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NCS - 301

(Following Paper ID and Roll No. to be filled in your Answer Books)

Paper ID : 2012267

Roll No.

**B.TECH**

Regular Theory Examination (Odd Sem - III), 2016-17

**DATA STRUCTURES USING 'C'**

Time : 3 Hours

Max. Marks : 100

Section - A

1. Attempt all parts. All parts carry equal marks. Write answer of each part in short. (10×2=20)
  - a) Define time complexity and space complexity of an algorithm.
  - b) What are the merits and demerits of array data structures?
  - c) How do you push elements in a linked stack?
  - d) Differential linear and non linear data structures.
  - e) What is the significance of priority queue?
  - f) Define complete binary tree. Give example.
  - g) When does a graph become tree?
  - h) Prove that the number of odd degree vertices in a connected graph should be the even.

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(1)

[P.T.O.]

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- i) What is sorting? How is sorting essential for database applications?
- j) Give the worst case and best case time complexity of binary search.

**Section - B**

**Note : Attempt any 5 questions from this section.**

**(5×10=50)**

- 2. What is recursion? Write a recursive program to find sum of digits of the given number. Also calculate the time complexity. [Ex:  $259 = 16 = 7$ (Answer)].
- 3. Solve the following:
  - a)  $((A - (B + C) * D) / (E + F))$  [Infix to postfix]
  - b)  $(A + B) + *C - (D - E) ^ F$  [Infix to prefix]
  - c)  $7\ 5\ 2 + * 4\ 1\ 5 - / -$  [Evaluate the given postfix expression]
- 4. Write a C program to implement the array representation of circular queue.
- 5. Write a C program to implement binary tree insertion, deletion with example.
- 6. Write the C program for various traversing techniques of binary tree with neat example.

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- 7. What is quick sort? Sort the given values using quick sort; present all steps/iterations :  
38, 81, 22, 48, 13, 69, 93, 14, 45, 58, 79, 72
- 8. Illustrate the importance of various traversing techniques in graph along with its application.
- 9. Compare and contrast the difference between B+ tree index files and B tree index files with an example.

**Section - C**

**Note : Attempt any 2 questions from this section.**

**(2×15=30)**

- 10. What is meant by circular linked list? Write the functions to perform the following operations in a doubly linked list.
  - a) Creation of list of nodes.
  - b) Insertion after a specified node.
  - c) Delete the node at a given position.
  - d) Sort the list according to descending order
  - e) Display from the beginning to end.
- 11. Define AVL Trees. Explain its rotation operations with example. Construct an AVL tree with the values 10 to 1 numbers into an initially empty tree.

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12. Discuss Prim's and Kruskal's algorithm. Construct minimum spanning tree for the below given graph using Prim's algorithm (Source node = a).

