B. Sc. (CSIT)/ 3rd Semester

Time: 3 hours

Subject: Data Structure and Algorithm (COM431)

Full Marks: 60

Pass Marks: 30

Candidates are required to give their answer in their own words as far as practicable. The figures in the margin indicate full marks.

Group A

Very short answer questions (attempt all)

[8x2 = 16]

1. What is an importance of data structure? Provide an example of an Abstract Data Type (ADT).
2. Define Big O notation and explain its significance in algorithm analysis.
3. Explain the concept of node deletion in a doubly linked list.
4. Write a C function for PUSH and POP operation in the context of a stack.
5. How can you apply divide and conquer algorithms to solve a problem?
6. What is the main operation performed in each iteration of insertion sort?
7. Define heap. List the two most important applications of heap data structure.
8. Explain quadratic probing in hashing.

Group B

Short answer questions (attempt any five)

[5x4 = 20]

9. Explain recursion with an example of the Tower of Hanoi problem.
10. How do you insert an element in a circular queue?
11. Explain Divide and Conquer algorithm with suitable example.
12. What is tree traversal? Explain in-order and pre-order traversal with examples.
13. Discuss the binary search algorithm and its advantages over sequential search.
14. Explain the insertion of a node in a Binary Search Tree (BST).

Group C

Long answer questions (attempt any three)

[3x8 = 24]

15. Write a program to implement a Doubly linked list in C++. Include functions for inserting and deleting nodes at the beginning and end of the list.
16. Explain the process of balancing an AVL tree with an example. Construct an AVL tree from the following data: 30, 20, 40, 10, 25, 35, 50.
17. Discuss Dijkstra's algorithm for finding the shortest path in a graph. Provide a detailed example to illustrate the algorithm.
18. Compare merge sort and quick sort in terms of their time complexity and partitioning strategy. Sort the following elements using merge sort: 23, 12, 1, 8, 34, 54, 2.

The End