	SVKM's NMIMS **Mukesh Patel School of Technology Management & Engineering / School of Technology Management & Engineering**	
B. Tech/MBA Tech	**Workbook**	**Academic Year- 2023-24**
Year:-First	**Subject:-** Programming for Problem Solving	**Semester: - First**

Experiment: 5

PART A

(PART A: TO BE REFERRED BY STUDENTS)

Aim: Programming using nested loops

Learning Outcomes: The learner would be able to

1. Understand the syntax of nested loop
2. Use nested to solve problems by writing programs

Theory:

Nested Loop (loop inside loop):

- A loop within another loop is known as nested loop.
- Combinations of any loops are possible.

Syntax:-

Nested For	**Nested While**	**Nested Do While**

for (initialization; condition; update)
{
for (initialization; condition; update)
{
// body of inner loop
}
// body of outer loop
}
	while (condition)
	{
	while (condition)
	{
	// body of inner loop
	}
	// body of outer loop
	}
		do
		{
		do
		{
		// body of inner loop
		}while (condition);
		// body of outer loop
		}while (condition);

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Loop to displays 12345

O/P

```
for( i=1 ; i<=5 ; i++){
        cout<<i;

1
2
3
4
5
        cout<<endl;
}
```

Loop to displays *****

```
for( j=1 ; j<=5 ; j++){
        cout<<"*";
}
```

Output:-

*****

Nested Loop: Ex1

```
for( i=1 ; i<=5 ; i++){
        for( j=1 ; j<=5 ; j++){
                cout<<"*";
        }
        cout<<endl;
}
```

Values of j	12345 (for every value of i)
Values of i	Actual Output:-
1	*****
2	*****
3	*****
4	*****
5	*****

Nested Loop: Ex2

```
for( i=1 ; i<=5 ; i++){
        for( j=1 ; j<= i ; j++){
                cout<<"*";
        }
        cout<<endl;
}
```

i	Output:-	j
1	*	12
2	**	123
3	***	1234
4	****	12345
5	*****	123456

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Nested Loop: Ex3

```
for( i=1 ; i<=5 ; i++){
        for( j=1 ; j<= i ; j++){
                cout<<j;
        }
        cout<<endl;
}
```

i
1
2
3
4
5

Output:-

```
1
12
123
1234
12345
```

j
12
123
1234
12345
123456

Nested Loop: Ex4

```
for( i=1 ; i<=5 ; i++){
        for( j=1 ; j<= i ; j++){
                cout<<i;
        }
        cout<<endl;
}
```

i
1
2
3
4
5

Output:-

```
1
22
333
4444
55555
```

j
12
123
1234
12345
123456

Nested Loop: Ex5

```
char ch = 'A' ;
for( i=1 ; i<=5 ; i++){
        for( j=1 ; j<= i ; j++){
                cout<<ch;
        }
        cout<<endl;
        ch++;
}
```

i
1
2
3
4
5

Output:-

```
A
BB
CCC
DDDD
EEEEE
```

j
12
123
1234
12345
123456

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Instructions: - All the students are informed to write all executed code in a workbook in the following sequence and format.

1. Problem Statement
2. Input and Output
3. Test Cases
4. Flowchart
5. Program (with color codes)
   a) Red – Directives
   b) Blue – Keywords, constants values
   c) Green – Comments, messages
   d) Black – {variables, functions, class, object} name, operators, punctuation
6. Trace Table (additional columns may require in some concepts)

Var-1	Var-2	….	Var-n	Condition	Output

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Tasks:

Sr. No.	Problem Statement	I/O	Test Cases	Flow chart	Program-with color codes	Trace Table
1	Write a program to print following pattern using nested loop. A BC DEF GHIJ KLMNO	✓		✓	✓	✓
2	Write a program to print following pattern using nested loop. ***** **** *** ** *	✓		✓	✓	✓

3	Write a program to print following pattern using nested loop, read number of lines to be displayed from user.
	  *
	  **
	  ***
	  ****
	  *****
		✓			✓	

4	Write a program to print following pattern using nested loop.
	  $
	  $ $
	$ $ $
		✓			✓	

5	Write a program to print following pattern using nested loop.	✓			✓	

	1 1 2 1 2 3 3 2 1 2 1 1					
6	Write a C++ program to print Armstrong numbers between N_1 to N_2, where $N_2>N_1$.	✓	✓		✓	
7	Write a C++ program to print prime numbers between N_1 to N_2, where $N_2>N_1$.	✓	✓	✓	✓	✓
8	WAP to generate all combinations of 1, 2 & 3 using for loop.	✓	✓		✓	

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Q1.