CSN-102 : Data Structures

Tutorial 1 (Time complexity)

Q1. Work out the computational complexity of the following piece of code:

```
x=x+1;
for(i=1; i<=1; i++)
   m=m+2;
for(i=1; i<=n ; i++)
{
      for(j=1; j<=n ; j++)
          k=k+1;
}
```

Q2. Find the time complexity of the program in terms of Big-O notation

```
function(int n)
{
          if(n==1)
              return;
          for(int i=1; i<=n; i++)
          {
                    for(int j=1; j<=n; j++)
                    {
                              printf("*");
                              break;
                    }
          }
 }
```

Q3. Find time complexity of below function in terms of O notation

```
void compute(int n)
{
       int i, j;
       for (i = 1; i <= n; i++)
          {
             for (j = 1; j < n; j += i)
             {
                   printf("%d %d",i,j);
```

```
            }
        }
}
```

Q4. What is the time complexity of the following code:

```
int i, j, k = 0;
for (i = n / 2; i <= n; i++)
{
    for (j = 2; j <= n; j = j * 2)
        k = k + n / 2;
}
```

Q5. For positive n and f(n), choose the time complexity of f(n), if $f(n) = a_0+a_1n+a_2n^2+....+a_mn^m$, and $a_m>0$

A. $\theta(n^m)$

B. $\theta(m^m)$

C. $\theta(a^m)$

D. $\theta(n^a)$

Q6. What is the minimum value of k at which package B becomes the preferred option over package A for processing a 10^k record database? Package A takes $0.0001n^2$ time units, while package B takes $10n\log_{10}n$ time units to process n records.

Q7. Which of the following functions is greater.

A) $f(n) = n$

B) $g(n) = (\log_2 n)^{100}$

Q8. Analyze the time complexity of this recursive function.

```
A(n)
{
   if (n==1)
      return 1 ;
   else
```

```
        return (A(n-1) ;
}
```

Q9. What would be the output of the following code

```
 #include< stdio.h >
struct Ournode
{
          char x,y,z;
};
int main()
{
          struct Ournode p = {'1', '0', 'a'+2};
          struct Ournode *q = &p;
          printf ("%c, %c", *((char*)q+1), *((char*)q+2));
          return 0;
}
```

Q10. Consider the following code and find the output.

```
#include <stdio.h>
main ()
{
          int i , j ;
          char a[6] = "DS102" ;

          for (i=0, j=5; i<j; a[i++] = a[j--]) ;
                    printf("Output is %s ", a);
}
```