

Total No. of Questions : 4]

SEAT No. :

PC183

[6361]-41

[Total No. of Pages : 2

B.E. (Computer Engineering) (Insem)
DESIGN AND ANALYSIS OF ALGORITHMS
(2019 Pattern) (Semester - VII) (410241)

Time : 1 Hour]

[Max. Marks : 30

Instructions to the candidates:

- 1) Answer Q.1 or Q.2, Q.3 or Q.4.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Figure to right indicate full marks.
- 4) Assume suitable data, if necessary.

Q1) a) Prove the correctness of the following algorithm, which finds the minimum number from the given array of n numbers.

```
int min_element (int A [ ])  
{  
  
    min=A[0];  
    for (i=1; i<n ; i++)  
    {  
        if (A[i]<min) then  
            min=A[i];  
    }  
    return(min);  
}
```

[7]

b) What is iterative algorithm? Explain iterative algorithm design issues using examples. [8]

OR

Q2) a) Prove the correctness of the following algorithm, which finds the factorial of a given number.

```
int fact (int n)  
{ if (n==0) then return 1;  
  else  
    return (n * fact(n-1));  
}
```

[7]

b) Write a short note on any four problem solving strategies. [8]

P.T.O.

Q3) a) Consider the algorithm for selection sort:

```
void select (int A[ ])
{
  // A is an array of n numbers.
  for (i=1;i<n-1; i++)
  {
    min_pos=i;
    min_val=A[i];
    for(j=i+1; j<=n;j++)
    {
      if(A[j] < min_val) then
      {
        min_pos=j;
        min_val=A[j];
      }
    }
    A[min_pos]=A[i];
    A[i]=min_val;
  }
}
```

Analyse the complexity of this algorithm. Clearly indicate the assumptions made, if any. [6]

- b) If an algorithm has a time complexity of both $O(f(n))$ and $\Omega(g(n))$ for the same function $f(n)$ and $g(n)$, then what does it imply? Explain. [3]
- c) What do Ω and Θ notations mean? When do we use O notation? [6]

OR

Q4) a) What is polynomial time reducibility? What is its importance in computational complexity theory? [6]

b) What do understand by NP complete and NP hard problems? Give examples. [6]

c) Is $6n^3 = \Theta(n^2)$? Justify your answer. [3]

