DHARMSINH DESAI UNIVERSITY, NADIAD
FACULTY OF TECHNOLOGY
B.TECH. SEMESTER IV [INFORMATION TECHNOLOGY]
SUBJECT: (IT-406) DATA STRUCTURES AND ALGORITHMS

Examination	**: First Sessional**	**Seat No.**	**:**
Date	**: 21/01/2016**	**Day**	**: Thursday**
Time	**: 11:00 to 12:15**	**Max. Marks**	**: 36**

INSTRUCTIONS:
1. Figures to the right indicate maximum marks for that question.
2. The symbols used carry their usual meanings.
3. Assume suitable data, if required & mention them clearly.
4. Draw neat sketches wherever necessary.

Q.1 Do as directed.

(a) Which of the following data structure is not linear data structure? **[1]**
1) Arrays 2) Linked lists 3) Both of the above 4) None of the above

(b) The disadvantage in using a circular linked list is ..... **[1]**
1) It is possible to get into infinite loop. 2) Last node points to first node.
3)Time consuming. 4) Requires more memory space

(c) The way in which the data item or items are logically related defines ..... **[1]**
1) storage structure 2) data structure 3) data relationship 4) data operation

(d) Arrays are best data structures **[1]**
1) for relatively permanent collections of data
2) for the size of the structure and the data in the structure are constantly changing for both of above situation
3) for none of above situation

(e) Deletion in the linked stack takes place by deleting node pointed at ..... **[1]**
1) Start of list 2) End of the list 3) Beginning of the list 4) Middle of the list

(f) Which of the following statement is false? **[1]**
1) Arrays are dense lists and static data structure.
2) Data elements in linked list need not be stored in adjacent space in memory
3) Pointers store the "next" data element of a list.
4) Linked lists are collection of the nodes that contain information part and next pointer.

(g) Which of the following is an application of stack? **[1]**
1)finding factorial 2)tower of Hanoi 3)infix to postfix 4)all of the above

(h) If the sequence of operations- **[1]**
Push(1), Push(2), Pop(), Push(1), Push(2), Pop(), Pop(), Pop(), Push(2), Pop()
are performed on a stack, the sequence of popped out values are
1) 2 1 2 2 2
2) 2 2 1 2 2
3) 2 2 1 1 2
4) 2 1 2 2 1

(i) Consider the following operations on a Linear Queue data structure that stores int values. **[2]**

```
Queue q = new Queue(5);   // takes 5 as the size of the array
q.insert (3);   q.insert (5);   q.insert (9);   cout<< q.remove( );
q.insert (2);   q.insert (4);
cout<< q.remove( );   cout<< q.remove( );
q.insert (1);   q.insert (8);
```

1. After the code above executes, how many elements would remain in queue?
   a) 1 b) 4 c) 2 d) 3
2. What value is returned by the last remove operation?
   a) 3 b) 5 c) 9 d) 2

(j) Postfix form of following infix expression is _____ **[2]**
(A + B) * (C + D - E) * F

Q.2 Attempt ***Any Two*** from the following questions. **[12]**

(a) Write an algorithm for inserting and deleting an element in circular queue. **[6]**

(b) What is tower of Hanoi problem? Discuss its solution for 3 pegs with 4 disks. **[6]**

(c) Write algorithm/pseudocode to perform following operations on doubly circular linked list: 1) insert a node in between two nodes **[6]**
2) deletion of node whose value passed in argument of a function

Q.3 **(a)** Give ADT to implement stack using linked list. Give algorithm/pseudocode for following :- 1) push 2) pop 3) infix to postfix conversion . **[1+2-2+5]**

(b) Which linked data structure is most appropriate for storing elements of "queue" Why? **[2]**

OR

Q.3 **(a)** Give ADT to store uni variate polynomial using linked list. Your ADT should provide functions for 1) Subtract two polynomials
2) display contents of polynomial
3) copy one polynomial into other.
Give algorithm/pseudocode to perform above operations **[8]**

(b) Represent following using linked list. Also clearly explain the structure of node used in the list. **[4]**
$x^5y^6z^6 + 3x^4y^6z^6 - 3x^3y^5z^3$
