

Exam.Code:0930  
Sub. Code: 6231

1048

B.E. (Electronics and Communication Engineering)  
Sixth Semester

EC-604: Data Structures and Algorithms

Time allowed: 3 Hours

Max. Marks: 50

**NOTE:** Attempt five questions in all, including Question No. 1 which is compulsory and selecting two questions from each Part.

x-x-x

- Q1. (i) Distinguish between the row major and column major ordering of an array.  
(ii) Discuss the time complexity of an algorithm using 'O' notation.  
(iii) How are insert operations carried out in a stack?  
(iv) How are push and pop operations implemented on a linked stack?  
(v) Why are binary search tree retrievals more efficient than sequential list retrievals?

**Part-A**

- Q2. (a) Define an Array and explain the two operations supported by it. Discuss using suitable examples, the applications of arrays.  
(b) Analyze the behavior of the following program which computes the  $n^{\text{th}}$  Fibonacci number, for appropriate values of 'n'. Obtain frequency count of the statements for various cases of 'n'.
- Q3. (a) Write an algorithm to convert the following infix expression to postfix expression.  
 $A + B * C - D$  for  $A = 2, B = -1, C = 2$  and  $D = 3$ .  
(b) Consider a stack DEVICE [1 : 3] of peripheral devices. Perform the operation of inserting following items as PEN, PLOTTER, JOY STICK and PRINTER into DEVICE and a deletion.
- Q4. (a) What is a doubly linked list? Using suitable diagram, illustrate its logical and physical representations. Also, discuss the various operations which can be performed on it.  
(b) Write a pseudocode procedure to insert NEW\_DATA as the kth element ( $K > 1$ ) in a non-empty singly linked list, T.

**Part-B**

- Q5. (a) Make the use of the infix and postfix expressions given below to trace the corresponding expression tree: Infix:  $A + B * C / F \uparrow H$ , Postfix:  $A B C * F H \uparrow / +$   
(b) Implement the ADT of a binary tree in a language of your choice. Include the operations to  
(i) obtain the height of a binary tree (ii) list of leaf nodes
- Q6. (a) Write a procedure to explain the process of Breadth First Traversal of an undirected graph.  
(b) Delete keys 333, 891 and 416 in the order given, from the binary search tree T associated with set  $S = \{416, 891, 456, 765, 111, 654, 345, 256, 333\}$ .
- Q7. (a) What is the need of Minimum Cost Spanning Tree? Discuss its applications in detail.  
(b) Define a Hash function. Discuss using suitable examples some methods of obtaining hash functions.

x-x-x