Mid Semester Examination
School of Computer Engineering
KIIT UNIVERSITY, BHUBANESWAR

Time: 2hrs   Full Mark: 25

[ANSWER ANY FIVE QUESTIONS INCLUDING Q.NO.-1]

1. Answer all the questions   [1 X 5]
   a. Define the term Data Structure and ADT with example. List any four applications of data structure.
   b. Find the time complexity of the following code snippet:

   ```
   void function(int n){
           int i,j,k;
           for(i=n/2; i<=n; i++)
                   for(j=1; j + n/2<=n; j= j++)
                           for(k=1; k<=n; k= k * 2)
                                   count++; }
   ```

   c. Compare and contrast Array ADT and Linked List ADT.
   d. Implement a stack ADT.
   e. Find the address of the element at index 65 and 93 of a two dimensional array, whose row index range from 35 to 93 and column index range from 75 to 99. The two dimensional address is stored in column major order and the base address of the matrix is 1000.

2.   [5]

   Write an algorithm to convert an infix expression into its equivalent postfix expression. Explain the execution of the algorithm using the following expression.

   $$((A + B) * C - (D - E) \wedge (F + G))$$

3.
   a) How do we represent a polynomial expression using linked list? Write a pseudo code to add two polynomial having two numbers of unknown variables.   [3]
   (e.g. : $4x^2y^3-3xy+x-5y+7$)

   ### OR

   Write a pseudo code to merge two sorted linked list.   [3]

   b) Write a pseudo code to check whether a given postfix expression is valid or not. [2]

4. [3+2]

a) Write a program to copy the elements of one stack to another stack without changing the order.

[**Note**: The program should not take the help of any additional data structures]

b) What is a sparse matrix? How do we represent a sparse matrix?

5.

a) Write a function to discard the common elements present in between two linked list from the original linked list. [3]

b) Write a pseudo code to reverse a single linked list by changing the required links. [2]

OR

Define Queue ADT. Write a program to implement insertion, deletion and traversing operation on circular queue ADT. [5]

6. [5]

Write a pseudo code to traverse a NXN 2D-array in row major order. During traversing, if the current traversed element is greater than the previously traversed element, then delete the current element and shift the remaining elements of the matrix. The last blank place should be filled with zero. The sequence of execution is shown below:

3	6	4
2	7	1
8	5	9

(I)

3	6	4
2	7	1
8	5	9

(II)

3	4	2
7	1	8
5	9	0

(III)

3	2	7
1	8	5
9	0	0

(IV)

[The elements will be traversed in row major order i.e.: 3, 6, 4, 2, 7, 1, 8, 5 and 9]

(I): Input Matrix, First element '3' is traversed.

(II): Current element traversed is '6' which is greater than previously scanned element '3'. Hence '6' is deleted and elements are shifted and finally last position is filled with zero.

(III): Current element traversed is '4' which is greater than previously scanned element '3'. Hence '4' is deleted and elements are shifted and finally last position is filled with zero.

(IV): Current element traversed is '2' which is less than previously scanned is '3'. Hence there will be no shifting of elements.

In the similar fashion, rest of the steps will be executed.