

December 2023  
BCA- III SEMESTER  
Data Structures (BCA-17-202)

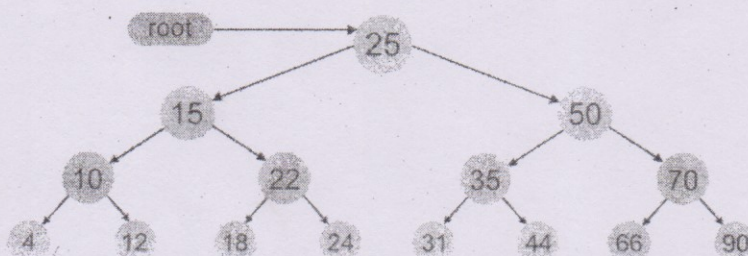
Time: 3 Hours

Max. Marks:75

- Instructions:**
1. It is compulsory to answer all the questions (1.5 marks each) of Part -A in short.
  2. Answer any four questions from Part -B in detail.
  3. Different sub-parts of a question are to be attempted adjacent to each other.

PART -A

- Q1 (a) Differentiate between data type and data structure. (1.5)
- (b) How do you compare two different algorithms? (1.5)
- (c) Compare best case, average case and worst case time complexities of linear search and binary search. (1.5)
- (d) How do you represent linear array and singly linked list in memory? (1.5)
- (e) List any three applications of a linked list. (1.5)
- (f) Compute the time complexity of the following code. (1.5)
- ```
int a = 0;
for (i = 0; i < N; i++) {
  for (j = N; j > i; j--) {
    a = a + i + j;
  }
}
```
- (g) Write an algorithm to insert an element in a given stack. (1.5)
- (h) What is priority queue? How it is different from simple queue? (1.5)
- (i) Find preorder, postorder and inorder traversal of the following tree. (1.5)

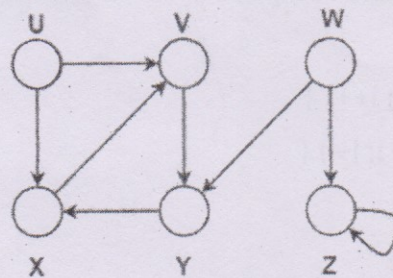


- (j) Differentiate between Breadth First Search and Depth First Search graph traversal techniques. (1.5)

PART -B

- Q2 (a) Define asymptotic notations. Explain them with suitable examples. (10)
- (b) What is time-space tradeoff? (5)

- Q3 (a) Discuss the different ways to represent string in memory. (5)  
 (b) Write pattern matching algorithm. Also analyze its complexity. (10)
- Q4 (a) Write an algorithm to insert and delete an element from arrays. (5)  
 (b) Differentiate between arrays and linked lists. Write an algorithm to insert an element at any specific position in doubly linked list. (10)
- Q5 (a) What is polish notation? Write the step-by-step procedure to convert the following infix expression to postfix expression.  $((A + B) - C * (D / E)) + F$  (10)  
 (b) Discuss the different operations on queue with their algorithms. (5)
- Q6 Write a short note on:  
 (a) Binary Search tree traversal (5)  
 (b) Representation of graph in memory (5)  
 (c) All pair shortest path algorithm (5)
- Q7 (a) Discuss Dijkstra's algorithm for shortest path. (5)  
 (b) Write an algorithm of Depth-First Search (DFS) Graph traversal technique. (10)  
 Traverse following given graph  $G(V,E)$  using DFS. (Start traversal from Vertex V).



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