

## 20.6. TIME COMPLEXITY CALCULATION FOR LOOP (EG-5).

```
//outer loop executed n times  
for(i = 0; i ≤ n; i = i + 2){  
    k = k + 1 ; // constant time.  
}
```

Hence it is fixed that it will run from 0 to  $n - 1$ , the times that  $k$   
 $= k + 1$  will be printed at  $\frac{n}{2}$  times when  $n$  is multiple of 2  $= O\left(\frac{n}{2}\right) = O(n)$ .

When  $n$  is not multiple of 2 i.e. odd  $= \left\lfloor \frac{n}{2} \right\rfloor + 1 = O\left(\left\lfloor \frac{n}{2} \right\rfloor + 1\right) = O(n)$ .

*Similarly,*

```
//outer loop executed n times  
for(i = 0; i ≤ n; i = i + 3){  
    k = k + 1 ; // constant time.  
}
```

$\Rightarrow$  for  $n$  is multiples of 3,  $k = k + 1$  will be printed  $\frac{n}{3}$  times  $= O\left(\frac{n}{3}\right) = O(n)$ .

$\Rightarrow$  for  $n$  is not multiples of 3,  $k = k + 1$  will be printed  $\left(\left\lfloor \frac{n}{3} \right\rfloor + 1\right)$  times

$$= O\left(\left\lfloor \frac{n}{3} \right\rfloor + 1\right) = O(n)$$

*//outer loop executed  $n$  times*

*for( $i = 0; i \leq n; i = i + 4$ )*

*$k = k + 1$  ; // constant time.*

*}*

$\Rightarrow$  for  $n$  is multiples of 4,  $k = k + 1$  will be printed  $\frac{n}{4}$  times  $= O\left(\frac{n}{4}\right) = O(n)$ .

$\Rightarrow$  for  $n$  is not multiples of 4,  $k = k + 1$  will be printed  $\left(\left\lfloor \frac{n}{4} \right\rfloor + 1\right)$  times

$$= O\left(\left\lfloor \frac{n}{4} \right\rfloor + 1\right) = O(n)$$

\*\*\*\*\*