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Paper Code : MCAN-201 Data Structure with Python

UPID : 002518

Time Allotted : 3 Hours *Full Marks :70*

The Figures in the margin indicate full marks.
Candidate are required to give their answers in their own words as far as practicable

Group-A (Very Short Answer Type Question)

1. Answer any ten of the following : [1 x 10 = 10]

(I) What is the average time complexity of bubble sort?

(II) What is direct addressing?

(III) What is the best case time complexity of binary search?

(IV) Write the postfix form of the expression: (A + B) * (C - D)

(V) In the worst case, what is the number of comparisons needed to search a singly linked list of length n for a given element

(VI) If binary trees are represented in arrays, what formula can be used to locate a left child, if the node has an index i?

(VII) What is the difference between Stack and Queue.

(VIII) What is the time complexity to insert an element to the front of a LinkedList(head pointer given)?

(IX) What is the average case time complexity to delete an element from a binary search tree?

(X) What is the number of edges present in a complete graph having n vertices?

(XI) What is priority queue?

(XII) Let P be a singly linked list, Let Q be the pointer to an intermediate node x in the list.What is the worst-case time complexity of the best known algorithm to delete the node x from the list?

Group-B (Short Answer Type Question)

Answer any three of the following : [5 x 3 = 15]

2. What do you mean by the time complexity of an algorithm? [5]
3. Write the algorithm for the evaluation of Postfix Expression using Stack. [5]
4. Convert the following Infix Expression to Postfix using stack. (A + B) * C - (D - E) * (F + G ^ H) [5]
5. Write a Python program to implement the "Insert at End" and "Delete from End" operation of a singly Linked List using Class "Node". [5]
6. Discuss Prim's MST algorithm with an example. [5]

Group-C (Long Answer Type Question)

Answer any three of the following : [15 x 3 = 45]

7. (a) Write a python program to implement stack. [8]
   (b) Write a python program to implement queue [7]
8. (a) What is the difference between linear and non-linear data structure? [5]
   (b) Calculate the average time complexity of binary search algorithm. [6]
   (c) Write a python program to implement linear search. [4]
9. (a) What do you mean by data structure? [4]
   (b) Write a Python program to insert an item in a sorted list in the appropriate position [5]
   (c) Write a python program to implement binary search for a given list of elements which are sorted in descending order. [6]
10. (a) Write the algorithm to convert infix to postfix expression with a suitable example. [8]
    (b) Why and when should we use Stack or Queue data structures instead of Arrays/Lists? [7]
11. (a) Write a python program to implement a circular queue. [10]
    (b) Explain why Stack is a recursive data structure. [5]

*** END OF PAPER ***