

**D 046**

B.E./B.Tech. DEGREE EXAMINATION, APRIL/MAY 2003.

Third Semester

Information Technology

IF 246 — DATA STRUCTURES AND ALGORITHMS

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What is time and space complexity of an algorithm?
2. Define grammar.
3. Explain the primitive string manipulation functions.
4. How do you store two dimensional array in a memory?
5. What is linked stack?
6. Explain dequeue.
7. Explain the adjacency list representation of graph.
8. Explain the selection sort algorithm with an example.
9. What is 2-3 tree?
10. What is multiple key access? Explain.

PART B — (5 × 16 = 80 marks)

11. (i) Write insertion and deletion algorithm for a linked queue. (8)
- (ii) Write recursive and non recursive algorithms for inorder traversal. (8)

12. (a) (i) Write insertion and deletion algorithm for doubly linked list. (4 + 4)  
(ii) Explain the representations of priority queue. (2 × 4)

Or

- (b) Write insertion and deletion algorithm for output restricted and input restricted dequeue. (16)
13. (a) A polynomial in three variables is represented by a linked linear list. Design an algorithm to subtract two polynomials in three variables. (16)

Or

- (b) (i) For the three dimensional array  $x$ , whose subscript limits are  $1 \leq i \leq 3, 1 \leq j \leq 3, -1 \leq k \leq 0$ . Give addressing function for the element  $x[i, j, k]$  where the storage representation is in row major order. (8)
- (ii) Write an algorithm for converting infix to postfix expression. Explain the evaluation of postfix expression. (8)
14. (a) (i) Explain the representations of binary tree. Discuss about one application of stack. (8)
- (ii) Write an algorithm to delete an element from binary tree. (8)

Or

- (b) The node of the linked list consists of an info and link, write the algorithms for the following :
- (i) Count the number of nodes in the list.
- (ii) Change the info field of the  $k^{\text{th}}$  node to the value given by  $Y$ .
- (iii) Perform an insertion to the immediate left of the  $k^{\text{th}}$  node in the list.
- (iv) Appends a linear list to another linear list. (4 × 4)

15. (a) (i) Write an algorithm to calculate the shortest distance from a start node using a breadth first search strategy. (8)
- (ii) Write the first fit storage allocation algorithm. (8)

Or

- (b) (i) Design an algorithm which perform deletion in a 2-3 tree. (8)
- (ii) Explain the processing of indexed sequential files. (8)