K. J. Somaiya College of Engineering, Mumbai-77

A Constituent College of Somaiya Vidyavihar University

Batch: C2-1 Roll No.: 16010122104

Experiment / assignment / tutorial No. 4

Grade: AA / AB / BB / BC / CC / CD /DD

Signature of the Staff In-charge with date

TITLE: Program to print patterns

AIM: Program to print patterns for 'n' rows using nested loop

Expected OUTCOME of Experiment:

To successfully run different programs of various patterns.

Books/ Journals/ Websites referred:

1. Programming in C, second edition, Pradeep Dey and Manas Ghosh, Oxford University Press.
2. Programming in ANSI C, fifth edition, E Balagurusamy, Tata McGraw Hill.
3. Introduction to programming and problem solving , G. Michael Schneider ,Wiley India edition.
4. **http://cse.iitkgp.ac.in/~rkumar/pds-vlab/**

Problem Definition:

The program is to print a pattern as given by the user. The program makes use of a nested loop to print a pattern of characters, numbers or alphabets.

Example:

Input: number of rows = 5, number of columns = 5

Output:

```
        5
      4 5
    3 4 5
  2 3 4 5
1 2 3 4 5
```

Pattern

```
#include<stdio.h>
void main ()
{
    int i, j;
    for(i=0; i<6; i++)
    {
        for(j=0; j<i+1; j++)
        {
            printf(" *");
        }
        printf("\n");
    }
    getch();
}
```

Pattern1

```
#include<stdio.h>
void main ()
{
   int i, j;
   for(i=1; i<6; i++)
   {
       for(j=1; j<i+1; j++)
       {
           printf("%d", i);
       }
       printf("\n");
   }
}
```

Pattern2

```
#include<stdio.h>
void main ()
{
   int i, j;
   for(i=1; i<6; i++)
   {
       for(j=1; j<i+1; j++)
       {
           printf("%d", j);
```

```
        }
        printf("\n");
    }
}
```

Pattern3

```
#include<stdio.h>
void main ()
{
    int i, j, k;
    for(i=1; i<6; i++)
    {
        for(k=5; k>i; k--)
        {
            printf(" ");
        }
            for(j=1; j<i+1; j++)
            {
                printf("%d", j);
            }
        printf("\n");
    }
}
```

Pattern4

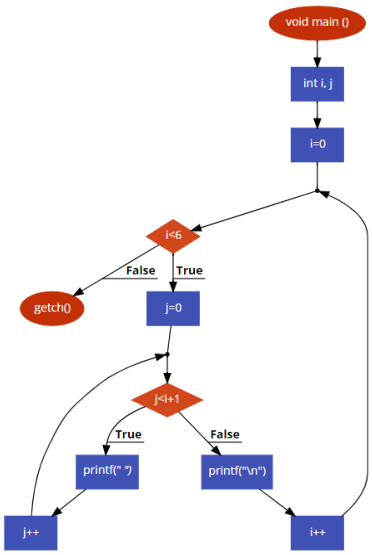
```
#include<stdio.h>
void main ()
{
    int i, j;
    for(i='A'; i<='E'; i++)
    {
        for(j='A'; j<i+1; j++)
        {
            printf("%c", j);
        }
        printf("\n");
    }
}
```

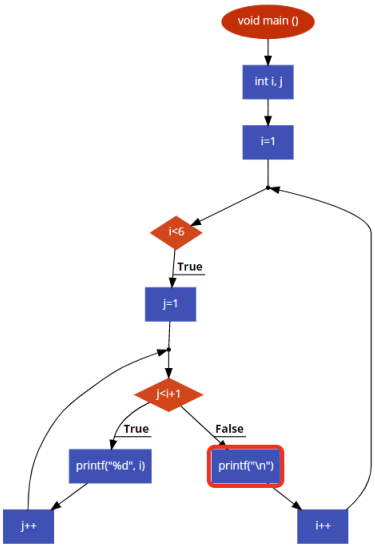
Pattern5

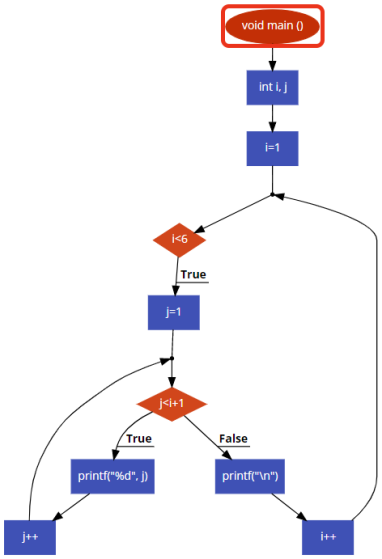
```
#include<stdio.h>
void main ()
{
    int i, j, k;
    for(i=1; i<6; i++)
    {
        for(k=5; k>i; k--)
        {
```

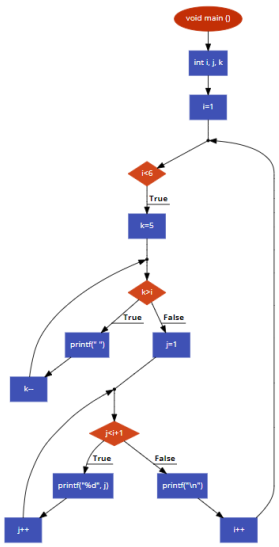
```
            printf(" ");
        }
            for(j=i; j>0; j--)
            {
                printf("%d", j);
            }
            for(j=2; j<i+1; j++)
            {
                printf("%d", j);
            }
        printf("\n");
    }
}
```

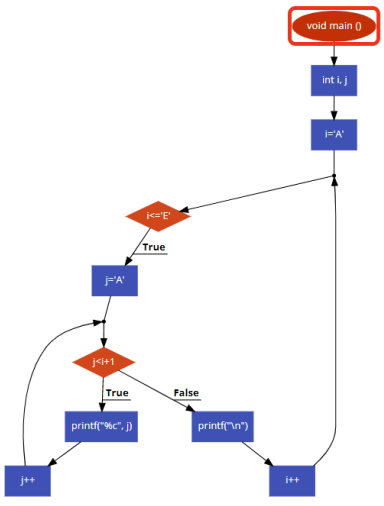
Flowchart:

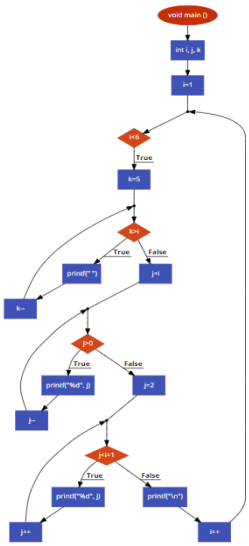












Implementation details:

Pattern:
STEP 1: Start
STEP 2: Declare variables i and j
STEP 3: Create a nested for loop taking i as rows and j as columns
for (initialize i = 1; test condition i<=5 ; post increment i++)
for (initialize j = 1; test condition j<=i ; post increment j++)
print *
print new line
STEP 4: Stop

Pattern1:
STEP 1: Start
STEP 2: Declare variables i and j
STEP 3: Create a nested for loop taking i as rows and j as columns
for (initialize i = 1; test condition i<=5 ; post increment i++)
for (initialize j = 1; test condition j<=i+1 ; post increment j++)
print i
print new line
STEP 4: Stop

Pattern2:
STEP 1: Start
STEP 2: Declare variables i and j
STEP 3: Create a nested for loop taking i as rows and j as columns
for (initialize i = 1; test condition i<=5 ; post increment i++)
for (initialize j = 1; test condition j<=i+1 ; post increment j++)
print j
print new line
STEP 4: Stop

Pattern3:
STEP 1: Start
STEP 2: Declare variables i, j, k
STEP 3: Create a nested for loop taking i as rows and j as columns
for (initialize i = 1; test condition i<=6 ; post increment i++)
for (initialize k = 5; test condition k>i ; post decrement k--)
print space " "
for (initialize j = 1; test condition j<=i+1 ; post increment j++)
print j
print new line
STEP 4: Stop

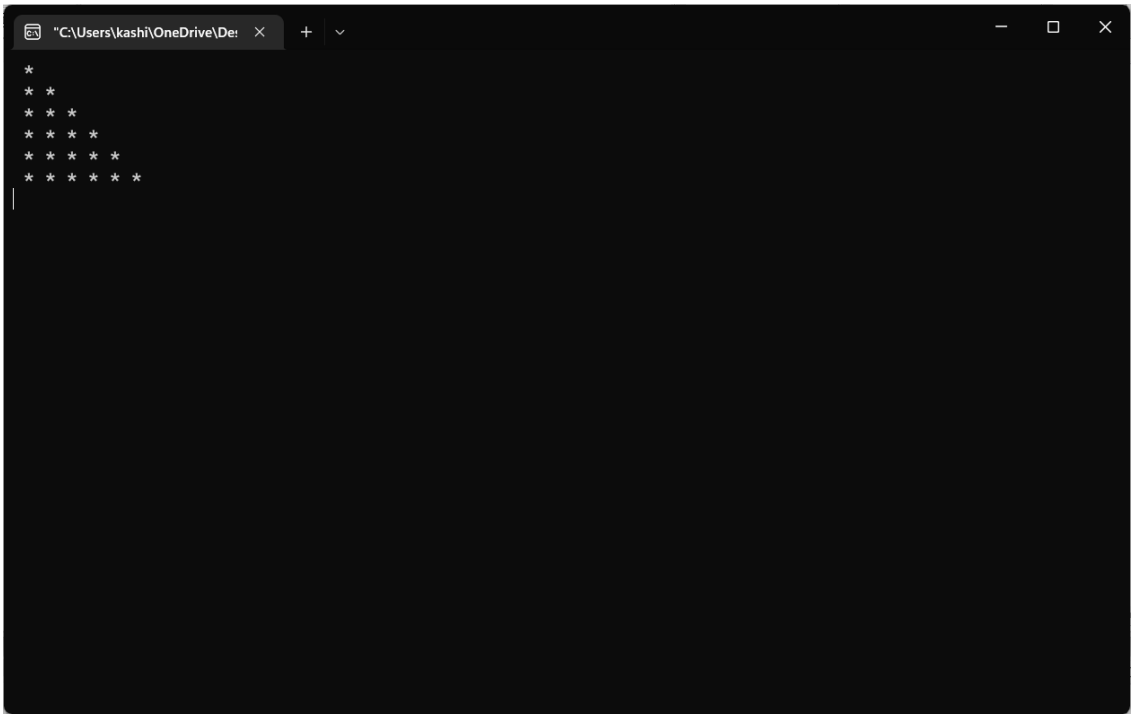
Pattern4:

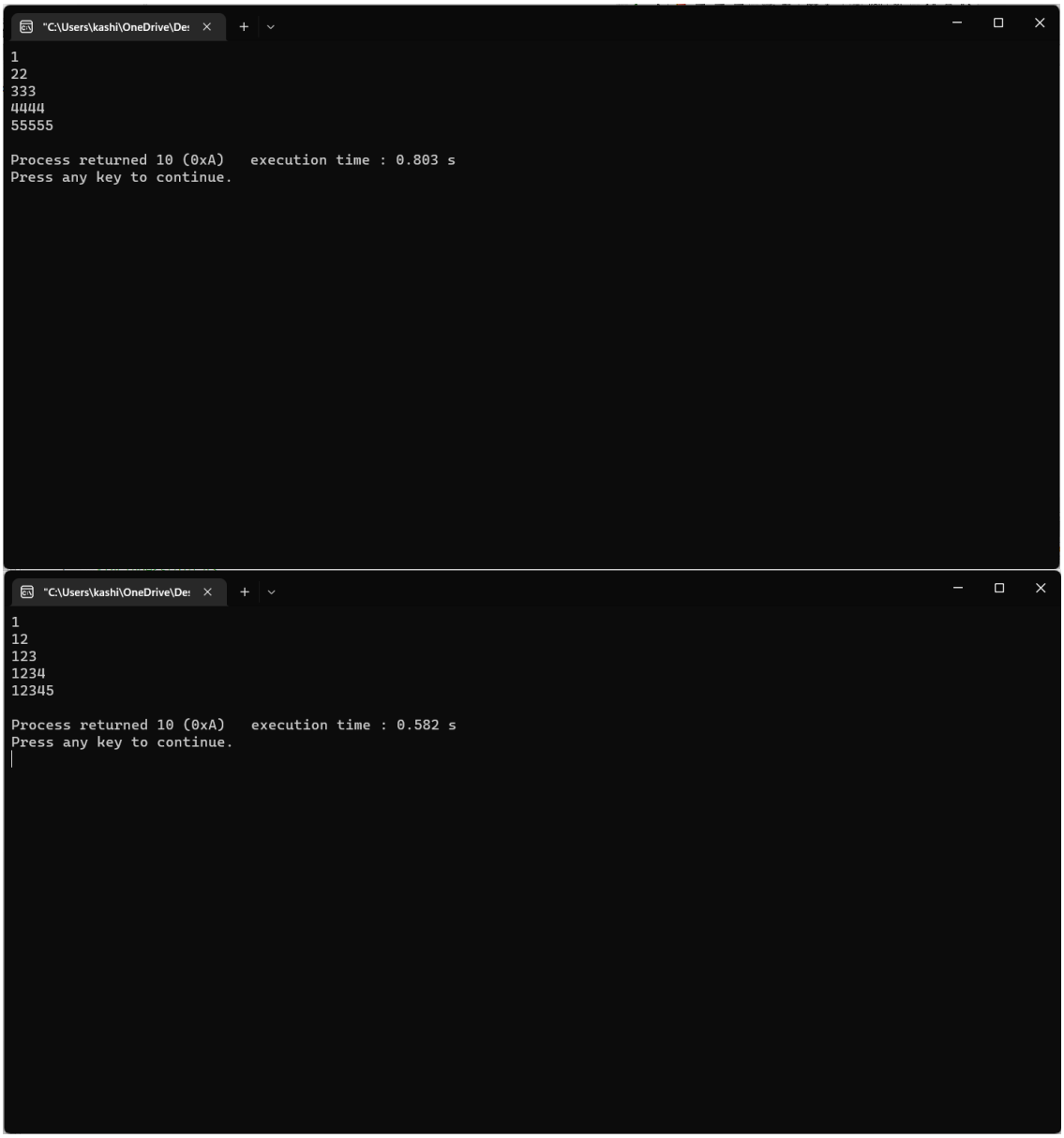
STEP 1: Start
STEP 2: Declare variables i and j
STEP 3: Create a nested for loop taking i as rows and j as columns
for (initialize i = 'A'; test condition i<='E' ; post increment i++)
for (initialize j = 'A'; test condition j<=i+1 ; post increment j++)
print j
print new line
STEP 4: Stop

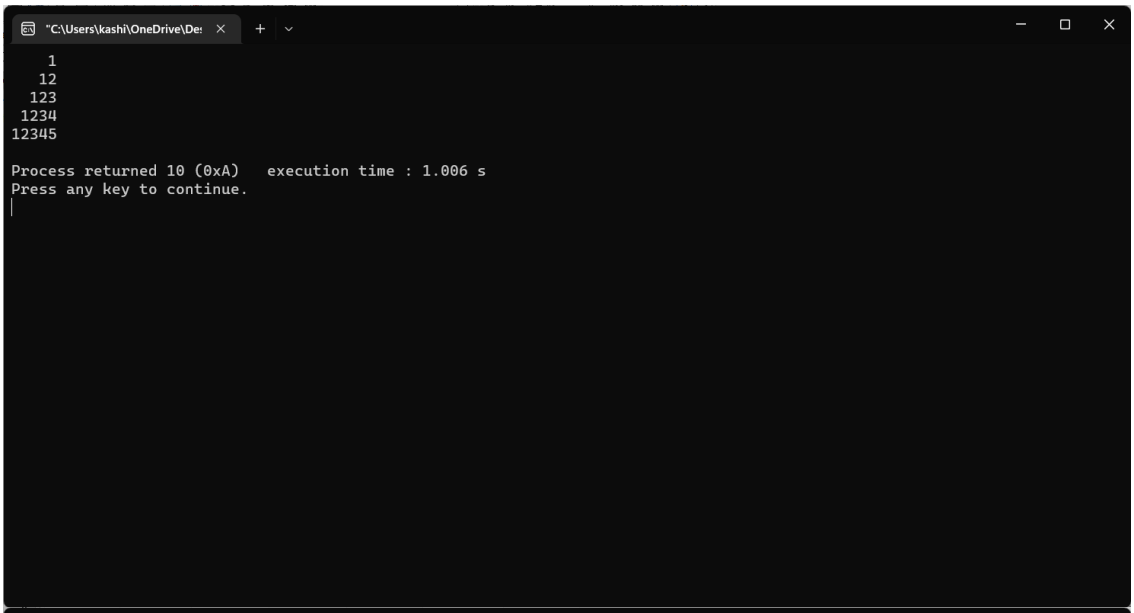
Pattern5:

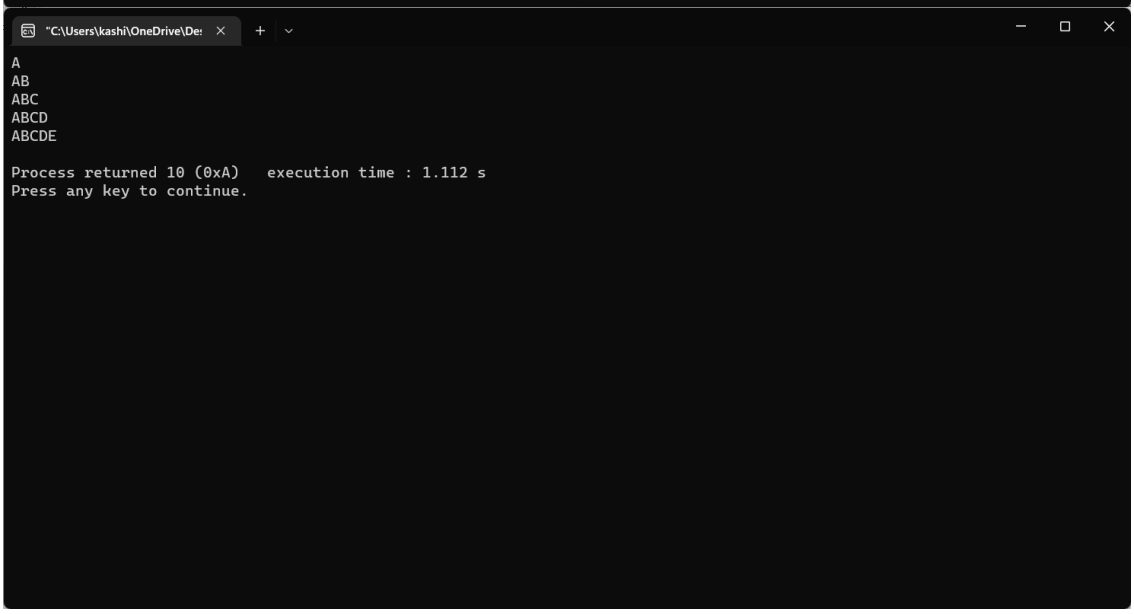
STEP 1: Start
STEP 2: Declare variables i, j, k
STEP 3: Create a nested for loop taking i as rows and j as columns
for (initialize i = 1; test condition i<=6 ; post increment i++)
for (initialize k = 5; test condition k>i ; post decrement k--)
print space " "
for (initialize j = i; test condition j>0 ; post decrement j--)
print j
for (initialize j = 2; test condition j<i+1 ; post increment j++)
print new line
STEP 4: Stop

Output(s):




"C:\Users\kashi\OneDrive\De
1
22
333
4444
55555
Process returned 10 (0xA) execution time : 0.803 s
Press any key to continue.
"C:\Users\kashi\OneDrive\De
1
12
123
1234
12345
Process returned 10 (0xA) execution time : 0.582 s
Press any key to continue.


"C:\Users\kashi\OneDrive\De
1
12
123
1234
12345
Process returned 10 (0xA) execution time : 1.006 s
Press any key to continue.


"C:\Users\kashi\OneDrive\De
A
AB
ABC
ABCD
ABCDE
Process returned 10 (0xA) execution time : 1.112 s
Press any key to continue.

Conclusion:

Various patterns of desired number of rows, columns and sequence can be printed using the nested for loop.

Post Lab Descriptive Questions

a) Write a program to print the following:

```
1
2       4
3       6       9
4       8       12      16
5       10      15      20      25
6       12      18      24      30      36
7       14      21      28      35      42      49
8       16      24      32      40      48      56      64
9       18      27      36      45      54      63      72      81
10      20      30      40      50      60      70      80      90      100
```

b) Write a program to print the following pattern:

```
    A
   ABA
  ABCBA
 ABCDCBA
```

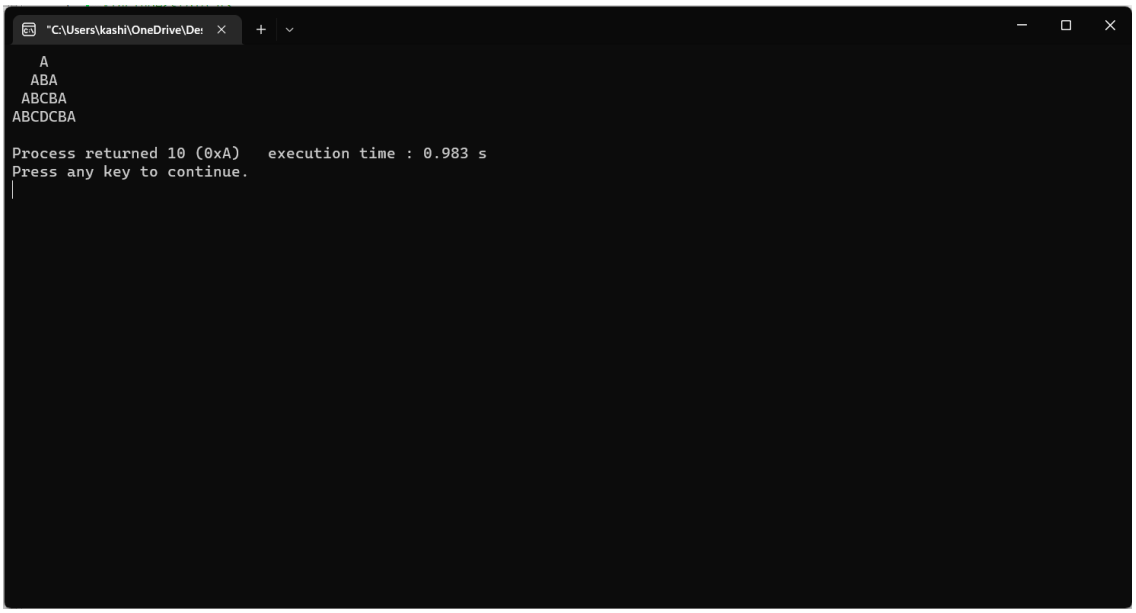
Answers:

a)

```
#include<stdio.h>
void main()
{
   int i,j,k=1;
   for(i=1;i<=10;i++)
   {
      for(j=1;j<=i;j++)
      {
         printf("%d ",j*i);
         k++;

      }
      printf("\n");
   }
}
```

b)

```
#include<stdio.h>
void main()
{
   int i,j;
   for(i=1;i<=4;i++)
   {
      for(j=1;j<=4-i;j++)
      {
         printf(" ");
      }
      for(j=1;j<=i;j++)
      {
         printf("%c",(char)(j+64));
      }
      for(j=i-1;j>=1;j--)
      {
         printf("%c",(char)(j+64));
      }
      printf("\n");

   }

}
```



Date: 07/01/2023 **Signature of faculty in-charge**