

Total No. of Questions - 9] [Total No. of Printed Pages - 3]

Dec-25-0347

CSPC-311 (Data Structure and Algorithms)

[CS, CSE, AIML, CS AIDS]

B.Tech. 3rd (NEP)

Time : 3 Hours

Max. Marks : 60

The candidates shall limit their answers precisely within the answer-book (40 pages) issued to them and no supplementary/continuation sheet will be issued.

SECTION - A

(Attempt one question)

1. (a) Define data structures. Differentiate between primitive and derived data types with examples. (6)
- (b) What is an abstract data type (ADT)? Explain its importance with one real-life example. (6)

OR

2. (a) Define algorithm. Explain the characteristics of a good algorithm with suitable examples. (6)
- (b) What is asymptotic notation? Explain Big-O, Big-Ω, and Big-Θ with examples. (6)

SECTION - B

(Attempt one question)

3. (a) Explain how a linked list is represented in memory. Differentiate between singly, doubly, and circular linked lists. (6)
- (b) What are the applications of linked lists? Give two examples with explanation. (6)

OR

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4. (a) Implement a queue of size 5 using an array. Insert the elements A, B, C, D and then delete two elements. Show the state of the queue after each operation. (6)
- (b) Convert the infix expression $(A + B) * (C - D)$ into postfix using stack operations. (6)

SECTION - C

(Attempt one question)

5. (a) Construct a binary search tree (BST) by inserting the keys: 50, 30, 70, 20, 40, 60, 80. Show the BST after each insertion. (6)
- (b) Explain heap tree with an example. Write the algorithm for heap sort. (6)

OR

6. (a) Define graphs. Explain adjacency matrix and adjacency list representation of graphs with examples. (6)
- (b) Write short notes on: (i) BFS Traversal (ii) Dijkstra's Algorithm for shortest path. (6)

SECTION - D

(Attempt one question)

7. (a) Explain linear search and binary search with suitable examples. Compare their time complexities. (6)
- (b) Explain quick sort with its algorithm and analyze its time complexity. (6)

OR

8. (a) Insert the following elements into a hash table of size 7 using the hash function $h(k) = k \bmod 7$: 10, 20, 15, 7, 32. Use linear probing for collision handling. Show the final hash table. (6)
- (b) Write short notes on: (i) Merge Sort (ii) Deletion from Hash Table. (6)

[P.T.O.]