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Paper Code : PCC- CS301/PCC- CSBS301/PCC-CS301/PCCCS301 Data Structure & Algorithms

UPID : 003443

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) Which type of linked list contains a pointer to the next as well as the previous node in the sequence?

(II) The time complexity of heap sort in worst case is----------

(III) The running time complexity of a linear time algorithm is given as-------

(IV) A linear list in which elements can be added or removed at either end but not in the middle is known as----------

(V) If the elements of a data structure are stored sequentially, then it is a _____.

(VI) Merge sort uses----------Technique

(VII) Where is linear searching used?

(VIII) Stack can be implemented using _____ and _____ ?

(IX) In C language, malloc( ) returns

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

(XI) _____ notation provides a tight lower bound for f(n).

(XII) Which data structures is used to implement recursion?

Group-B (Short Answer Type Question)

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

2. Make a comparison between a linked list and a linear array. [5]
3. A graph contains 21 edges, 3 vertices of degree 4 and all other vertices of degree 2. Find total number of vertices. [5]
4. Write an algorithm for bubble sort technique. [5]
5. Write algorithms for push and pop operations of stack. [5]
6. What are the properties a of b tree? What are the disadvantages of a binary search tree? [5]

Group-C (Long Answer Type Question)

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

7. (a) Explain what is ideal Sorting algorithm? [5]
   (b) Classify Sorting Algorithms based on some parameter like stability, number of swap required, number of comparison, complexity, types, etc. [10]
8. (a) Write merge sort algorithm. [7]
   (b) Implement merge sort in C code. [8]
9. (a) Define hashing. [3]
   (b) What are the different types of hashing technique explain. [6]
   (c) What are the advantages of hashing. [6]
10. (a) Explain with a suitable example the principle of operation of Quick Sort algorithm. [5]
    (b) In which cases, Quick Sort becomes a 'Slow Sort' ? discuss the remedy in those cases. [5]
    (c) Compare the performance and operation of Bubble Sort and Selection Sort. [5]
11. (a) Define recursion? Explain the usage of stack in recursive algorithm implementation? [5]
    (b) What are types of Queues? Explain each. [10]