

# Programming in C# Lab

## BCA-DS-651

**Manav Rachna International Institute of Research and  
Studies**

**School of Computer Applications**

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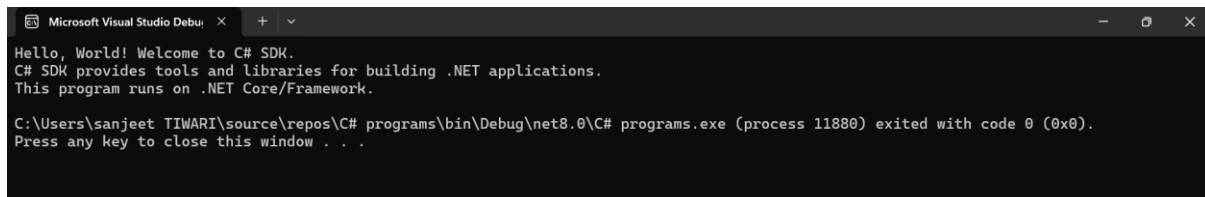
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## 1. Write program to demonstrate the working of C# SDK.

```
using System;

class Program
{
    static void Main()
    {
        Console.WriteLine("Hello, World! Welcome to C# SDK.");
        Console.WriteLine("C# SDK provides tools and libraries for building .NET applications.");
        Console.WriteLine("This program runs on .NET Core/Framework.");
    }
}
```

### Output:-

A screenshot of the Microsoft Visual Studio Debug Console window. The window title is "Microsoft Visual Studio Debug Console". The output text is as follows:  
Hello, World! Welcome to C# SDK.  
C# SDK provides tools and libraries for building .NET applications.  
This program runs on .NET Core/Framework.  
  
C:\Users\sanjeet TIWARI\source\repos\C# programs\bin\Debug\net8.0\C# programs.exe (process 11880) exited with code 0 (0x0).  
Press any key to close this window . . .

## 2. Write program to show the use of various data types available in C#.

using System;

class DataTypesExample

```
{  
    static void Main()  
    {  
        int num = 10;  
        float pi = 3.14f;  
        double largeDecimal = 123.456;  
        char letter = 'A';  
        bool isTrue = true;  
        string message = "Hello C#";  
        Console.WriteLine($"Integer: {num}");  
        Console.WriteLine($"Float: {pi}");  
        Console.WriteLine($"Double: {largeDecimal}");  
        Console.WriteLine($"Character: {letter}");  
        Console.WriteLine($"Boolean: {isTrue}");  
        Console.WriteLine($"String: {message}");  
    }  
}
```

### Output:-

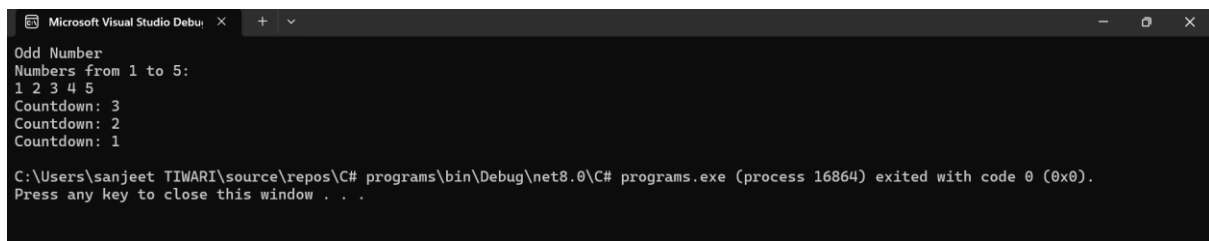
### 3. Write programs to understand the use of Control statements.

using System;

class ControlStatementsExample

```
{  
    static void Main()  
    {  
        int num = 5;  
        // If-else  
        if (num % 2 == 0)  
            Console.WriteLine("Even Number");  
        else  
            Console.WriteLine("Odd Number");  
        // For loop  
        Console.WriteLine("Numbers from 1 to 5:");  
        for (int i = 1; i <= 5; i++)  
            Console.Write(i + " ");  
        Console.WriteLine();  
        // While loop  
        int count = 3;  
        while (count > 0)  
        {  
            Console.WriteLine("Countdown: " + count);  
            count--;  
        }  
    }  
}
```

**Output:-**



The image shows a screenshot of a Microsoft Visual Studio Debug Console window. The window has a title bar with the text "Microsoft Visual Studio Debug Console" and standard window controls (minimize, maximize, close). The console output is as follows:

```
Odd Number
Numbers from 1 to 5:
1 2 3 4 5
Countdown: 3
Countdown: 2
Countdown: 1

C:\Users\sanjeet TIWARI\source\repos\C# programs\bin\Debug\net8.0\C# programs.exe (process 16864) exited with code 0 (0x0).
Press any key to close this window . . .
```

#### 4. Write programs to understand the use of library functions.

using System;

class LibraryFunctionsExample

```
{  
    static void Main()  
    {  
        double sqrtValue = Math.Sqrt(25);  
        string upperCase = "hello".ToUpper();  
        string formatted = string.Format("Value: {0}, Square Root: {1}", 100, sqrtValue);  
        Console.WriteLine($"Square Root of 25: {sqrtValue}");  
        Console.WriteLine($"Uppercase String: {upperCase}");  
        Console.WriteLine(formatted);  
    }  
}
```

#### Output:-



The screenshot shows a Visual Studio Debug Console window with the following output:

```
Square Root of 25: 5  
Uppercase String: HELLO  
Value: 100, Square Root: 5  
  
C:\Users\sanjeet TIWARI\source\repos\C# programs\bin\Debug\net8.0\C# programs.exe (process 12336) exited with code 0 (0x0).  
Press any key to close this window . . .
```



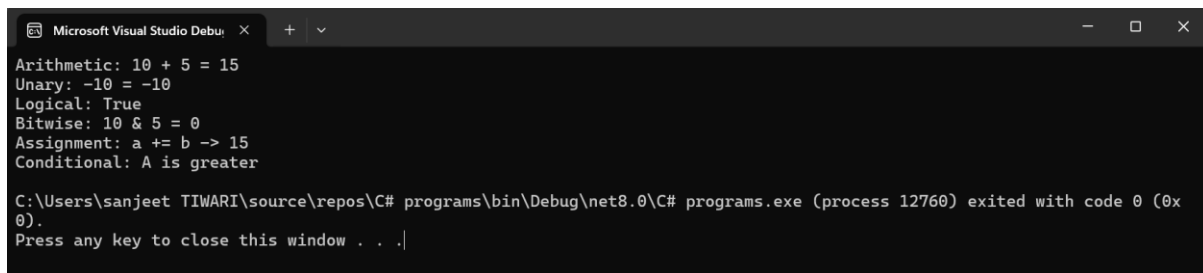
## 5. Write a program to demonstrate the use of various arithmetic, unary, logical, bit-wise, assignment and conditional operators.

using System;

class OperatorsExample

```
{  
    static void Main()  
    {  
        int a = 10, b = 5;  
  
        Console.WriteLine($"Arithmetic: {a} + {b} = {a + b}");  
  
        Console.WriteLine($"Unary: -{a} = {-a}");  
  
        Console.WriteLine($"Logical: {a > b && b < 15}");  
  
        Console.WriteLine($"Bitwise: {a} & {b} = {a & b}");  
  
        Console.WriteLine($"Assignment: a += b -> {a += b}");  
  
        Console.WriteLine($"Conditional: {(a > b ? "A is greater" : "B is greater")}");  
    }  
}
```

### Output:-



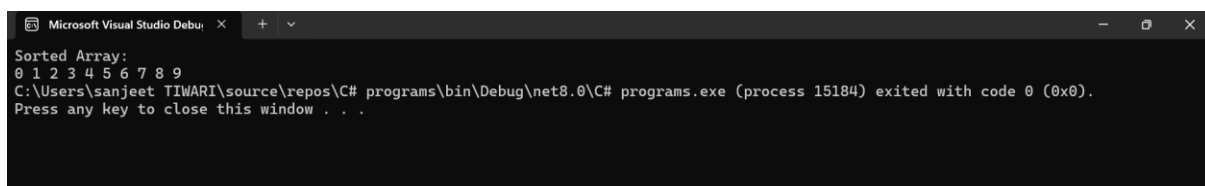
```
Microsoft Visual Studio Debug Console  
Arithmetic: 10 + 5 = 15  
Unary: -10 = -10  
Logical: True  
Bitwise: 10 & 5 = 0  
Assignment: a += b -> 15  
Conditional: A is greater  
C:\Users\sanjeet TIWARI\source\repos\C# programs\bin\Debug\net8.0\C# programs.exe (process 12760) exited with code 0 (0x0).  
Press any key to close this window . . .|
```

**6. Write a program to store 10 elements in an array and display the array elements in increasing order.**

```
using System;

class ArraySorting
{
    static void Main()
    {
        int[] arr = { 9, 5, 2, 8, 3, 7, 1, 6, 4, 0 };
        Array.Sort(arr);
        Console.WriteLine("Sorted Array:");
        foreach (int num in arr)
            Console.Write(num + " ");
    }
}
```

**Output:-**

A screenshot of a Microsoft Visual Studio Debug Console window. The window title is "Microsoft Visual Studio Debu" with a close button. The output text is: "Sorted Array:", "0 1 2 3 4 5 6 7 8 9", "C:\\Users\\sanjeet TIWARI\\source\\repos\\C# programs\\bin\\Debug\\net8.0\\C# programs.exe (process 15184) exited with code 0 (0x0).", and "Press any key to close this window . . .".

```
Sorted Array:
0 1 2 3 4 5 6 7 8 9
C:\Users\sanjeet TIWARI\source\repos\C# programs\bin\Debug\net8.0\C# programs.exe (process 15184) exited with code 0 (0x0).
Press any key to close this window . . .
```

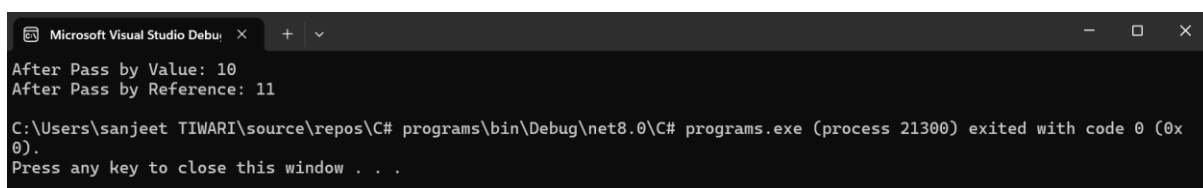
## 7. Demonstrate the use of pass by value and pass by reference by writing a program.

using System;

class PassExample

```
{  
    static void IncrementByValue(int num)  
    {  
        num++;  
    }  
    static void IncrementByReference(ref int num)  
    {  
        num++;  
    }  
    static void Main()  
    {  
        int val = 10;  
        IncrementByValue(val);  
        Console.WriteLine("After Pass by Value: " + val);  
        IncrementByReference(ref val);  
        Console.WriteLine("After Pass by Reference: " + val);  
    }  
}
```

### Output:-



```
Microsoft Visual Studio Debu: X + -  
After Pass by Value: 10  
After Pass by Reference: 11  
C:\Users\sanjeet TIWARI\source\repos\C# programs\bin\Debug\net8.0\C# programs.exe (process 21300) exited with code 0 (0x  
0).  
Press any key to close this window . . .
```

## 8. Write a program to implement recursion.

using System;

class RecursionExample

{

static int Factorial(int n)

{

if (n == 1) return 1;

return n \* Factorial(n - 1);

}

static void Main()

{

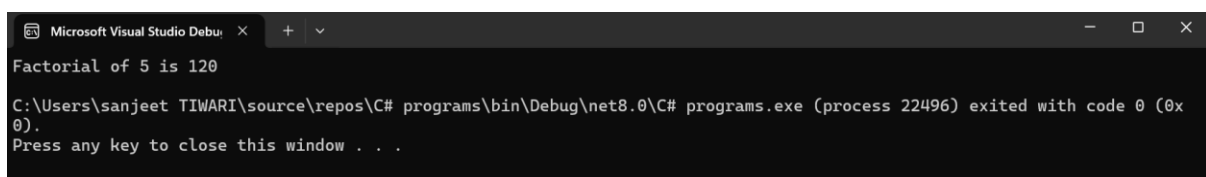
int num = 5;

Console.WriteLine(\$"Factorial of {num} is {Factorial(num)}");

}

}

## Output:-



```
Microsoft Visual Studio Debug Console
Factorial of 5 is 120
C:\Users\sanjeet TIWARI\source\repos\C# programs\bin\Debug\net8.0\C# programs.exe (process 22496) exited with code 0 (0x0).
Press any key to close this window . . .
```

## 9. Write programs to implement one dimensional and two dimensional arrays.

### 1-D Array

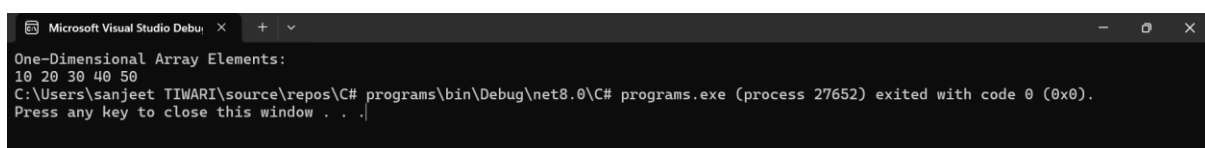
```
using System;

class OneDArrayExample
{
    static void Main()
    {
        int[] numbers = { 10, 20, 30, 40, 50 };

        Console.WriteLine("One-Dimensional Array Elements:");

        for (int i = 0; i < numbers.Length; i++)
        {
            Console.Write(numbers[i] + " ");
        }
    }
}
```

### Output:-

A screenshot of a Microsoft Visual Studio Debug Console window. The window title is "Microsoft Visual Studio Debug Console". The output text is: "One-Dimensional Array Elements:", "10 20 30 40 50", "C:\Users\sanjeet TIWARI\source\repos\C# programs\bin\Debug\net8.0\C# programs.exe (process 27652) exited with code 0 (0x0).", and "Press any key to close this window . . .".

```
Microsoft Visual Studio Debug Console
One-Dimensional Array Elements:
10 20 30 40 50
C:\Users\sanjeet TIWARI\source\repos\C# programs\bin\Debug\net8.0\C# programs.exe (process 27652) exited with code 0 (0x0).
Press any key to close this window . . .
```

## 2-D Array

```
using System;

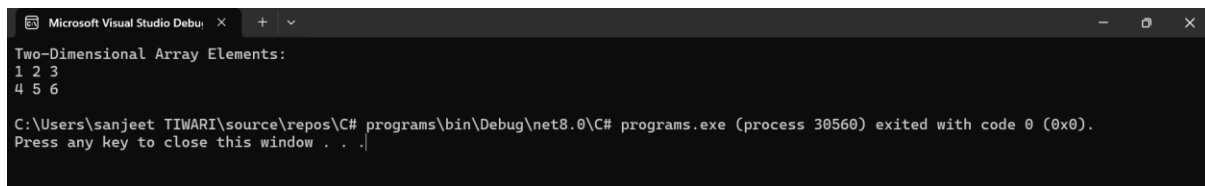
class TwoDArrayExample
{
    static void Main()
    {
        int[,] matrix = { { 1, 2, 3 }, { 4, 5, 6 } };

        Console.WriteLine("Two-Dimensional Array Elements:");

        for (int i = 0; i < 2; i++)
        {
            for (int j = 0; j < 3; j++)
            {
                Console.Write(matrix[i, j] + " ");
            }

            Console.WriteLine();
        }
    }
}
```

### **Output:-**



```
Microsoft Visual Studio Debug Console
Two-Dimensional Array Elements:
1 2 3
4 5 6
C:\Users\sanjeet TIWARI\source\repos\C# programs\bin\Debug\net8.0\C# programs.exe (process 30560) exited with code 0 (0x0).
Press any key to close this window . . .
```

**10. Write programs to understand the working of predefined string functions like Compare( ), CompareTo( ), Concat( ),**

**a. Copy( ) and Join().**

using System;

class StringFunctions

{

static void Main()

{

string str1 = "Hello";

string str2 = "World";

// Compare()

int result = string.Compare(str1, str2);

Console.WriteLine("Compare(): " + result); // Returns -1, 0, or 1

// CompareTo()

int result2 = str1.CompareTo(str2);

Console.WriteLine("CompareTo(): " + result2); // Similar to Compare()

// Concat()

string concatenated = string.Concat(str1, " ", str2);

Console.WriteLine("Concat(): " + concatenated);

// Copy()

string copiedString = string.Copy(str1);

Console.WriteLine("Copy(): " + copiedString);

// Join()

string[] words = { "C#", "is", "awesome" };

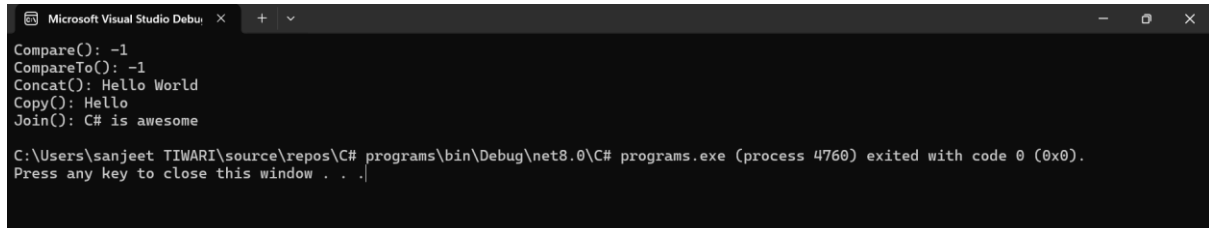
string joinedString = string.Join(" ", words);

Console.WriteLine("Join(): " + joinedString);

}

```
}
```

## Output:-

A screenshot of the Microsoft Visual Studio Debug Console window. The window has a title bar with the text "Microsoft Visual Studio Debug Console" and standard window controls. The console output shows the following lines: "Compare(): -1", "CompareTo(): -1", "Concat(): Hello World", "Copy(): Hello", and "Join(): C# is awesome". Below these, a message indicates the process has exited: "C:\Users\sanjeet TIWARI\source\repos\C# programs\bin\Debug\net8.0\C# programs.exe (process 4760) exited with code 0 (0x0).". The final line prompts the user: "Press any key to close this window . . .".

```
Microsoft Visual Studio Debug Console
Compare(): -1
CompareTo(): -1
Concat(): Hello World
Copy(): Hello
Join(): C# is awesome

C:\Users\sanjeet TIWARI\source\repos\C# programs\bin\Debug\net8.0\C# programs.exe (process 4760) exited with code 0 (0x0).
Press any key to close this window . . .
```



## 11. Write a program to implement class and its objects.

using System;

class Car

{

    // Fields (Attributes)

    public string Brand;

    public string Model;

    public int Year;

    // Constructor to initialize values

    public Car(string brand, string model, int year)

    {

        Brand = brand;

        Model = model;

        Year = year;

    }

    // Method to Display Car Information

    public void DisplayCarInfo()

    {

        Console.WriteLine("Car Brand: " + Brand);

        Console.WriteLine("Car Model: " + Model);

        Console.WriteLine("Manufacturing Year: " + Year);

    }

}

class Program

{

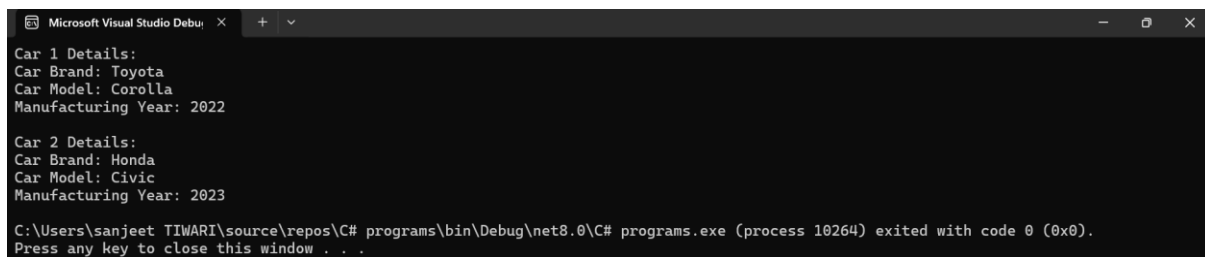
    static void Main()

    {

        // Creating objects of the Car class

```
Car car1 = new Car("Toyota", "Corolla", 2022);  
Car car2 = new Car("Honda", "Civic", 2023);  
// Displaying car details  
Console.WriteLine("Car 1 Details:");  
car1.DisplayCarInfo();  
Console.WriteLine("\nCar 2 Details:");  
car2.DisplayCarInfo();  
}  
}
```

### Output:-



```
Microsoft Visual Studio Debug Console  
Car 1 Details:  
Car Brand: Toyota  
Car Model: Corolla  
Manufacturing Year: 2022  
  
Car 2 Details:  
Car Brand: Honda  
Car Model: Civic  
Manufacturing Year: 2023  
  
C:\Users\sanjeet TIWARI\source\repos\C# programs\bin\Debug\net8.0\C# programs.exe (process 10264) exited with code 0 (0x0).  
Press any key to close this window . . .
```

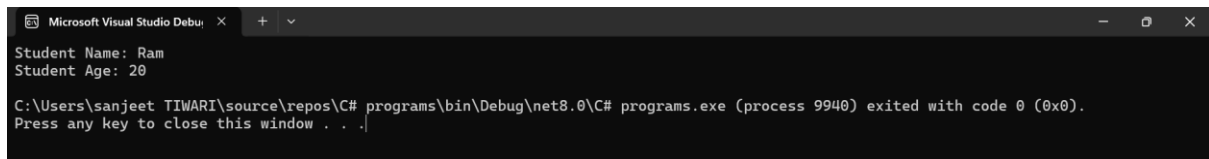
## 12. Write a program to implement constructors.

using System;

class Student

```
{  
    public string Name;  
    public int Age;  
    // Constructor  
    public Student(string name, int age)  
    {  
        Name = name;  
        Age = age;  
    }  
    public void Display()  
    {  
        Console.WriteLine("Student Name: " + Name);  
        Console.WriteLine("Student Age: " + Age);  
    }  
}  
  
class Program  
{  
    static void Main()  
    {  
        Student student1 = new Student("Ram", 20);  
        student1.Display();  
    }  
}
```

**Output:-**



A screenshot of a Microsoft Visual Studio Debug Console window. The window has a dark theme and a title bar that reads "Microsoft Visual Studio Debug Console". The output text is as follows:

```
Student Name: Ram  
Student Age: 20  
  
C:\Users\sanjeet TIWARI\source\repos\C# programs\bin\Debug\net8.0\C# programs.exe (process 9940) exited with code 0 (0x0).  
Press any key to close this window . . .
```