S1

# G. H. RAISONI COLLEGE OF ENGG. NAGPUR

**(An Autonomous Institute under UGC Act 1956)**

## Department of Computer Science & Engg.

**TAE-I: Algorithm Analysis Test** **Subject: Design and Analysis of Algorithms**

**Time: 30min** **Class: 5th-CSE-C** **Subject Teacher: Prof. D. Theng** **Max Marks: 04**

---

**Name of Student:_____ _____ _____Roll No.: _____**

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**Q. A. Analyze time complexity of following iterative functions/Algorithms:**

**1.**
```
for i=1 to n/2 do
    for j=i to n-i do
        for k=1 to j do
            print ''foobar''
        end
    end
end
```

**2.**
```
void add (matrix a, matrix b, matrix c, int m, int n)
{
    for (int i = 0; i < m; i++)
    {
      count++;
      for (int j = 0; j < n; j++)
      {
            count++;
            c[i][j] = a[i][j] + b[i][j];
            count++;
      }
      count++;
    }
    count++;
}
```

**Q. B. Analyze time complexity of following Recursive functions/Algorithms:**

**1.** $T(n) = 3T(n/4) + n \log n$

**2.** $T(n) = 4T(n/2) + n/\log n$

S2

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---

**Name of Student:**_____ _____ _____**Roll No.:** _____

---

**Q. A. Analyze time complexity of following iterative functions/Algorithms:**

**1.**
```
line void add (matrix a, matrix b, matrix c, int m, int n)
{
  for (int i = 0; i < m; i++)
  {
          for (int j = 0; j < n; j++)
                  count += 2;
          count+2;
  }
  count++;
}
```

**2.** Algorithm prefixAverages1(X, n)

```
Input array X of n integers
Output array A of prefix averages of X
 A ¬ new array of n integers
 for i ¬ 0 to n - 1 do
          s ¬ X[0]
          for j ¬ 1 to i do
                  s ¬ s + X[j]
          A[i] ¬ s / (i + 1)
return A
```

**Q. B. Analyze time complexity of following Recursive functions/Algorithms:**

**1.** $T(n) = 2T(n/2) + n/\log n$

**2.** $T(n) = 4T(n/2) + n^2$

S3

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---

**Name of Student:_____ _____ _____Roll No.: _____**

---

**Q. A. Analyze time complexity of following iterative functions/Algorithms:**

**1.** procedure Fibonacci(n)

```
 if n = 1 or n = 2
   return 1
else
  n1 ← 1, n2 ← 1
for k = 3 to n do
  n3 ← n2 + n1
  n1 ← n2
  n2 ← n3
return n3
```

**2.**
```
for (i=1; i<=x; i++){
    for (j=1; j<=y; j++) {
      C[i][j] = 0;
      for (k=1; k<=z; k++){
        C[i][j] += A[i][k] * B[k][j];
      }
    }
 }
```

**Q. B. Analyze time complexity of following Recursive functions/Algorithms:**

**1.** $T(n) = 4T(n/2) + \log n$

**2.** $T(n) = 2T(n/2) + n/\log n$

S4

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**Time: 30min** **Class: 5th-CSE-C** **Subject Teacher: Prof. D. Theng** **Max Marks: 04**

---

**Name of Student:_____ _____ _____Roll No.: _____**

---

**Q. A. Analyze time complexity of following iterative functions/Algorithms:**

**1.**

```
function
 conundrum(n) r := 0
for i := 1 to n do
    for j := i + 1 to n do
        for k := i + j − 1 to n do
              r := r + 1
return (r)
```

**2.**

```
function mystery(n)
 r := 0
 for i := 1 to n − 1 do
     for j := i + 1 to n do
         for k := 1 to j do
             r := r + 1
return(r)
```

**Q. B. Analyze time complexity of following Recursive functions/Algorithms:**

**1.** $T(n) = 4T(n/2) + \log n$

**2.** $T(n) = 3T(n/4) + n \log n$

S5

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---

**Name of Student:_____ _____ _____Roll No.: _____**

---

**Q. A. Analyze time complexity of following iterative functions/Algorithms:**

**1.** function pesky(n)

```
    r := 0

    for i := 1 to n do

        for j := 1 to i do

            for k := j to i + j do

                r := r + 1

    return(r)
```

**2.** function()

```
{
  int i, j, k, n;
   for(i = 1; i<= n; i++)
   {
     for( j= 1; j<=i; j++)
     {
         for( k= 1 k<=100; k++)
         {
             print("Hello");
          }
       }
    }
}
```

**Q. B. Analyze time complexity of following Recursive functions/Algorithms:**

**1.** $T(n) = 6T(n/3) + n^2 \log n$

**2.** $T(n) = 4T(n/2) + n^2$

S6

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---

**Name of Student:_____ _____ _____Roll No.: _____**

---

**Q. A. Analyze time complexity of following iterative functions/Algorithms:**

**1.**

```
function()
{
   int i, j, k, n;
    for(i = 1; i<= n; i++)
    {
      for( j= 1; j<=i^2; j++)
      {
          for( k= 1 k<=n/2; k++)
          {
              print("Hello");
           }
        }
     }
   }
```

**2.**

```
function()
{
   int i, j, k, n;
    for(i = 1; i<= n; i++)
    {
      for( j= 1; j<=i^2; j++)
      {
          for( k= 1 k<=500; k++)
          {
              print("Hello");
           }
        }
     }
   }
```

**Q. B. Analyze time complexity of following Recursive functions/Algorithms:**

**1.** $T(n) = \sqrt{2}\, T(n/2) + \log n$

**2.** $T(n) = 6T(n/3) + n^2 \log n$

S7

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**Time: 30min** **Class: 5th-CSE-C** **Subject Teacher: Prof. D. Theng** **Max Marks: 04**

---

**Name of Student:_____ _____ _____Roll No.: _____**

---

**Q. A. Analyze time complexity of following iterative functions/Algorithms:**

**1.**
```
function()
    {
       int i, j, k, n;
        for(i = 1; i<= n; i++)
        {
          for( j= 1; j<=i; j++)
          {
              for( k= 1 k<=n; k++)
              {
                   print("Hello");
               }
            }
         }
       }
```

**2.**
```
int fun(int n)

{

 int count = 0;

 for (int i = n; i > 0; i /= 2)

    for (int j = 0; j < i; j++)

      count += 1;

 return count;

}
```

**Q. B. Analyze time complexity of following Recursive functions/Algorithms:**

**1.** $T(n) = 4T(n/2) + cn$

**2.** $T(n) = 3T(n/2) + n$

S8

# G. H. RAISONI COLLEGE OF ENGG. NAGPUR

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**Time: 30min** **Class: 5th-CSE-C** **Subject Teacher: Prof. D. Theng** **Max Marks: 04**

---

**Name of Student:_____ _____ _____Roll No.: _____**

---

**Q. A. Analyze time complexity of following iterative functions/Algorithms:**

**1.**
```
int fun(int n)
{
  int count = 0;
  for (int i = 0; i < n; i++)
     for (int j = i; j > 0; j--)
        count = count + 1;
  return count;
}
```

**2.**
```
void fun(int n, int arr[])
{
    int i = 0, j = 0;
    for(; i < n; ++i)
       while(j < n && arr[i] < arr[j])
          j++;
}
```

**Q. B. Analyze time complexity of following Recursive functions/Algorithms:**

**1.** $T(n) = 3T(n/3) + \sqrt{\ }$

**2.** $T(n) = 3T(n/4) + n \log n$

S9

# G. H. RAISONI COLLEGE OF ENGG. NAGPUR

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**Time: 30min** **Class: 5th-CSE-C** **Subject Teacher: Prof. D. Theng** **Max Marks: 04**

---

**Name of Student:**_____ _____ _____**Roll No.:** _____

---

**Q. A. Analyze time complexity of following iterative functions/Algorithms:**

**1.**
```
int unknown(int n) {
   int i, j, k = 0;
   for (i = n/2; i <= n; i++) for
      (j = 2; j <= n; j = j * 2)
         k = k + n/2;
   return k;
 }
```

**2.**
```
double foo (int
n) { int i;
   double sum;
   if (n = = 0) return
   1.0; else
   {
      sum = 0.0;
      for (i = 0; i < n; i++)
           sum += foo (i);
      return sum;
   }
}
```

**Q. B. Analyze time complexity of following Recursive functions/Algorithms:**

**1.** $T(n) = 4T(n/2) + n^2$

**2.** $T(n) = 16T(n/4) + n!$

S10

# G. H. RAISONI COLLEGE OF ENGG. NAGPUR

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---

**Name of Student:_____ _____ _____Roll No.: _____**

---

**Q. A. Analyze time complexity of following iterative functions/Algorithms:**

**1.**
```
int fun1 (int n)
{
  int i, j, k, p, q = 0;
  for (i = 1; i<n; ++i)
  {
    p = 0;
    for (j=n; j>1; j=j/2)
      ++p;
    for (k=1; k<p; k=k*2)
      ++q;
  }
  return q;
}
```

**2.**
```
void fun()
{
  int i, j;
  for (i=1; i<=n; i++)
    for (j=1; j<=log(i); j++)
      printf("GeeksforGeeks");
}
```

**Q. B. Analyze time complexity of following Recursive functions/Algorithms:**

**1.** $T(n) = 4T(n/2) + n^2$

**2.** $T(n) = 2T(n/2) + n/\log n$

S11

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---

**Name of Student:**_____ _____ _____**Roll No.:** _____

---

**Q. A. Analyze time complexity of following iterative functions/Algorithms:**

**1.** Check ()

```
{
   int i, n;
   for (i=1; i<=n ; i++)
  {
      for (j=1; j<=i^2 ; j++)
         printf("Techtud");
   }
}
```

**2.** Check ()

```
{
   int i,j,k n;
   for (i=1; i<=n ; i++)
  {
     for (j=1; j<=i^2 ; j++)
     {
        for (k=1; k<=n\2 ;k++)
        printf("Techtud");
     }
  }
}
```

**Q. B. Analyze time complexity of following Recursive functions/Algorithms:**

**1.** $T(n) = 3T(n/2) + n^2$

**2.** $T(n) = 2T(n/2) + n \log n$

S12

# G. H. RAISONI COLLEGE OF ENGG. NAGPUR

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---

**Name of Student:_____ _____ _____Roll No.: _____**

---

**Q. A. Analyze time complexity of following iterative functions/Algorithms:**

**1.**
```
int i,j,k; for(i=n/2
;i<=n ;i++)
{
 for(j=1;j<=n/2;j*3)
  {
   for(k=1;k<=n;k=k*2)
    {
      printf('Wish');
    }
  }
}
```

**2.**
```
if (digit >= 5){

output = output +

"D"; digit = digit % 5;

while (digit > 0)

{

output = output + "C";

digit--;

}

}
```

**Q. B. Analyze time complexity of following Recursive functions/Algorithms:**

**1.** $T(n) = 16T(n/4) + n$

**2.** $T(n) = 6T(n/3) + n^2 \log n$

**S13**

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---

**Name of Student:_____ _____ _____Roll No.: _____**

---

**Q. A. Analyze time complexity of following iterative functions/Algorithms:**

**1.** Function Pow (x,

y) prod= 1

p= 0

while p < y do

prod=prod×x

p=p+ 1

end while

return prod

end function

**2.** sum = 0;

```
for (int i = 1; i <= n; i++ )
   for (int j = 1; j <= i*i; j++)
      if (j % i ==0)
         for (int k = 0; k < j k++)
            sum++;
```

**Q. B. Analyze time complexity of following Recursive functions/Algorithms:**

**1.** $T(n) = T(n/2) + 2^n$

**2.** $T(n) = 4T(n/2) + n/\log n$

S14

# G. H. RAISONI COLLEGE OF ENGG. NAGPUR

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---

**Name of Student:_____ _____ _____Roll No.: _____**

---

**Q. A. Analyze time complexity of following iterative functions/Algorithms:**

**1.**
```
int fun1 (int n)
{
  int i, j, k, p, q = 0;
  for (i = n; i>0; --i)
  {
    p = 0;
    for (j=1; j<n; j=j*2)
      ++p;
    for (k=p; k>1; k=k/2)
      ++q;
  }
  return q;
}
```

**2.**
```
int fun(int n)

{

 int count = 0;

 for (int i = 0; i < n; i=pow(i,2))

   for (int j = i; j > 0; j--)

     count = count + 1;

 return count;

}
```

**Q. B. Analyze time complexity of following Recursive functions/Algorithms:**

**1.** $T(n) = 4T(n/2) + n^2$

**2.** $T(n) = 7T(n/3) + n^2$

**S15** **G. H. RAISONI COLLEGE OF ENGG. NAGPUR**

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---

**Name of Student:_____ _____ _____Roll No.: _____**

---

**Q. A. Analyze time complexity of following iterative functions/Algorithms:**

**1.** function()

```
{
   int i, j, k, n;
    for(i = 1; i<= n; i++)
    {
      for( j= 1; j<=i; j++)
      {
             print("Hi");
       }
       for( k= 1 k<=n; k++)
          {
               print("Hello");
           }
      }
   }
```

**2.** function()

```
{
   int i, j, k, n;
    for(i = 1; i<= n; i++)
    {
      for( j= 1; j<=i^2; j++)
      {
         print("Hi");
       }
       for( k= 1 k<=500; k++)
       {
         print("Hello");
       }

     }
   }
```

**Q. B. Analyze time complexity of following Recursive functions/Algorithms:**

**1.** $T(n) = 3T(n/2) + n^2$

**2.** $T(n) = 4T(n/2) + \log n$