Question Bank -1

Data Structure

Q.1. Explain the classification of data structures with examples. How do linear and non-linear data structures differ?
Q.2. Describe various types of data structures and their applications in real-world scenarios.
Q.3. Explain different types of operations performed on data structures with suitable examples.
Q.4. Discuss how insertion and deletion operations work in different data structures such as arrays, linked lists, and trees.
Q.5. Explain the concept of dynamic memory allocation. How does it differ from static memory allocation? Discuss with an example in C/C++.
Q.6. What are the functions used for dynamic memory allocation in C? Explain their working with examples.
Q.7. Explain different types of case analysis (Best Case, Worst Case, and Average Case) used in algorithm analysis with examples.
Q.8. Why is worst-case analysis often preferred in algorithm design? Provide examples where best-case and average-case analysis might be more relevant.
Q.9. Explain the step-by-step process of converting an infix expression to prefix and postfix notation with examples.
Q.10. Describe the role of the stack data structure in expression conversion. Implement a C/C++ program to convert an infix expression to postfix.
Q.11. Discuss various techniques used for efficient memory utilization in data structures. How does garbage collection help in memory management?
Q.12. Explain how linked lists can be used to manage memory efficiently compared to arrays.
Q.13. Define recursion and explain its working with an example. What are the advantages and disadvantages of recursion?
Q.14. Write a recursive function for calculating factorial and Fibonacci numbers. Explain its time complexity.
Q.15. Explain time complexity and space complexity with suitable examples. How do they impact the performance of an algorithm?
Q.16. Compare iterative and recursive approaches in terms of time and space complexity with examples.
Q.17. Define Big O notation and Theta notation. Explain how they are used in analyzing algorithm performance with examples.
Q.18. Compare and contrast Big O, Theta, and Omega notations with examples. Why is Big O notation most commonly used?