Timing : 45 minutes | Attempt **all** Questions | **Marks :** 30

Question 1.

(a) Given functions confusing(int) and confused(int) are a part of some class. Answer the questions given below with dry run/working.

```
public void confusing(int n)
  {
       if(n>0)
       {
       System.out.print(n+" ");
       confusing(n-2);
       System.out.print(n+" ");
       }
  }

public String confused(int n)
  {
       if(n<=0)
       return " ";
       else
       return (confused(n-1)+n+" ");
  }
```

(i) What will be the output of the function **confusing(int)** when n=5? **[2]**
(ii) What will the function **confused(int)** return when n=6? **[2]**
(iii) State in one line that what is the function **confused(int)** doing apart from recursion? **[1]**

(b) The following function is a part of some class that computes and returns the Greatest Common Divisor (GCD) of any two numbers. There are some places in the code marked by ?1?, ?2?, ?3?, ?4?, ?5? which must be replaced by statements or expression so that the function runs correctly.

```
int gcd (int a, int b)
{
   int r;
   while ( ? 1 ? )
    {
      r = ?2? ;
      b = ?3? ;
      a = ?4? ;
    }
if(a == 0)
    return ?5? ;
else
    return -1;
}
```

(i) What is the expression/value at **? 1 ?** **[1]**
(ii) What is the expression/value at **? 2 ?** **[1]**
(iii) What is the expression/value at **? 3 ?** **[1]**
(iv) What is the expression/value at **? 4 ?** **[1]**
(v) What is the expression/value at **? 5 ?** **[1]**

Question 2.

(a) A linked list is formed from the objects of the class, **[4]**

```
class LinkList
        {
          int value;
          LinkList add;
        }
```

Write a method OR an algorithm to

(i) Insert a Node at the Middle of the Link List.
(ii) Compute and return the sum of all integer values stored in the linked list.

The method declarations to be used are as follows:

void insertMid(LinkList start, int x) //method for inserting a node in the middle

int listSum(LinkList start) //method for finding the sum of all integers

(b) Write the difference between an array and a linked list. **[2]**

(c) A D-Queue is a structure in which insertion and deletion can be performed from both ends. **[4]**

Write a method OR an algorithm to

(i) Push an element from the front
(ii) Push an element from the rear

Question 3.

(a) What is the worst case complexity for the following nested loop? **[2]**

```
for(q =1; q<N; q++)
{
for(r =1; r<N; r++)
  {
System.out.println("*");
  }
}
for(z =1; z<N; z++)
  {
System.out.println("@");
  }
```

(b) Define the term Best Case Complexity with a suitable example. **[2]**

(c) State the **Best Case** and **Worst Case** complexity for the following algorithms : **[2]**

(i) Quick Sort
(ii) Merge Sort

(d) Write the recursive as well as iterative function for checking whether a number is a Prime number or not. **[4]**