MCA/ II Sem

Time: 1 Hour **MCA -201: Data Structures and File Processing** *Maximum Marks: 30*

Attempt all six questions.
All parts of a question must be answered together.
Marks are indicated against each question.
Read the questions carefully.

1. Convert the following infix expression to postfix expression with the help of Operator Stack.

   a+(b+c*d+e)*e/f*(g+h*i-j)+k

   You are required to show the usage of Operator Stack at each step. [1+4]

2. (a) What is tail recursion? How does it differ from non-tail recursion? [1+1]
   (b) With the help of a recursion tree, show the number of moves required to move three discs between pegs i.e. Source, Destination and Temp. (Towers of Hanoi puzzle) [3]

3. Give a node structure for class StringLinkedList. Write an Iterative member function to reverse a singly linked list, returning pointer to the first node. [1+4]

4. Difference between height and depth of a node in Binary tree. Write an algorithm / pseudo code to find the height of a binary tree. [2+3]
   (Given: the height of the root is 1)

5. Write an Iterative function for Post order traversal of a Binary Tree. Show the stack usage with the help of a full binary tree of height at least 2. [3+2]

   Or

   (a) Write the necessary steps required to construct a binary tree using Pre Order and Post Order traversal.
   (b) Construct a binary tree from following:
   Pre Order Traversal = {A,B,D,H,I,E,C,F,G}
   Post Order Traversal = {H,I,D,E,B,F,G,C,A}
   (c) Is it possible to construct unique binary tree with Pre and Post order traversals always? Justify your answer. [2+2+1]

6. Write an algorithm /pseudo code / approach for the level order traversal of a Binary Tree. Show the level order traversal with an example. [3+2]

   Or

   Can a Queue data structure be implemented using (i) array (ii) stack (iii) linked list? If yes then explain how the enqueue and dequeue operations of queue would be performed using each of them? (Mention the approach only) [1+4]