06378

DIPLOMA IN CIVIL ENGINEERING

Term-End Examination

June, 2013

BCS-042 : ANALYSIS AND DESIGN OF ALGORITHM

Time : 2 hours *Maximum Marks : 50*

Note : *Question number **1** is **compulsory.** Answer **any three** from the rest **(Section -B)***

SECTION-A

1. (a) Put the following classes of algorithms in increasing order of growth : 2

   (i) $0(n)$

   (ii) $0(2^n)$

   (iii) $0\left(\log_2^N\right)$

   (iv) $0(\sqrt{n})$

   (b) Write the names of the following symbols : 3

   (i) θ

   (ii) Ω

   (iii) $\forall$

   (c) Write the values of the followings : 3

   (i) $[4.4]$

   (ii) $[-4.4]$

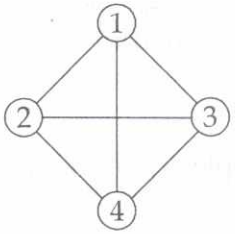
   (iii) $\log_2(4+16)$

(d) Write an algorithm for the linear search and analyse its time complexity in best case and worst case consider the following list : 8
15, 10, 20, 5, 3, 12, 2
Apply your Algorithm and show the steps to find an element 12 (i.e key=12) in the list given

(e) Define θ(Theta) Notation. By using Basic definition of θ, show that $3x+5=\theta(x)$ 4

SECTION-B

2. (a) Write a adjacency list and adjacency matrix representation of the following graph : 5



(b) Find the time complexity of the following : 5

```
for (i=1 ; i≤n ; i++)
    i=i*2 ;
```

3. (a) Explain the following terms : 5

(i) Space complexity

(ii) Time complexity

(iii) Recurrence

(iv) Lower bound

(v) Combinational problem

(b) Write a Recurrence Relation for the following Recursive factorial function : 5

```
int FACT (int n)
{
    if(n==1)
      return 1
    else
      return n*FACT(n-1)
}
```

4. What is an optimization problem ? What are the data structure and functions required to solve optimization problem using Greedy techniques. 10

5. Write a Pseudo code for merge sort algorithm. Apply the merge sort algorithm to sort the following :
15, 4, 3, 10, 8, 7, 13, 6
Also write the time complexity of merge sort in worst case. 10