[Total No. of Questions - 9] [Total No. of Printed Pages - 2]
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B. Tech 3rd Semester Examination

Data Structures and Algorithms (N.S.)

CS(IT)-211

Time : 3 Hours **Max. Marks : 100**

The candidates shall limit their answers precisely within the answer-book (40 pages) issued to them and no supplementary/continuation sheet will be issued.

Note : Attempt five questions in all, select one question from each section A, B, C and D. Section E is compulsory.

SECTION - A

1. Write an algorithm that applies a binary search method on given data and if item does not exists inserts the same item in given array? **(20)**

2. Define tridiagonal Matrix? Write an algorithm to find the sum of its elements? **(20)**

SECTION - B

3. Write an algorithm that deletes the first element of a linked list and adds same element at the end of linked list? **(20)**

4. Write an algorithm that adds an element at the end of circular header linked list? **(20)**

SECTION - C

5. Write an algorithm to search an item in a binary search tree? Discuss its complexity too. **(20)**

6. What is a m way search tree? How an element can be inserted in this tree? Explain with the help of a Diagram. **(20)**

SECTION - D

7. Explain Dijsktra algorithm to find shortest path in a graph with the help of an example. **(20)**

8. Explain the radix sort procedure to sort the following data in ascending order:

   541, 243, 342, 123, 129, 345, 543, 435, 439 **(20)**

SECTION - E

9. (i) Define time space complexity tradeoff?

   (ii) How two dimensional array are stored in memory?

   (iii) Define sparse matrices.

   (iv) Write down any two disadvantages of linked lists.

   (v) Let J, K be integers and Q (J,K) be defined by

   $$Q(J,K) = \begin{cases} 5 & \text{if } J < k \\ Q(j-K, K+2)+J & \text{if } J >= k \end{cases}$$

   Calculate Q(15,2)?

   (vi) Define Height Balanced tree?

   (vii) What could be the maximum height of a binary search tree?

   (viii) Define Hashing. Give a suitable example.

   (ix) What are the siblings?

   (x) Write any two disadvantages of sequential file organization. **(2×10=20)**