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017404

May 2024

B. Tech. (EEIOT) (Fourth Semester)

Data Structures and Algorithms (EEN-403)

Time : 3 Hours] [*Maximum Marks : 75*

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

Part A

1. (a) Using addition and subtraction operator and without using temporary variable swap two numbers. **1.5**

(b) Which time complexity notation gives lower bound time complexity ? **1.5**

(c) How can we calculate the reachability of a graph ? **1.5**

(d) Arrange in order of their increasing time complexity values : Linear search, Binary Search, Insertion sort and Merge sort. **1.5**

(e) Give the condition for the queue to be full in array notation. **1.5**

(f) Differentiate between grounded and header link list. **1.5**

(g) How can we find immediate successor of a node in Binary search tree ? **1.5**

(h) Which tree is called as complete binary tree ? **1.5**

(i) Which data structure is used in BFS and DFS ? **1.5**

(j) Give *two* important properties of Heap tree. **1.5**

Part B

2. (a) Write a program to calculate sum of squares of n natural numbers using recursion. Also, explain its time complexity. **7.5**

(b) Explain various time complexity notations with the help of examples. **7.5**

3. (a) Write an algorithm to delete an element from a queue using Link List form. Also, write its time complexity. **7.5**

(b) Write an algorithm to insert an element in a stack using link list. Also, write its time complexity. **7.5**

4. What are various types of Binary Trees ? Explain using algorithm how an element is inserted in a Binary Search Trees. Also, calculate its time complexity. **15**

5. (a) Write the algorithm of deletion of a node in a graph using linked list representation. Also, write its time complexity too. **7.5**

(b) Differentiate between various file organizations in detail. **7.5**

6. (a) Explain how an element is deleted in a Circular link list. Also, calculate its time complexity. **7.5**

(b) Explain DFS algorithm for traversing a graph. **7.5**

7. Write short notes on the following : **15**

(a) Application of Sets

(b) Skip List