**D 30336**  (Pages : 2)

# THIRD SEMESTER B.TECH. (ENGINEERING) DEGREE EXAMINATION, DECEMBER 2008

## CS/IT 2K/PTCS 2K 302. DATA STRUCTURES AND ALGORITHMS

Time : Three Hours                                                    Maximum : 100 Marks

*Answer all the questions.*

I. (a) Differentiate between a data structure and a storage structure.

(b) Explain how algorithms are analysed.

(c) List few applications of stacks.

(d) Write the expressions to compute the address of an element A $(x, y)$ in a two dimensional array of size $m \times n$ if the array is stored in :

   (i) Row major order.

   (ii) Column major order.

(e) Define the following terms with respect to graphs :—

   (i) Adjacency matrix.

   (ii) Path.

   (iii) Graph.

(f) What are the different types of tree traversal ? Explain.

(g) Compare linear search with binary search.

(h) Formulate an algorithm to perform an insertion sort and analyse its time complexity.

(8 × 5 = 40 marks)

II. (A) (i) What are the operations that can be performed with records ? Explain with examples.

(8 marks)

(ii) What are the different types of files ? Explain.

(7 marks)

*Or*

(B) What is recursion ? What are the steps involved in any recursive procedure ? Formulate an algorithm to compute the factorial of a number N using recursion.

(15 marks)

III. (A) State and explain the algorithm to convert an infix expression to a prefix expression using stacks. Trace the algorithm for the following input :—

$$a + b * c - d/e * h.$$

(15 marks)

*Or*

(B) Implement a queue using a doubly linked list. Write algorithms to perform :

   (i) Insertion of an element into the queue.

   (ii) Deletion of an element from the queue.

(3 × 5 = 15 marks)

**Turn over**

IV. (A) With a sample graph, state and explain the algorithm to perform Breadth first traversal of the graph.

*Or*

(B) State and explain the algorithm to copy a binary tree, whose root node is pointed to by the pointer variable T.

(15 marks)

V. (A) State and explain the algorithm to perform quick sort. Trace the algorithm with an input sequence.

*Or*

(B) Discuss in brief about external sorting.

(15 marks)

[4 × 15 = 60 marks]