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Alliance

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# M109

حلف الطلاب العاصميين يقدم لكم النسخة الأولى من تجمعيات الامتحانات النهائية محلولةً بالكامل.  
الشكراً مُسدى لكل من صاح وتعقب ورَاجَ النسخ، ومن جمع الملفات على مر السنين.  
نرجو ألا تكون هذه التجمعيات محل اعتمادكم في المذاكرة، فشرائح المُقرر أولى وأكثر أهمية.  
يغلب على النماذج تكرار الأفكار الأسئلة، لذا ننصح بالرجوع إليها والاهتمام بها

فَجَلَّ مَنْ لَا عَيْبَ فِيهِ وَعَلَا  
وَإِنْ تَجِدْ عَيْبًا فَسُدُّ الْخَلَّا

حرر في:

# M109 Exams

جميع نماذج المقرر M109 تم حلها ومراجعتها.  
نسخة الفصل الصيفي لعام 21-22 لم يتم تصويرها لكنها مطابقة تماماً للنموذج المتوفر في  
الصفحة 28 وكذلك أول نماذج الموك.

**Part 1 have 5 questions each question carries 2 mark [10 Mark]**

1. \_\_\_\_\_ class includes the methods to capture input and output in a application.  
a. System  
c. Object  
b. String  
d. Console
2. Which of the following statements is correct about the C#.NET code snippet below?  

```
int a;           False
a = Convert.ToInt32((30 < 20));
```

  
a. A value 0 will be assigned to a.  
c. A value -1 will be assigned to a.  
b. A value 1 will be assigned to a.  
d. The code reports an error
3. What will be the output of the C#.NET code snippet given below?  

```
int j = 1, k;
k = j-- + ++j;
Console.WriteLine(k + " ");
```

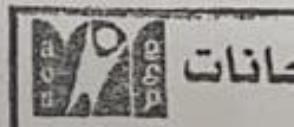
  
a. 2  
d. 5  
b. 1  
d. None of the above
4. Which of the following statement is correct?  
a. Data members of a class are by default public.  
b. Data members of a class are by default private.  
c. Member functions of a class are by default public.  
d. None of the above
5. Which of the following is TRUE about constructors?  
a. Constructors have the same name as the class itself.  
b. Constructors return values.  
c. Constructor is called when an object is no longer required.  
d. None of the above.

Deconstructor

**Part2 Short Essay Questions- each question carries 3 marks [15 Marks]**

1. Complete the program given below (Program -1) to get the following pattern.  
Output

```
1
22
333
4444
55555
```



```

Program -1
static void Main(string[] args)
{
int i,j;

// Write the codes here
}

```

2. What will be the output of the following code snippet?

```

class Program
{
    static void Change(int[] A)
    {
        for (int i = 0; i < A.Length; i++)
        {
            if (i < 3) تزيد 1 على أول 3 عناصر من المصفوفة
                A[i] = A[i] + 1;
        }
    }

    static void Main(string[] args)
    {
        int[] P = new int[] { 1, 3, 5, 7, 9, 11 };
        Change(P);
        for (int i = 0; i < P.Length; i++)
        {
            Console.WriteLine(P[i] + " ");
        }

        Console.ReadLine();
    }
}

```

```

static void Main(string[] args)
{
    int i, j;
    for (i = 1; i <= 5; i++)
    {
        Console.WriteLine();
        for (j = 1; j <= i; j++)
        {
            Console.Write(i);
        }
    }
}

```

P[0] = 1+1=2  
P[1] = 3+1=4  
P[2] = 5+1=6  
P[3] = 7  
P[4] = 9  
P[5] = 11

**output:**  
2  
4  
6  
7  
9  
11

3. Given below is a program to print the product of first 5 numbers using a do-while loop. Will the program generate the desired output? If not, why?

```

class Program
{
    static void Main(string[] args)
    {
        int a=1;
        int pr;
        do
        {
            pr = pr * a;
        }
        while (a > 5);
    }
}

```

It will not print the product, there are **four** mistakes:

- The variable 'pr' is not initialized. It should be `int pr = 1;`
- The condition of the loop is wrong; it must be `while(a<=5)`
- Inside the loop, the variable should be incremented as `a++ (a=a+1)`
- The product needs to be printed so, it's `Console.WriteLine(pr);`



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

4. What will be the output of the following code snippet?

```
namespace ConsoleApplication1
{
    struct FnI
    {
        public int marks;
    }
    class Program
    {
        static void Main(string[] args)
        {
            FnI x = new FnI();
            x.marks = 1210;
            Check(ref x);
            x.marks = x.marks + 5; 1320 + 5;
            Console.Write(x.marks + " "); ---> 1325 ③
            Console.ReadLine();
        }
        public static void Check(ref FnI y)
        {
            y.marks = 1330;
            Console.Write(y.marks + " "); ---> 1330 ①
            y.marks = y.marks - 10; 1320 - 10;
            Console.Write(y.marks + " "); ---> 1320 ②
        }
    }
}
```

Output:

1330 1320 1325

5. Briefly explain the building blocks of .NET Framework with a block diagram.

**Part 3: Problem Solving Questions -**

[25 Marks]

1. Write a program to create a two-dimensional array of 3 rows and 3 columns. Input values to the array. Display all the even elements in the array. [7.5 Marks]

Sample I/O

## Question 5 Answer:

- **Common Language Runtime or CLR**

- The runtime layer of .NET is known as the CLR.
- A collection of services that are required to execute a given compiled unit of code.
- The primary role of the CLR is to locate, load, and manage .NET objects on your behalf.
- The CLR also takes care of several low-level details such as memory management, application hosting, coordinating threads and performing basic security checks.

- **Common Type System or CTS**

- Another building block of the .NET platform is CTS.
- The CTS specification fully describes all possible data types and all programming constructs supported by the runtime, specifies how these entities can interact with each other, and details how they are represented in the .NET format.

- **Common Language Specification or CLS**

- A given .NET-aware language might not support every feature defined by the CTS.
- So, CLS is a related specification that defines a subset of common types and programming constructs that all .NET programming languages can agree on.

- **Base Class Library**

- The .NET platform provides a base class library that is available to all .NET programming languages.
- The base class libraries define types that can be used to build any type of software application.
- It contains predefined methods and properties to implement common and complex functions like reading and writing to file, graphic rendering, database interaction etc.

### The Base Class Libraries

Database Access

Desktop GUI APIs

Security

Remoting APIs

Threading

File I/O

Web APIs

(et al.)

### The Common Language Runtime

Common Type System

Common Language Specification

### Part 3: Question 1

```
using System;
namespace ISA
{
    class _2DArray
    {
        static void Main(string[] args)
        {
            int i, j;
            int[,] arr = new int[3, 3];
            for (i = 0; i < 3; ++i)
            {
                for (j = 0; j < 3; ++j)
                {
                    Console.WriteLine("Enter array value : \t");
                    arr[i, j] = int.Parse(Console.ReadLine());
                }
            }
            Console.WriteLine("\nEven elements is : ");
            for (i = 0; i < 3; ++i)
            {
                for (j = 0; j < 3; ++j)
                {
                    if (arr[i, j] % 2 == 0)
                    {
                        Console.WriteLine("\t" + arr[i, j] + " ");
                    }
                }
            }
            Console.WriteLine();
        }
    }
}
```

```
Microsoft Visual Studio Debug + ▾

Enter array value : 1
Enter array value : 2
Enter array value : 3
Enter array value : 4
Enter array value : 5
Enter array value : 6
Enter array value : 7
Enter array value : 8
Enter array value : 9

Even elements is : 2 4 6 8

C:\Users\z-xon\source\repos\Q2P1\Q2P1\bin\Debug\net6.0\Q2P1.exe
Press any key to close this window . . .
```

```

Enter array value: 1
Enter array value: 2
Enter array value: 3
Enter array value: 4
Enter array value: 5
Enter array value: 6
Enter array value: 7
Enter array value: 8
Enter array value: 9

Even elements are      2      4      6      8

```

2. Write a C# program that displays all the prime numbers between 1 and 100 using loops?  
[7.5 Marks]

**Note:** A prime number is a whole number greater than 1, which is divisible by only 1 and itself. First few prime numbers are 2, 3, 5, 7, 11, 13, 17, 19, 23...

Sample I/O

Prime Numbers :									
2	3	5	7	11	13	17	19	23	
29	31	37	41	43	47	53	59	61	67
71	73	79	83	89	97				

3. Write a C# application that implements a class 'PR' with the following members.
- Seven data members 'side1', 'side2', 'side3', 'base', 'height', 'perimeter' and 'area' of double data type.
  - Four methods, setInitial(), calcPer(), calcArea() and showResult()
    - setInitial() – to set the initial values of side1, side2, side3, base, and height of the shape as per the user input.
    - calcPer() – to calculate the perimeter of the triangle using the formulae  
 $P = \text{side1} + \text{side2} + \text{side3}$
    - calcArea() – to calculate the area of the triangle using the formulae  
 $A = (\text{bs} * \text{h})/2$
    - showResult() – to display the perimeter and area of the triangle.

In the Main method, create an object of the 'PR' class, read the value of length of side1, side2, side3, base, and height and use the object to call the methods to display the output as shown below.  
[10 Marks]

Sample I/O

```

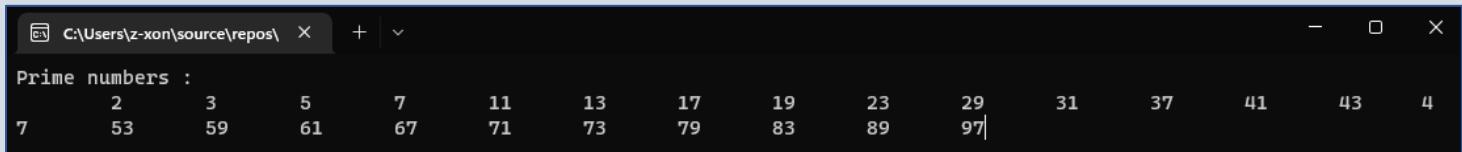
Enter the length of side 1 : 3
Enter the length of side 2 : 4
Enter the length of side 3 : 5
Enter the base area : 4
Enter the height 8

Perimeter = 12
Area = 16

```

### Part 3: Question 2

```
using System;
namespace ISA
{
    class IsaPrimeNumbers
    {
        static void Main(string[] args)
        {
            bool isPrime = true;
            Console.WriteLine("Prime numbers : ");
            for (int i = 2; i <= 100; i++)
            {
                for (int j = 2; j <= 100; j++)
                {
                    if (i != j && i % j == 0)
                    {
                        isPrime = false; break;
                    }
                }
                if (isPrime)
                {
                    Console.Write("\t" + i);
                }
                isPrime = true;
            }
            Console.ReadLine();
        }
    }
}
```

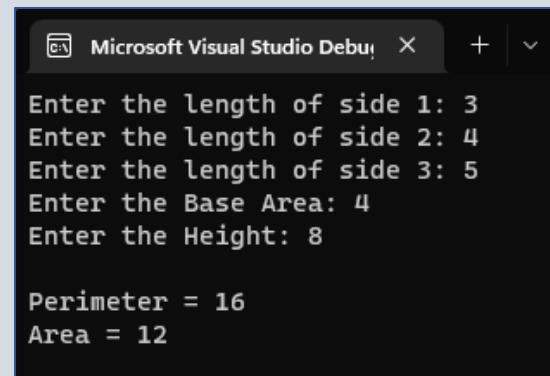


A screenshot of a terminal window titled "C:\Users\z-xon\source\repos\". The window displays the output of a C# program. The output starts with "Prime numbers :" followed by a series of prime numbers from 2 to 43, each preceded by a tab character. The last number, 43, is partially cut off on the right.

```
Prime numbers :
      2      3      5      7     11     13     17     19     23     29     31     37     41     43      4
7      53     59     61     67     71     73     79     83     89     97|
```

### Part 3: Question 3

```
using System;
class Program
{
    double side1, side2, side3, Base, height, perimeter, area;
    public void setLinitial(double s1, double s2, double s3, double bs, double ha)
    {
        side1 = s1;
        side2 = s2;
        side3 = s3;
        Base = bs;
        height = ha;
    }
    public double calcPer()
    {
        perimeter = (Base * height) / 2;
        return perimeter;
    }
    public double calcArea()
    {
        area = side1 + side2 + side3;
        return area;
    }
    public void showResult()
    {
        Console.WriteLine("\nPerimeter = " + calcPer());
        Console.WriteLine("Area = " + calcArea());
    }
}
class Testing
{
    public static void Main(string[] args)
    {
        Program pr = new Program();
        Console.Write("Enter the length of side 1: ");
        double ss1 = Convert.ToDouble(Console.ReadLine());
        Console.Write("Enter the length of side 2: ");
        double ss2 = Convert.ToDouble(Console.ReadLine());
        Console.Write("Enter the length of side 3: ");
        double ss3 = Convert.ToDouble(Console.ReadLine());
        Console.Write("Enter the Base Area: ");
        double bb = Convert.ToDouble(Console.ReadLine());
        Console.Write("Enter the Height: ");
        double hh = Convert.ToDouble(Console.ReadLine());
        pr.setLinitial(ss1, ss2, ss3, bb, hh);
        pr.showResult();
    }
}
```



The screenshot shows a Microsoft Visual Studio Debug window with the title bar "Microsoft Visual Studio Debug". The window displays the following text:

```
Enter the length of side 1: 3
Enter the length of side 2: 4
Enter the length of side 3: 5
Enter the Base Area: 4
Enter the Height: 8

Perimeter = 16
Area = 12
```

**PART A contains 10 questions each question carries 1 Mark**

1. In C#, why is it necessary to perform 'Conversion of data types?'
  - a. To store a value of one data type into a variable of another data type
  - b. To get desired data
  - c. To prevent situations of runtime error during change or conversion of data type
  - d. None of the mentioned
2. Which of the following can be facilitated by the Inheritance mechanism?
  1. Use the existing functionality of base class.
  2. Override the existing functionality of base class.
  3. Implement new functionality in the derived class.
  4. Implement polymorphic behaviour.
  5. Implement containership.

**a. 1,2,3**      c. 2,4,5  
b. 3,4      d. 3,5
3. Which of the following is the correct way of decrementing the variable 'p'? **P=P-1;**

**a. p -= 1;**      c. p - 1;  
b. p == 1;      d. -p --;
4. \_\_\_\_\_ performs invisible tasks even if you write no code.
  - a. Private Method
  - b. Destructor
  - c. Constructor
  - d. Function
5. Encapsulation makes it easier to:
  - a. Reuse and modify existing modules
  - b. Hide and protect data from external code
  - c. Write and read code by sharing method names
  - d. None of the above
6. Dynamic polymorphism is implemented by abstract classes and virtual functions.

**a. true**  
**b. false**
7. How many times can a constructor be called during lifetime of the object?

**a. Only once.**  
**b. As many times as we call it.**  
c. Any number of times before the object is deleted.  
d. None of the above.
8. Array index starts with

**a. 0**      c. 1  
b. -1      d. 2
9. Which of the following is an identifier that denotes a storage location?
  - a. Constant
  - b. Reference
  - c. Variable
  - d. Object
10. C# Applications always starts execution by calling the following method
  - a. Class()
  - b. Main()
  - c. Submain()
  - d. Namespace

11. Which of the following language allow more than one method in a single class?  
a. C  
b. C++  
c. C#  
d. Java
12. An instruction that instructs the computer to perform certain mathematical or logical manipulations  
a. Operator  
b. Logic  
c. Condition  
d. Expression
13. The block which is visible only in the block they are declared  
a. System  
b. Local  
c. Global  
d. Console
14. The method which have same name, but different parameter lists and different definition is known as  
a. Method overloading  
b. Method overriding  
c. Method overwriting  
d. Operator overloading
15. Can the method add () be overloaded in the following ways in C#?

Public int add ()  
Public float add ()

- a. True  
b. False
16. Contiguous data item that shares a common name is  
a. Integer  
b. Array  
c. Operator  
d. Functions
17. Unreachable code in a c# is always  
a. Error  
b. Method  
c. reachable  
d. unreachable
18. Which of these keywords is not a part of exception handling?  
a. try  
b. finally  
c. thrown  
d. catch

19. Encapsulation makes it easier to:  
a. Reuse and modify existing modules  
b. Hide and protect data from external code  
c. Write and read code by sharing method names  
d. None of the above
20. Which is the correct multidimensional array declaration  
a. myArray[1][3]  
b. myArray[1-3]  
c. myArray{1}{3}  
d. myArray(1),(3)
21. Which of the following statement is true?  
a. A base class inherits some of the properties of a derived class.  
b. A base class inherits all of the properties of a derived class.  
c. A derived class inherits all of the properties of a base class.  
d. None of the above
22. Which of these exceptions will occur if we try to access the index of an array beyond its length?  
a. ArithmeticException  
b. ArrayException  
c. ArrayArgumentException  
d. IndexOutOfRangeException
23. Which of the following can control access to a class, methods, or variables?  
a. Encapsulation  
b. Polymorphism  
c. Data hiding  
d. Overriding

24. Which of the following statements is correct?
- Each derived class does not have its own version of a virtual method
  - If a derived class does not have its own version of virtual method, then one in base class is used
  - By default methods are virtual
  - All of the mentioned
25. The syntax for declaration and initialization of data variable is?
- `<data type><var_name> = <Value>;`
  - `<data type><var_name>;`
  - `<var_name><data type>;`
  - `<var_name> = <value>;`
26. C# does not support:
- Abstraction
  - Polymorphism
  - Inheritance
  - Multiple inheritances
27. Which keyword is used to declare a base class method while performing overriding of base class methods?
- this
  - virtual
  - override
  - extend
28. Which of these can be overloaded?
- Constructors
  - Methods
  - Both Constructors & Methods
  - None of the mentioned
29. If a class inheriting an abstract class does not define all of its functions, then it is known as?
- Abstract
  - A simple class
  - Static class
  - None of the mentioned
30. What is the process of defining a method in terms of itself, that is a method that calls itself?
- Polymorphism
  - Abstraction
  - Encapsulation
  - Recursion

### Part B Programming Questions Each question carries 2 Marks

1. What is the output of the following piece of code?

```
int a, b;
a = 10; b = 4;
Console.WriteLine(a % b);
a. 2
b. 0
c. 2.5
d. 1
```

2. Consider the array `int[] B = {2, 4, 1, 2, 1}`. Which of the following is the output of the statement?

```
|Console.WriteLine(B[3] / 2);
```

- 1
- 2
- 0.5
- 1

3. Which of the following statements are correct about the C#.NET code snippet given below?

```
|int[] a = {11, 3, 5, 9, 4};
```

- The array elements are created on the stack.
- Reference is created on the stack.
- The array elements are created on the heap.

1] When an array is created it is derived from System.Array.

2] As it is of reference type it is stored on Heap memory dynamically.

3] & its reference is got stored on the stack.

- D On declaring the array a new array class is created which is derived from  
 E System.Array Class.  
 Whether the array elements are stored in the stack or heap depends upon the size of the array.

- a. 1, 2  
 b. 2, 3, 4  
 c. 2, 3, 5  
 d. 4, 5
4. Which statement is correct about the following set of code?  
 int[,] a={{5, 4, 3},{9, 2, 6}};
- a. 'a' represents 1-D array of 5 integers  
 b. GetUpperBound(0) gives 9  
 c. Represents a rectangular array of 2 columns and 3 arrays  
 d. GetUpperBound(0) gives 2

543

526

5. Which of the following is the correct output of the C# .NET code given below?

```
int[] a = new int[2];
a[0] = new int[4]{6, 1, 4, 3};
a[1] = new int[3]{9, 2, 7};
Console.WriteLine(a[1].GetUpperBound(0));
```

- c. 1  
 d. 8

```
using System;
class Testing
{
    public static void Main(string[] args)
    {
        int[] a = new int[2];
        a[0] = new int[4] { 6, 1, 4, 3 };
        a[1] = new int[3] { 9, 2, 7 };
        Console.WriteLine(a[1].GetUpperBound(0));
    }
}
```

6. What will be the output of the following code.

```
int[] i = new int[0];
Console.WriteLine(i[0]);
```

- c) Nothing is printed as array is empty

- a) 0  
 b) IndexOutOfRangeException  
 d) 1

7. What will be the output of the following code?

```
1. static void Main(string[] args)
2. {
3.     m();
4.     Console.ReadLine();
5. }
6. static void m()
7. {
8.     Console.WriteLine("HI");
9.     m();
10. }
```

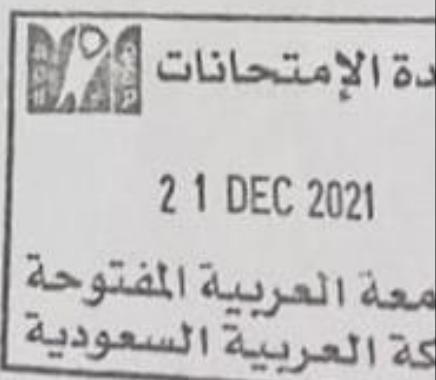
- c) Stack overflow exception  
 d) Compile-time error

8. Find the output of the following code

```
1. static void Main(string[] args)
2. {
3.     String a = "Ilove";
4.     String b = "CSHARP";
5.     b = string.Concat(a, ' ', b);
6.     Console.WriteLine(b);
7.     Console.ReadLine();
8. }
```

- a) IloveCSHARP  
 b) I loveCSHARP

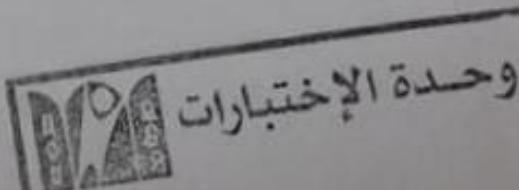
- c) Ilove  
 d) Illoye CSHARP



**Part 1: Multiple Choice Questions (write answers in the external answer sheet, 1.5 Marks each)**

**[15 Marks]**

1. A .NET program compiles into an intermediate code, which is known as \_\_\_\_\_  
a. Common Language Specification  
**b. MSIL**  
c. Common Type System  
d. None of the above
2. When a new C# application is created, the IDE creates a \_\_\_\_\_ with a single project.  
a. Solution  
b. Properties  
**c. Toolbox**  
d. Server
3. Which of the following is an example of a real literal?  
a. '2.5f'  
b. 23  
**c. 2.5f**  
d. "12"
4. Which of the following is not a floating-point data type?  
**a. char**  
b. float  
c. double  
d. All of the above
5. \_\_\_\_\_ is an example of an equality operator in C#.  
a. =  
**b. !=**  
c. <  
d. &&
6. Which of the following is a replacement of if-else statement?  
a. Relational operator  
b. Unary operator  
**c. Ternary operator**  
d. Logical operator
7. In C#, the access modifier used to access methods from anywhere, including outside the class is known as \_\_\_\_\_  
a. Private  
b. Protected  
**c. Public**  
d. None of the above
8. Consider the array int[] A = { 10, 8, 6, 4, 0 }; Which of the following is the output of the statement Console.WriteLine(++A[0]); ?  
a. 8  
b. 9  
**c. 10**  
**d. 11**
9. Which of the following is true about constructors?  
a. Constructor is a method which is called when an object is no more required  
**b. Constructors have the same name as the class itself**  
c. Constructors specify a return type  
d. None of the above
10. C# handles an exception that is not caught by any of the previous catch statements using \_\_\_\_\_ statement.  
**a. finally**  
b. try  
c. throws  
d. catch



## Part 2: Short Essay Questions/ Output Questions

[35 Marks]

1. What will be the output of the following code? [6 Marks]

```
public class AOU
{
    public static void Main(string[] args)
    {
        int[] PQR = new int[] { 20, 20, 20, 40, 50 };
        test(ref PQR);
        Console.ReadLine();
    }

    static void test(ref int[] PQ)
    {
        for (int i = 0; i < PQ.Length; i++)
        {
            PQ[i] = PQ[i] + 1;
            Console.Write(PQ[i] + " ");
        }
    }
}
```

**Output:**

20 21 22 43

**Question2:**

polymorphism **is** achieved by method overloading and **method** overloading

2. How to achieve polymorphism in C#.NET?

3. Rewrite the following C# switch statement using the if-else-if statement: [6 Marks]

```
switch(B)
{
    case 2:
    case 4: Console.WriteLine("Hai");
        break;
    case 6:
    case 8: Console.WriteLine("Hello");
        break;
    default: Console.WriteLine("Good Bye");
        break;
}
```

4. The following C# code contains syntax errors. Identify the errors and write the correction opposite to each line of code. If there is no error in a line, write NO ERROR. [6 Marks]

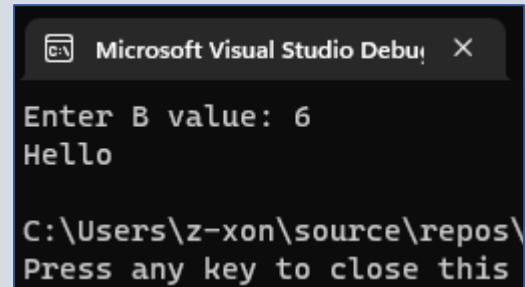
CODE	ERRORS
class Program	NO ERROR
{	NO ERROR
static Main(string[] args)	Return type is missing - void
{	NO ERROR
int a, b;	NO ERROR
Console.WriteLine(Input two numbers);	Double Quotations is missing - ""
a = Convert.ToInt32(Console.ReadLine());	NO ERROR
b = Convert.ToDouble(Console.ReadLine());	Wrong converting - Convert.ToInt32
if(a >b)	NO ERROR
Console.WriteLine("{0} is the biggest,);	Console.WriteLine("{0} is the biggest", a);
else	NO ERROR
Console.WriteLine("{0} is the biggest, b)	Console.WriteLine("{0} is the biggest", b);
Console.ReadLine();	NO ERROR
}	Missing class Curley brackets

5. Briefly explain two-dimensional arrays. How to declare, create and initialize a two-dimensional array? Explain with an example. [6 Marks]

6. Compare the features of C#, Java programming languages. [5 Marks]

### Question 3 Answer:

```
using System;
class Testing
{
    public static void Main(string[] args)
    {
        Console.Write("Enter B value: ");
        int b = Convert.ToInt32(Console.ReadLine());
        if (b == 2 || b == 4)
        {
            Console.WriteLine("Hai");
        }
        else if (b == 6 || b == 8)
        {
            Console.WriteLine("Hello");
        }
        else
        {
            Console.WriteLine("Good Bye");
        }
    }
}
```



The screenshot shows a Microsoft Visual Studio Debug window. It displays the following text:  
Enter B value: 6  
Hello  
  
C:\Users\z-xon\source\repos\  
Press any key to close this

### Question 5 Answer:

#### Explanation:

Represent a particular value in matrix by using two subscripts such as  $V_{ij}$  it allows us to define such table of items by using two-dimensional array.

#### Declaration and Creation:

```
int[,] myArray;  
myArray = new int[3, 4];
```

OR

```
int[,] myArray = new int[3,4];
```

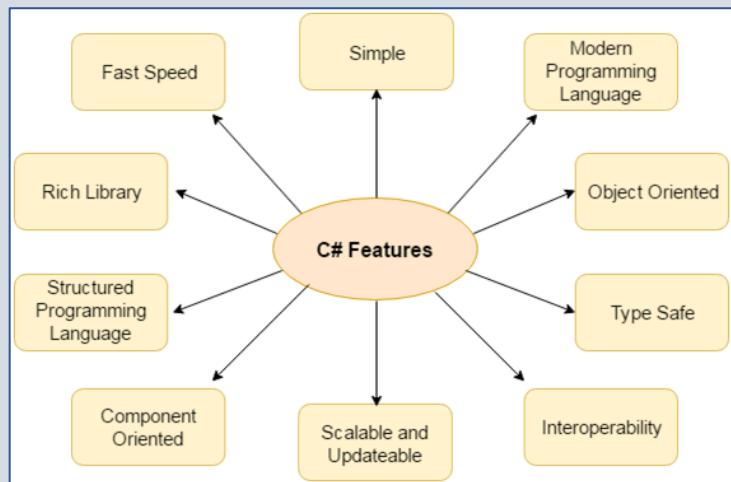
#### Initialization:

```
int[,] myArray = {  
    {0, 0, 0},  
    {1, 1, 1},  
    {2, 2, 2},};
```

### Question 6 Answer:

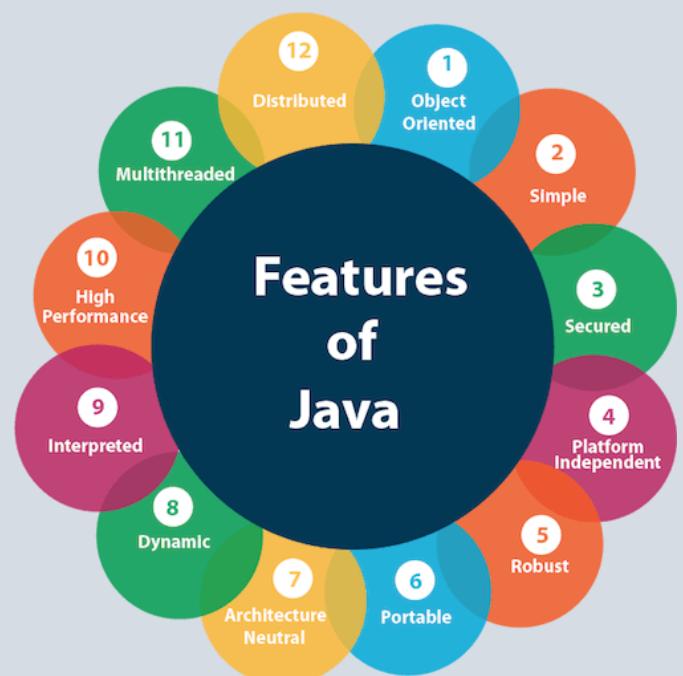
C# is object-oriented programming language. It provides a lot of features that are given below. (1-5 are from the slides)

- 1- No pointers required! C# programs typically
- 2- have no need for direct pointer manipulation.
- 3- Automatic memory management through garbage collection.
- 4- Support for strongly typed queries used to interact with various forms of data.
- 5- It can be compiled on a variety of computer platforms.
- 6- Simple
- 7- Modern programming language
- 8- Object oriented
- 9- Type safe
- 10- Interoperability
- 11- Scalable and Updateable
- 12- Component oriented
- 13- Structured programming language
- 14- Rich Library
- 15- Fast speed



The primary objective of Java programming language creation was to make it portable, simple and secure programming language. It provides a lot of features that are given below (1-10 from TM105 Course).

- 1- Java Is Simple
- 2- Java Is Object-Oriented
- 3- Java Is Distributed
- 4- Java Is Interpreted
- 5- Java Is Robust
- 6- Java Is Secure
- 7- Java Is Architecture-Neutral
- 8- Java Is Portable
- 9- Java's Performance
- 10- Java Is Multithreaded
- 11- Java Is Dynamic
- 12- Platform independent



### **Part 3: Problem Solving Questions**

**[50 Marks]**

Write a C# application to find the largest element in an array of 10 integers. The user should enter the 10 integers from the keyboard. Print the result in the following format:

The Largest number in the array= Answer

[15 Marks]

Write a C# application that implements a class 'Amount'. Define three data members 'TotalAmount', 'Deductions' and 'BalanceAmount' of double data type and four public methods Balance(), Debit(), Credit(), and GetData() in the class. In the Main method, create an object of the 'Amount' class and use the object to call the Balance() method and the GetData() method. Define the methods as follows:- [20 Marks]

Balance()

- i. Set the value of TotalAmount as 10000 and Deductions as 1500.
- ii. Calculate the BalanceAmount. [BalanceAmount = TotalAmount - Deductions].
- iii. Display the BalanceAmount.

Debit()

- iv. Read a DebitAmount entered by the user.
- v. Update the BalanceAmount [BalanceAmount = BalanceAmount - DebitAmount].
- vi. Display the updated BalanceAmount.

Credit()

- vii. Read a CreditAmount entered by the user.
- viii. Update the BalanceAmount [BalanceAmount = BalanceAmount + CreditAmount].
- ix. Display the updated BalanceAmount.

GetData()

- x. Display the list of choices ('d' for Debit and 'c' for Credit) to the user.
- xi. Read the choice of the user.
- xii. If the user option is 'd' call the Debit() method, otherwise call the Credit() method.

3. The following table shows the criteria for diagnoses of diabetes and prediabetes during fasting. Write a program to read the test type and the blood sugar level of a person, and then display his/her test result as per the criteria below. [15 Marks]

Test Type	Blood Sugar Level (mg/dl)	Test Result
F (Fasting)	Less than 108 mg	Normal
	Less than or equal to 125 and greater than or equal to 108	Prediabetes
	Greater than 125	Diabetes
AF (After Food)	Less than 140 mg	Normal
	Less than or equal to 199 and greater than or equal to 140	Prediabetes
	Greater than 199	Diabetes

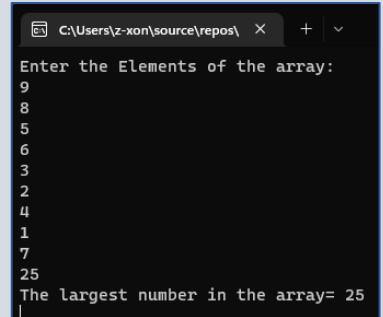
Sample  
I/O

Enter the test type [F for fasting/ AF for after food]: AF  
Enter the blood sugar level: 175  
Test result is Prediabetes

### Question 1 Answer (Largest number):

```
using System;
class ISALargestNumber
{
    public static void Main(string[] args)
    {

        int[] arr=new int[10];
        int max = 0;
        Console.WriteLine("Enter the Elements of the array: ");
        for(int i = 0; i < arr.Length; i++)
        {
            arr[i]= Convert.ToInt32(Console.ReadLine());
            if(arr[i] > max)
                max = arr[i];
        }
        Console.WriteLine("The largest number in the array= " + max);
        Console.ReadLine();
    }
}
```



```
C:\Users\z-xon\source\repos\ X + | 
Enter the Elements of the array:
9
8
5
6
3
2
4
1
7
25
The largest number in the array= 25
```

### Question 2 Answer:

```
using System;
class ISAAmount
{
    double TotalAmount, Deductions, BalanceAmount;

    public void Balance()
    {
        TotalAmount = 10000;
        Deductions = 1500;
        BalanceAmount = TotalAmount - Deductions;
        Console.WriteLine("The Balance Amount is: " + BalanceAmount);
    }

    public void Debit()
    {
        Console.Write("Enter the Debit Amount: ");
        double DebitAmount = Convert.ToDouble(Console.ReadLine());
        BalanceAmount = BalanceAmount - DebitAmount;
        Console.WriteLine("The updated Balance Amount is: " + BalanceAmount);
    }

    public void Credit()
    {
        Console.Write("Enter the Credit Amount: ");
        double CreditAmount = Convert.ToDouble(Console.ReadLine());
        BalanceAmount = BalanceAmount + CreditAmount;
        Console.WriteLine("The updated Balance Amount is: " + BalanceAmount);
    }
}
```

```

public void GetData()
{
    Console.Write("Enter 'd' to show the Debit, and 'c' to show the Credit: ");
    char choice = Char.ToLower(Convert.ToChar(Console.ReadLine()));
    if (choice == 'd') //you can use switch instead of if-else
        Debit();
    else if (choice == 'c')
        Credit();
    else
        Console.WriteLine("Wrong Choice");
}
class Test {
    public static void Main(string[] args)
    {
        ISAAmount x = new ISAAmount ();
        x.Balance();
        x.GetData();
        Console.ReadKey();
    }
}

```

```

C:\Users\z-xon\source\repos\  X + | v
The Balance Amount is: 8500
Enter 'd' to show the Debit, and 'c' to show the Credit: c
Enter the Credit Amount: 5000
The updated Balance Amount is: 13500
|
```

### Question 3 Answer:

```

using System;
class ISADiagnoses
{
    public static void Main(string[] args)
    {
        Console.WriteLine("\n Enter the test type (F for fasting/ AF for after food):");
        string testType = Console.ReadLine();
        Console.WriteLine("\n Enter the blood sugar level: ");
        int bloodSugar = Convert.ToInt32(Console.ReadLine());

        if (testType == "F")
        {
            if (bloodSugar < 108)
                Console.WriteLine("\n Test result is Normal");
            else if (bloodSugar <= 125 && bloodSugar >= 108)
                Console.WriteLine("\n Test result is Prediabetes");
            else
                Console.WriteLine("\n Test result is Diabetes");
        }
        else if (testType == "AF")
        {
            if (bloodSugar < 140)
                Console.WriteLine("\n Test result is Normal");
            else if(bloodSugar <= 199 && bloodSugar >= 140)
                Console.WriteLine("\n Test result is Prediabetes");
            else
                Console.WriteLine("\n Test result is Diabetes");
        }
    }
}

```

```

Microsoft Visual Studio Debug  X + | v
Enter the test type (F for fasting/ AF for after food): AF
Enter the blood sugar level: 175
Test result is Prediabetes
C:\Users\z-xon\source\repos\Q2P1\Q2P1\bin\Debug\net6.0\Q2P1.exe
Press any key to close this window . . .
|
```

## Part 1: Multiple Choice Questions (write answers on the external answer sheet, 2 Marks each)

1. A Constructor
  - a. is used to create objects
  - b. must have the same name as the class it is declared within
  - c. maybe overloaded
  - d. all of the above
2. A variable declared inside a method is called a \_\_\_\_\_ variable.
  - a. Static
  - b. Private
  - c. Local
  - d. b and c
3. Defining two methods with the same name but with different parameters is called
  - a. Loading
  - b. Overloading
  - c. Encapsulation
  - d. Overriding
4. A \_\_\_\_\_ block encloses the code that could throw an exception.
  - a. Try
  - b. Catch
  - c. Exception
  - d. Error
5. \_\_\_\_\_ parameters are used to pass results back to the calling method
  - a. Input
  - b. Reference
  - c. Value
  - d. Output
6. Which of the following is the incorrect way to increment the value of variable a by 1?
  - a.  $++a$
  - b.  $a += 1$
  - c.  $a = a + 1$
  - d.  $a++1$
7. What will be the output of the following C# code:

```
int i, j = 1, k;
for (i = 0; i < 5; i++)
{
    k = j++ + ++j;
    Console.Write(k + " ");
}
```

  - a. 4 16 12 20
  - b. 4 8 12 16 20
  - c. 4 8 16 32 64
  - d. 2 4 6 8 10
8. The total number of elements in an array can be found using
  - a. Max
  - b. Length
  - c. All
  - d. Count
9. Which of the following is the correct way to declare an object of class testClass:
  - a. testClass t = new testClass();
  - b. testClass t;
  - c. t = new testClass();
  - d. All of the above
10. Which of the following is correct:
  - a. Data members of a class are by default public.
  - b. Data members of a class are by default private.
  - c. Member functions of a class are by default public.
  - d. All of the above

## Part 2: Short Essay Questions (6 marks each)

[30 Marks]

Already Solved Below

1. What is an exception? How are try, catch and finally blocks used in exception handling?

Already Solved Below

[6 marks]

2. What is the difference between prefix and postfix decrement operators? Give an example. [6 marks]

3. Rewrite the following code using for loop: [6 marks]

```
int i = 0;
do
{
    Console.WriteLine(i);
    i += 1;
} while (i <= 10);
```

```
for (int i = 0; i <= 10; i += 1)
{
    Console.WriteLine(i);
}
```

4. Rewrite the following if-else statement using the ternary operator: [6 marks]

```
if (grade >= 60)
    Console.WriteLine("Passed");
else
    Console.WriteLine("Failed");
```

5. Explain any three types of access modifiers that can be applied to classes and their members. [6 marks]

## Part 3: Problem Solving Questions

[50 Marks]

1. Write a C# program to count the frequency of each element in an Array. Enter the length of the Array and values of the array from Keyboard. [20 Marks]

Sample I/O

Count frequency of each element of an array:

Input the number of elements to be stored in the array (Length) :3

Input 3 elements in the array :

element - 0 : 25

element - 1 : 12

element - 2 : 25

The frequency of all elements of array :

25 occurs 2 times

12 occurs 1 times

## Part2 Q5 Answer:

MODIFIER	ACCESSIBILITY CONTROL
Private	Member is accessible only within the class containing the member.
Public	Member is accessible from anywhere outside the class as well. It is also accessible in derived classes.
protected	Member is visible only to its own class and its derived classes.

## Part3 Q1 Answer:

```
using System;
namespace ISA
{
    class Frequency
    {
        static void Main(string[] args)
        {
            Console.WriteLine("Count frequency of each element of an array:");
            Console.Write("Input the number of elements to be stored in the array
(Length): ");
            int n = Convert.ToInt32(Console.ReadLine());
            int[] arr = new int[n];
            Console.WriteLine("Input " + n + " elements in the array:");

            for(int i = 0; i < n; i++)
            {
                Console.Write("element - " + i + ": ");
                arr[i] = Convert.ToInt32(Console.ReadLine());
            }
            int[] arr2 = new int[arr.Length];
            int visited = -1;

            for(int i = 0; i < arr.Length; i++)
            {
                int count = 1;
                for(int j = i+1; j < arr.Length; j++)
                {
                    if(arr[i] == arr[j])
                    {
                        count++;
                        arr2[j] = visited;
                    }
                }
                if (arr2[i] != visited)
                    arr2[i] = count;
            }
            Console.WriteLine("\nThe frequency of all elements of array: ");
            for( int i = 0; i < arr2.Length; i++)
            {
                if (arr2[i] != visited)
                    Console.WriteLine(arr[i] + " occurs " + arr2[i] + " times");
            }
        }
    }
}
```

```
Microsoft Visual Studio Debug X + ▾
Count frequency of each element of an array:
Input the number of elements to be stored in the array (Length): 3
Input 3 elements in the array:
element - 0: 25
element - 1: 12
element - 2: 25

The frequency of all elements of array:
25 occurs 2 times
12 occurs 1 times
```

2. Write a C# application that implements a class ‘Square’ with the following members.
- a. Three private data members ‘side’, ‘perimeter’ and ‘area’ of double data type.
  - b. Four methods, setSide(), calcPer(), calcArea() and dispResult()
    - i. setSide() – to set the length of the side (s) of the square as per the user input.
    - ii. calcPer() – to calculate the perimeter of the square using the formulae  
$$P = 4 * s$$
    - iii. calcArea() – to calculate the area of the square using the formulae  $A = s^2$
    - iv. dispResult() – to display the perimeter and area of the square.

In the Main method, create an object of the ‘Square’ class, read the value of length of side and use the object to call the methods to display the output as shown below.

[15 Marks]

Sample I/O

```
Enter the length of the side of square : 3
Perimeter of the Square= 12
Area of the Square= 9
```

3. Write a C# application to display the N terms of even natural number and their sum. Enter the number of terms from Keyboard.

[15 Marks]

Sample I/O

```
Calculate N terms of even natural number and their sum:
```

```
Input number of terms : 10
```

```
The even numbers are :2 4 6 8 10 12 14 16 18 20
```

```
The Sum of even Natural Number up to 10 terms : 110
```

---

**End of Questions**

**Part3 Q2 Answer:**

```
using System;
namespace ISA
{
    class Square
    {
        private double side, perimeter, area;

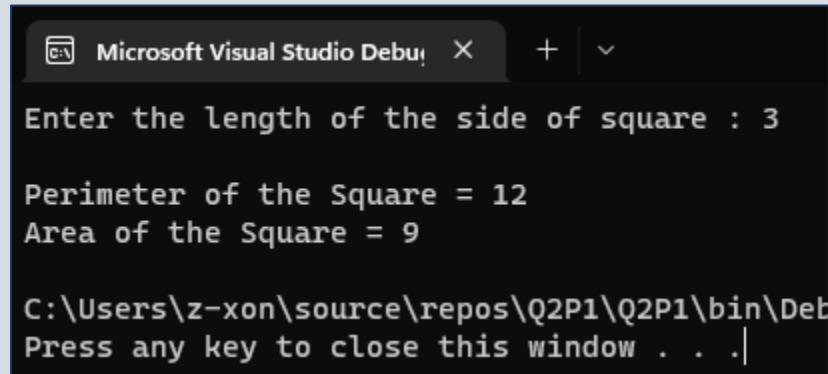
        public void setSide(double s)
        {
            side = s;
        }

        public double calcPer()
        {
            perimeter = 4 * side;
            return perimeter;
        }

        public double calcArea()
        {
            area = side * side;
            return area;
        }

        public void disResult()
        {
            Console.WriteLine("\nPerimeter of the Square = " + calcPer());
            Console.WriteLine("Area of the Square = " + calcArea());
        }
    }

    static void Main(string[] args)
    {
        Square x = new Square();
        Console.Write("Enter the length of the side of square : ");
        double side = Convert.ToDouble(Console.ReadLine());
        x.setSide(side);
        x.disResult();
    }
}
```



The screenshot shows the Microsoft Visual Studio Debug window. It displays the following output:

```
Microsoft Visual Studio Debug X + | v

Enter the length of the side of square : 3

Perimeter of the Square = 12
Area of the Square = 9

C:\Users\z-xon\source\repos\Q2P1\Q2P1\bin\Debug
Press any key to close this window . . .
```

**Part3 Q2 Answer:**

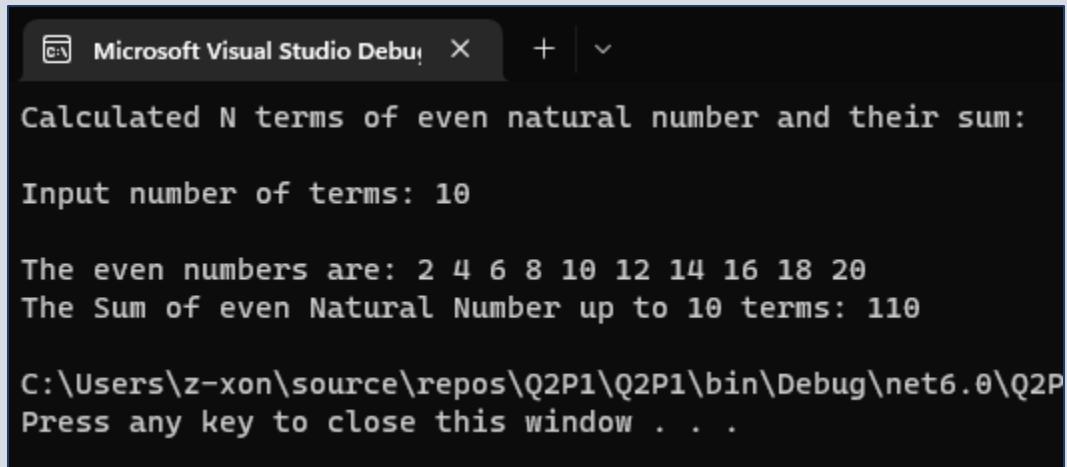
```
using System;
namespace ISA
{
    class Square
    {
        static void Main(string[] args)
        {

            Console.WriteLine("Calculated N terms of even natural number and their
sum: \n");

            int sum = 0;
            Console.Write("Input number of terms: ");
            int num = Convert.ToInt32(Console.ReadLine());
            Console.WriteLine();
            Console.Write("The even numbers are: ");

            for (int i = 1; i <= num; i++)
            {
                Console.Write("{0} ", 2 * i);
                sum = sum + 2 * i;
            }

            Console.WriteLine("\nThe Sum of even Natural Number up to 10 terms: " +
sum);
        }
    }
}
```



```
Microsoft Visual Studio Debug X + | ▾

Calculated N terms of even natural number and their sum:

Input number of terms: 10

The even numbers are: 2 4 6 8 10 12 14 16 18 20
The Sum of even Natural Number up to 10 terms: 110

C:\Users\z-xon\source\repos\Q2P1\Q2P1\bin\Debug\net6.0\Q2P
Press any key to close this window . . .
```

## Part 1: Multiple Choice Questions (write answers on the external answer sheet, 2 Marks each)

1. Which of the following is an example of a static method?
  - a. Main()
  - b. Public
  - c. Internal
  - d. None of the above
2. Which of the following is not an example of a C# keyword?
  - a. sum
  - b. public
  - c. default
  - d. for
3. The .NET building block which describes all possible data types and programming constructs in C# is known as \_\_\_\_\_
  - a. Base Class Library
  - b. Common Language Runtime
  - c. Common Type System
  - d. None of the above
4. \_\_\_\_\_ is a tool window in the Visual Studio IDE that displays the contents of a solution.
  - a. Solution Explorer
  - b. Properties Window
  - c. Toolbox
  - d. Server Explore
5. What is the output of the following statements in C#?
  - a. 8
  - b. 9
  - c. 7
  - d. 10

```
a = 3  
a = 3 * 3  
a = 9  
a = 9
```
6. Which of the following is a replacement of if-else statement?
  - a. Relational operator
  - b. Unary operator
  - c. Ternary operator
  - d. Logical operator
7. In C#, which of the following is the least permissive access modifier?
  - a. Private
  - b. Protected
  - c. Public
  - d. None of the above
8. Consider the array int[] A = { 10, 8, 6, 4, 0 };  
Which of the following is the output of the statement?

```
A[2]=A[2]++;  
Console.WriteLine(A[2]++);
```

  - a. 8
  - b. 4
  - c. 7
  - d. 6
9. Which of the following is true about constructors?
  - a. Constructor is a method which is called when an object is no more required
  - b. Constructors have the same name as the class itself
  - c. Constructors specify a return type
  - d. None of the above
10. Which of these keywords is used to manually throw an exception?

try

finally

catch

29 DEC 2019

  - a. try
  - b. throw
  - c. finally
  - d. catch

## Part 2: Short Essay Questions (6 marks each)

[30 Marks]

1. Briefly explain unary operators in C# with examples. [6 Marks]
2. Explain the syntax of conditional operator in C#. [6 marks]
3. What is the output of the following program segment? Justify your answer for the output. [6 Marks]

```
public static void Main(string[] args)
{
    int []M = new int [] {2,3,1,7,8,3,9,1,2,0};
    int i;
    for (i = 0; i < 10+2; i+=2)
        Console.WriteLine(M[i]);
}
```

Output:

2  
1  
8  
9  
2

Run-time exception (line 11):  
Index was outside the bounds  
of the array.

4. What will be the output of the following code?

```
public class Program
{
    static void Change(ref int [] A)
    {
        for (int i = 0; i < 4; i++)
        {
            if (i < 3)
                A[i] = A[i] + 1;
        }
    }

    public static void Main(string[] args)
    {
        int[] P = new int[] { 2,4,6,8,10,12 };
        Change(ref P);
        for (int i = 0; i < 4; i++)
        {
            Console.WriteLine(P[i] + " ");
        }
        Console.ReadLine();
    }
}
```

Output:

3  
5  
7  
8

5. Rewrite the following using for loop:

[6 Marks]

```
int i=0;
while(i<10)
{
    Console.WriteLine(i*2);
    i = i + 1;
}
```

```
for (int i = 0; i < 10; i++)
    Console.WriteLine(i * 2);
```

## **Part2 Q1 Answer:**

The C# unary operator is widely used for increment or decrement value by 1. This operator is widely used with loop constructs to increment/ decrement loop by 1.

### **++ Increment Operator:**

This operator is pronounced as increment operator. It is used for incrementing value by 1. It is used in C# programming by two types: Pre-increment (`++i`) and post-increment (`i++`). In pre-increment, first it increments by 1 then loop executes whereas in post-increment, the loop executes first, then it increments by 1.

Example: `++a;`

### **-- Decrement Operator:**

It is used for decrementing the value by one. It has also two types: Pre-Decrement (`--i`) and post-Decrement (`i--`). In pre-decrement the value is decremented by one then loop executes whereas in post-decrement the loop is executed and then the value decrements by one.

Example: `a--;`

## **Part2 Q2 Answer:**

### **Syntax:**

`Exp1 ? Exp2 : Exp3;`

Where `Exp1`, `Exp2`, and `Exp3` are expressions.

The value of a ? expression is determined like this: `Exp1` is evaluated. If it is true, then `Exp2` is evaluated and becomes the value of the entire? expression. If `Exp1` is false, then `Exp3` is evaluated, and its value becomes the value of the expression.

### **Part 3: Problem Solving Questions**

**[50 Marks]**

1. Write a C# program to merge two Arrays with 5 elements in each. Display the content of the merged Array. Find the smallest and largest elements in the merged Array. Read the array values from keyboard.

**[20 Marks]**

#### Sample I/O

Enter the array1 elements

1  
2  
3  
4  
5

Enter the array2 elements

1  
2  
3  
4  
5

Merged Array

2  
4  
6  
8  
10

The smallest element in the array is 2  
The Largest element in the array is 10

2. Write a C# application that implements a class 'Cube' with the following members.
- Three private data members 'side', 'volume' and 'surfacearea' of double data type.
  - Four methods, setSide(), calcVol(), calcSA() and showResult()
    - setSide() – to set the length of the side (s) of the cube as per the user input.
    - calcVol() – to calculate the volume of the cube using the formulae  $V = s \times s \times s$
    - calcSA() – to calculate the surface area of the cube using the formulae  $A = 6s^2$
    - showResult() – to display the volume and surface area of the cube.

In the Main method, create an object of the 'Cube' class, read the value of length of side and use the object to call the methods to display the output as shown below.

**[15 Marks]**

#### Sample I/O

Enter the length of the side of cube : 3

Volume of the Cube= 27  
Surface Area of the Cube= 54

3. Write an application to implement a simple calculator application. The user should enter 2 numbers and the required operator (\*, /, +, -). Print the result in the following format:

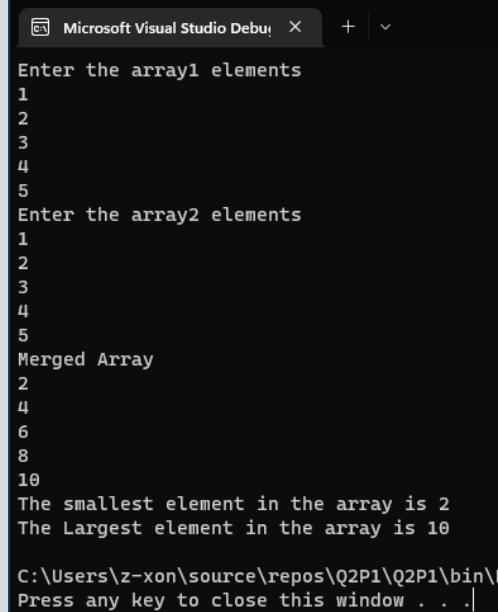
*FirstNumber Operator SecondNumber = Answer*

**[15 Marks]**

**End of Questions**

### Part3 Q1 Answer:

```
using System;
class ISAMergedArray
{
    public static void Main(string[] args)
    {
        int[] A = new int[5];
        Console.WriteLine("Enter the array1 elements");
        for (int i = 0; i < 5; i++)
        {
            A[i] = Convert.ToInt32(Console.ReadLine());
        }
        int[] B = new int[5];
        Console.WriteLine("Enter the array2 elements");
        for (int i = 0; i < 5; i++)
        {
            B[i] = Convert.ToInt32(Console.ReadLine());
        }
        int[] C = new int[5];
        for (int i = 0; i < 5; i++)
        {
            C[i] = A[i] + B[i];
        }
        Console.WriteLine("Merged Array ");
        for (int i = 0; i < 5; i++)
        {
            Console.WriteLine(C[i]);
        }
        int min = C[0];
        for (int i = 0; i < 5; i++)
        {
            if (min > C[i])
                min = C[i];
        }
        int max = C[0];
        for (int i = 0; i < 5; i++)
        {
            if (max < C[i])
                max = C[i];
        }
        Console.WriteLine("The smallest element in the array is {0}", min);
        Console.WriteLine("The Largest element in the array is {0}", max);
    }
}
```



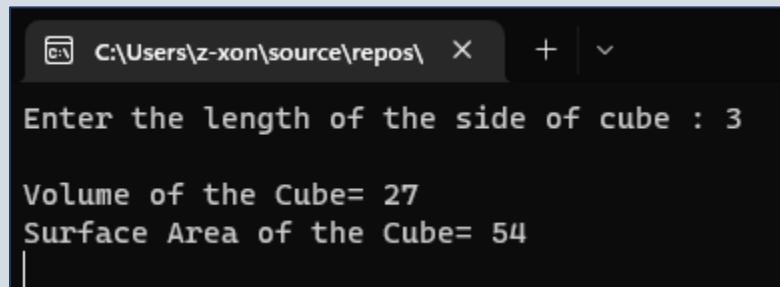
The screenshot shows the Microsoft Visual Studio Debug window. It displays the following interaction:

- Enter the array1 elements
- 1  
2  
3  
4  
5
- Enter the array2 elements
- 1  
2  
3  
4  
5
- Merged Array
- 2  
4  
6  
8  
10
- The smallest element in the array is 2
- The Largest element in the array is 10
- C:\Users\z-xon\source\repos\Q2P1\Q2P1\bin\|
- Press any key to close this window . . .|

### Part3 Q2 Answer:

```
using System;
namespace ISA
{
    public class Cube
    {
        private double s, V, Ar;
        public void SetSide(double b)
        {
            s = b;
        }
        public void CalcVol()
        {
            V = s * s * s;
        }
        public void CalcSA()
        {
            Ar = 6 * s * s;
        }
        public void ShowResult()
        {
            Console.WriteLine();
            Console.WriteLine("Volume of the Cube= " + V);
            Console.WriteLine("Surface Area of the Cube= " + Ar);
        }
    }

    class Program
    {
        static void Main(string[] args)
        {
            Cube c = new Cube();
            double s;
            Console.Write("Enter the length of the side of cube : ");
            s = double.Parse(Console.ReadLine());
            c.SetSide(s);
            c.CalcVol();
            c.CalcSA();
            c.ShowResult();
            Console.ReadLine();
        }
    }
}
```

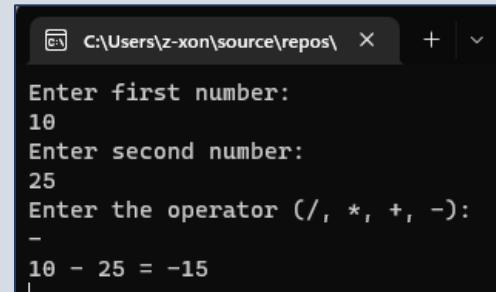


```
C:\Users\z-xon\source\repos\ X + | ~
Enter the length of the side of cube : 3

Volume of the Cube= 27
Surface Area of the Cube= 54
```

### Part3 Q3 Answer:

```
using System;
namespace ISA
{
    class Calcualtor
    {
        static void Main(string[] args)
        {
            int first, second, answer;
            Char op;
            Console.WriteLine("Enter first number:");
            first = Convert.ToInt32(Console.ReadLine());
            Console.WriteLine("Enter second number:");
            second = Convert.ToInt32(Console.ReadLine());
            Console.WriteLine("Enter the operator (/, *, +, -):");
            op = Convert.ToChar(Console.ReadLine());
            switch (op)
            {
                case '/':
                {
                    answer = first / second;
                    Console.WriteLine(first + " " + op + " " + second + " = " +
answer);
                    break;
                }
                case '*':
                {
                    answer = first * second;
                    Console.WriteLine(first + " " + op + " " + second + " = " +
answer);
                    break;
                }
                case '+':
                {
                    answer = first + second;
                    Console.WriteLine(first + " " + op + " " + second + " = " +
answer);
                    break;
                }
                case '-':
                {
                    answer = first - second;
                    Console.WriteLine(first + " " + op + " " + second + " = " +
answer);
                    break;
                }
                default:
                    Console.WriteLine("Invalid operator");
                    break;
            }
            Console.ReadLine();
        }
    }
}
```



```
C:\Users\z-xon\source\repos\ X + | 
Enter first number:
10
Enter second number:
25
Enter the operator (/, *, +, -):
-
10 - 25 = -15
```

**Part 1: Multiple Choice Questions** (write answers on the external answer sheet, 2 Marks each) [20 M]

- Which of the following is not an Integer data type:
    - Char
    - Byte
    - Short
    - Long
  - Which of the following is the incorrect way to increment the value of variable a by 1?
    - $++a$
    - $a += 1$
    - $a = a + 1$
    - $a++1$
  - In C#, by default all variables are passed
    - By memory
    - By value
    - By reference
    - By address
  - Code in the \_\_\_\_\_ block is always executed
    - try
    - catch
    - exception
    - finally
  - Which of the following statements correctly declares a 2 dimensional integer array
    - `int [] myArray;`
    - `int [][] myArray;`
    - `int[2] myArray;`
    - all of the above
  - Which of the following loops will always execute at least once:
    - for
    - while
    - do while
    - foreach
  - Which of the following is not a value data type:
    - Integer
    - Long
    - String
    - Char
  - \_\_\_\_\_ parameters do not create a new storage location
    - Value
    - Reference
    - Output
    - Both b & c
  - What will be the output of the following code:

```
int i;
for(i = 0; i<=10; i++)
{
    if(i == 4)
        { Console.Write(i + " "); continue;
    }
    else if (i != 4)
        Console.Write(i + " ");
    else
        break;
}
```

- a. 1 2 3 4 5 6 7 8 9 10  
b. 1 2 3 4  
c. 0 1 2 3 4 5 6 7 8 9 10  
d. 4 5 6 7 8 9 10

10. Which of the following is correct:

- a. Data members of a class are by default public.
- b.** Data members of a class are by default private.
- c. Member functions of a class are by default private.
- d. Both b & c

**Part 2 Question 1:**

Use any of these:

a -= 1  
a--  
--a  
a = a - 1

## Part 2: Short Essay Questions (5 marks each)

1. Write any two C# statements that decrement 1 from the int variable a.
2. Rewrite the following using a FOR loop:

```
int i = 0;
do
{
    Console.WriteLine(i);
    i += 1;
} while (i <= 10);
```

3. What is an exception? How are try, catch and finally blocks used in exception handling?
4. What is the output of the following piece of code:

```
namespace ConsoleApplication1
{
    class Sample
    {
        int i;
        Single j;
        public void SetData(int i, Single j)
        {
            i = i;
            j = j;
        }
        public void Display()
        {
            Console.WriteLine(i + " " + j);
        }
    }
    class MyProgram
    {
        static void Main(string[] args)
        {
            Sample s1 = new Sample();
            s1.SetData(10, 5.4f);
            s1.Display();
        }
    }
}
```

**Output:**

0 0

### Part2 Q1 Answer:

```
int a = 1;           or           int a = 1;  
a = --a;           a = a--;
```

### Part2 Q2 Answer:

```
for (int i = 0; i <= 10; i += 1) //can use i++  
{  
    Console.WriteLine(i);  
}
```

### Part2 Q3 Answer:

An exception is an indication of a problem that occurs during a program's execution. Exception handling enables us to create applications that can resolve exceptions. To handle an exception, we need to place the code within the try block.

When an exception occurs inside the try block, the control looks for the catch block and raises an exception that is handled in the catch block. At least one catch and/or a finally block must follow the try block. The finally block executes regardless of whether a try block executes successfully or an exception occurs. Below is the simple skeleton for the try-catch and finally blocks:

```
try  
{  
}  
catch  
{  
}  
finally  
{  
}
```

5. Consider the class "Date".

```
class Date
{
    public int day;
    public int month;
    public int year;
}
```

**Question2 - 5:**

```
public Date(int d, int m, int y)
{
    day = d;
    month = m;
    year = y;
}
```

Write the constructor (with argument) of the above class.

6. What is the difference between prefix and postfix decrement operators? Give an example.

## Part 3: Problem Solving Questions

**[50 Marks]**

1. Write a method **IsEven** that takes an integer argument and returns true if the integer is even and false otherwise. Call this method in a main method. Print the result in the Main method.

**[15 Marks]**

**Already Solved**

2. Write a C# program to find the largest number in a given array of numbers with 10 elements. Read the array values from keyboard.

**[20 Marks]**

3. Write a C# application to prompt the user for the radius of a sphere and call method **SphereArea** to calculate and display the surface area of the sphere. Use the following formula to calculate the area:

$$A = 4\pi r^2$$

**[15 Marks]**

---

End of Questions

### Part2 Q6 Answer:

Prefix Operators are the Operators which are placed before the variables to perform tasks. Postfix Operators are placed after the variables to perform tasks.

Prefix: `--x` (First decrease value then use it in expression)

```
int a = 2;
```

```
int b = --a;
```

After these statements execute, value of both `a`, `b` is 1.

PostFix: `x--` (First use it in expression, then decrease value by 1 of `x`)

```
int a = 2;
```

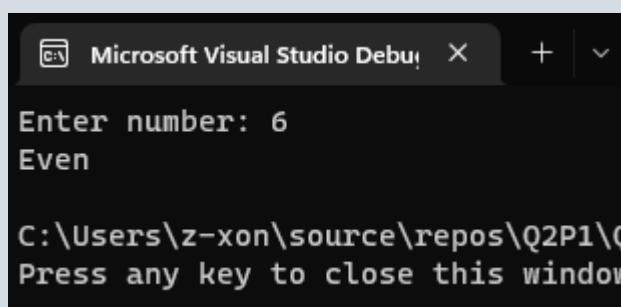
```
int b = a--;
```

After these statements execute, value of `a=1`, `b=2`.

### Part3 Q1 Answer:

```
using System;
class ISAIsEven
{
    // Returns true if n is even, else odd
    public static bool isEven(int n)
    {
        return (n % 2 == 0);
    }

    public static void Main()
    {
        Console.Write("Enter number: ");
        int n = Convert.ToInt32(Console.ReadLine());
        if (isEven(n) == true)
            Console.WriteLine("Even");
        else
            Console.WriteLine("Odd");
    }
}
```

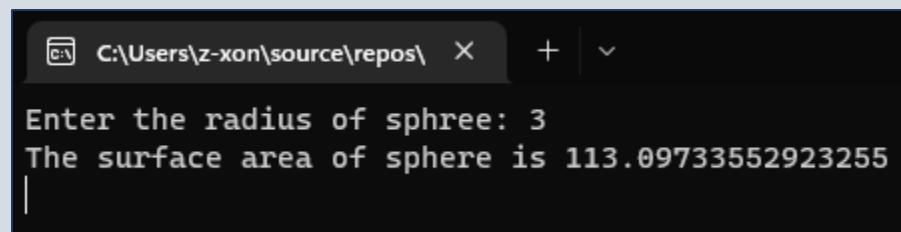


**Part3 Q3 Answer:**

```
using System;
class ISASphereArea
{
    static void SphereArea(double rad)
    {
        double area;
        area = 4.0 * Math.PI * Math.Pow(rad, 2); //or area=4.0*3.14*rad*rad;
        Console.WriteLine("The surface area of sphere is {0}", area);
    }

    public static void Main()
    {
        double radius;
        Console.Write("Enter the radius of sphree: ");
        radius = Convert.ToDouble(Console.ReadLine());

        SphereArea(radius);
        Console.ReadLine();
    }
}
```



## Part 1: Multiple Choice Questions

[20 Marks]

(Write answers on the external answer sheet, 2 Marks each)

1. Code that cannot be directly hosted by the .NET runtime is termed as
  - a. Managed code
  - b. Native code
  - c. Unmanaged code
  - d. None of the above
2. Which of the following displays the contents of a 'Solution'?
  - a. Solution Explorer
  - b. Properties Window
  - c. Toolbox
  - d. Server Explorer
3. \_\_\_\_\_ class includes the methods to capture input and output in a C# application.
  - a. System
  - b. String
  - c. Object
  - d. Console
4. The char data type can store only \_\_\_\_\_.
  - a. Two characters
  - b. Four characters
  - c. One character
  - d. Eight characters
5. Which of the following statements is correct about the C#.NET code snippet given below?

```
int a;
a = Convert.ToInt32((30 < 20));
```

  - a. A value 0 will be assigned to a.
  - b. A value 1 will be assigned to a.
  - c. A value -1 will be assigned to a.
  - d. The code reports an error.
6. What will be the output of the C#.NET code snippet given below?

```
int j = 1, k;
k = j-- + ++j;
Console.WriteLine(k + " ");
```

  - a. 2
  - b. 1
  - c. 5
  - d. None of the above
7. Which of the following statement is correct?
  - a. Data members of a class are by default public.
  - b. Data members of a class are by default private.
  - c. Member functions of a class are by default public.
  - d. None of the above
8. When a method is \_\_\_\_\_ then it can be invoked directly from the class level without creating an object.
  - a. Public
  - b. Static
  - c. Private
  - d. None of the above
9. Which of the following is TRUE about constructors?
  - a. Constructors have the same name as the class itself.
  - b. Constructors return values.
  - c. Constructor is called when an object is no longer required.
  - d. None of the above.

10. Consider the array int[] PZ = { 10, 12, 14, 16, 18 }; Which of the following is the output of the statement Console.WriteLine(PZ[2] / 2);?

- a. 7
- b. 6
- c. 8
- d. 5

## Part 2: Short Essay Questions (6 marks each)

[30 Marks]

1. Complete the program given below (Program 1) to get the following pattern.

Output

Program 1

**Already Solved**

```
1  
22  
333  
4444  
55555
```

```
static void Main(string[] args)  
{  
    int i,j;  
    // Write the codes here  
}
```

2. What will be the output of the following code snippet?

```
class Program  
{  
    static void Change(int[] A)  
    {  
        for (int i = 0; i < A.Length; i++)  
        {  
            if (i < 3)  
                A[i] = A[i] + 1;  
        }  
    }  
    static void Main(string[] args)  
    {  
        int[] P = new int[] { 1, 3, 5, 7, 9, 11 };  
        Change(P);  
        for (int i = 0; i < P.Length; i++)  
        {  
            Console.WriteLine(P[i] + " ");  
        }  
        Console.ReadLine();  
    }  
}
```

**Already Solved**

3. Given below is a program to print the product of first 5 numbers using a do-while loop.  
Will the program generate the desired output? If not, why? **Already Solved**

```
class Program  
{  
    static void Main(string[] args)  
    {  
        int a=1;  
        int pr;  
        do  
        {  
            pr = pr * a;  
        }  
        while (a > 5);  
        Console.WriteLine(a);  
        Console.ReadLine();  
    }  
}
```

4. What will be the output of the following code snippet?

```
namespace ConsoleApplication1
{
    struct Fn1
    {
        public int marks;
    }
    class Program
    {
        static void Main(string[] args)
        {
            Fn1 x = new Fn1();
            x.marks = 1210;
            Check(ref x);
            x.marks = x.marks + 5;
            Console.WriteLine(x.marks + " ");
            Console.ReadLine();
        }

        public static void Check(ref Fn1 y)
        {
            y.marks = 1330;
            Console.WriteLine(y.marks + " ");
            y.marks = y.marks - 10;
            Console.WriteLine(y.marks + " ");
        }
    }
}
```

Already Solved

5. Explain the building blocks of .NET Framework with a block diagram.

Already Solved

### Part 3: Problem Solving Questions

[50 Marks]

1. Write a program to create a two-dimensional array of 3 rows and 3 columns. Input values to the array. Display all the even elements in the array. [15 Marks]

Sample I/O

Already Solved

```
Enter array value: 1
Enter array value: 2
Enter array value: 3
Enter array value: 4
Enter array value: 5
Enter array value: 6
Enter array value: 7
Enter array value: 8
Enter array value: 9

Even elements are      2          4          6          8
```

2. Write a C# program that displays all the prime numbers between 1 and 100 using loops? [15 marks]

Note: A prime number is a whole number greater than 1, which is divisible by only 1 and itself. First few prime numbers are 2, 3, 5, 7, 11, 13, 17, 19, 23...

Sample I/O

Already Solved

Prime Numbers :									
2	3	5	7	11	13	17	19	23	
29	31	37	41	43	47	53	59	61	67
71	73	79	83	89	97				

**Already Solved**

3. Write a C# application that implements a class 'PR' with the following members.
- Seven data members 'side1', 'side2', 'side3', 'base', 'height', 'perimeter' and 'area' of double data type.
  - Four methods, setInitial(), calcPer(), calcArea() and showResult()
    - setInitial() – to set the initial values of side1, side2, side3, base, and height of the shape as per the user input.
    - calcPer() – to calculate the perimeter of the triangle using the formulae  $P = \text{side1} + \text{side2} + \text{side3}$
    - calcArea() – to calculate the area of the triangle using the formulae  $A = (\text{base} * \text{height}) / 2$
    - showResult() – to display the perimeter and area of the triangle.

In the Main method, create an object of the 'PR' class, read the value of length of side1, side2, side3, base, and height and use the object to call the methods to display the output as shown below.

[20 Marks]

Sample I/O

```
Enter the length of side 1 : 3
Enter the length of side 2 : 4
Enter the length of side 3 : 5
Enter the base area : 4
Enter the height 8

Perimeter = 12
Area = 16
```

---

End of Questions

**Part 1:- Choose the correct answer and write it on the external answer sheet. [20 Marks]**

1. Which of the following is NOT an Arithmetic operator in C#.NET?  
a. + c. %  
b. / d. !=

2. Which of the following is a 64-bit integer?  
a. char c. long  
b. short d. byte

3. Which of the following statements correctly define .NET Framework?  
a. It is an environment for developing, building, deploying and executing Desktop Applications, Web Applications and Web Services.  
b. It is an environment for developing, building, deploying and executing only Web Applications.  
c. It is an environment for developing, building, deploying and executing Web Services.  
d. It is an environment for development and execution of Windows applications.

4. Which of the following is not a value type in C#?  
a. Integer c. String  
b. Long d. All of the above

5. How many values can be returned by a function in C#?  
a. one c. both a and b  
b. many d. None of the above

6. Which of the following are the correct ways to decrement the value of variable a by 1?  
a. a -- c. a=a-1  
b. -- a d. All of the above

7. What will be the output of the following C# code?

```
static void Main(string[] args)
{
    short s1 = 400;
    short s2 = 250;
    int a;
    a = s1 /s2;
    Console.WriteLine(a);
    Console.ReadKey(); }
```

a. 1 c. 1.62  
b. 1.6 d. None of the above.

8. If a method does not return anything, the return type must be specified as \_\_\_\_\_  
a. int c. double  
b. void d. None of the above

9. What is the location of number 5 in the following array?  
int [] a = {11, 3, 5, 9, 4};  
a. a[1] c. a[3]  
b. a[0] d. None of the above

10. Which of the following can be facilitated by the Inheritance mechanism?  
a. Use the existing functionality of base class.  
b. Override the existing functionality of base class.  
c. Implement new functionality in the derived class.  
d. All of the above

## Part 2: Output and Short essays questions

[30 marks]

1. Name and explain any 5 relational operators in C#. [5 marks]
2. Write the syntax of switch statement in C# with an example. [5 marks]
3. Consider the following code: [5 marks]

```
class FF
{
    int x, y, z, P;
    x=10; y=5; z=5;
    P = x / (y - z);
    Console.WriteLine ("end of the program"); }
```

Rewrite the above code by including the necessary try and catch statements.

4. Given below is a C# program to print numbers from 20 to 25 using a while loop. Rewrite the program using do-while loop. [5 marks]

```
class Program
{
    public static void Main()
    {
        int c = 20;
        while (c <= 25)
        {
            Console.WriteLine(c);
            c=c+1;
        }
    }
}
```

Part2 Q4 Answer:

```
class Square
{
    static void Main(string[] args)
    {
        int c = 20;
        do
        {
            Console.WriteLine(c);
            c = c + 1;
        } while (c <= 25);
        Console.ReadKey();
    }
}
```

5. Consider the following code:

```
class Exam
{
    static void Main(string[] args)
    {
        int [] M = new int[]{10, 20, 30, 40};
        for (int i = 0; i < M.Length; i++)
        {
            M[i] = M[i] - 5/2;  $\rightsquigarrow \frac{5}{2} = 2.5 = 2$ 
            Console.Write(M[ i ]);
        }
    }
}
```

10-2 = 8  
20-2 = 18  
30-2 = 28  
40-2 = 38

Part2 Q5 Output:

8 18 28 38

What will be the output of the above code?

[5 marks]

6. Consider the class “Date”.

```
class Date
{
    public int day;
    public int month;
    public int year; }
```

Already Solved

Write the constructor (with argument) of the above class.

[5 marks]

### Part2 Q1 Answer:

Operator	Description	Example (A=10, B=20)
==	Checks if the values of two operands are equal or not, if yes then condition becomes true.	(A == B) is not true.
!=	Checks if the values of two operands are equal or not, if values are not equal then condition becomes true.	(A != B) is true.
>	Checks if the value of left operand is greater than the value of right operand, if yes then condition becomes true.	(A > B) is not true.
<	Checks if the value of left operand is less than the value of right operand, if yes then condition becomes true.	(A < B) is true.
>=	Checks if the value of left operand is greater than or equal to the value of right operand, if yes then condition becomes true.	(A >= B) is not true.
<=	Checks if the value of left operand is less than or equal to the value of right operand, if yes then condition becomes true.	(A <= B) is true.

### Part2 Q2 Answer:

Syntax:

```
switch (expression)
{
    case x:
        // code block
        break;
    case y:
        // code block
        break;
    default:
        // code block
        break;
}
```

Example:

```
int i = 2;
switch (i)
{
    case 1:
        Console.WriteLine("One");
        break;
    case 2:
        Console.WriteLine("Two");
        break;
    default:
        Console.WriteLine("Not correct");
        break;
}
```

### Part2 Q3 Answer:

```
class FF
{
    int x, y, z, P;
    x = 10; y = 5; z = 5;
    try
    {
        P = x / (y - z);
    }
    catch(Exception e)
    {
        Console.WriteLine("Division by zero");
    }
    Console.WriteLine("End of the program");
}
```

### Part 3: Problem Solving Questions

[50 marks]

1. Write a C# application that implements a class 'circle' with the following members.
  - a. Three private data members 'radius', 'perimeter' and 'area' of double data type.
  - b. Four methods, setRadius(), calcPer(), calcArea() and dispResult()
    - i. setRadius() – to set the radius of the circle as per the user input.
    - ii. calcPer() – to calculate the perimeter of the circle using the formulae  
 $P = 2\pi r$  [Hint: Value of  $\pi$  is 3.14]
    - iii. calcArea() – to calculate the area of the circle using the formulae  $A = \pi r^2$
    - iv. dispResult() – to display the perimeter and area of the circle.

In the Main method, create an object of the 'circle' class, read the value of radius and use the object to call the methods to display the output as shown →.

```
Enter the radius of the circle : 3
Perimeter of the Circle= 18.84
Area of the Circle= 28.26
```

[20 Marks]

2. Write a C# program to find the even numbers in a given array of numbers with 10 elements. Read the array values from keyboard.

[15 Marks]

Sample I/O →

```
Enter the array elements
12
1
7
3
5
6
8
10
14
9

EVEN ELEMENTS IN THE ARRAY
12 is an even element
6 is an even element
8 is an even element
10 is an even element
14 is an even element
```

Already Solved

3. Write an application to implement a simple calculator application. The user should enter 2 numbers and the required operator (\*, /, +, -). Print the result in the following format:

*FirstNumber Operator SecondNumber = Answer*

[15 Marks]

**End of Questions**

**Part3 Q1 Answer:**

```
using System;
namespace ISA {
    class circle
    {

        private double radius, perimeter, area;

        public void setRadius(double r)
        {
            radius = r;
        }
        public double calcPer()
        {
            perimeter = 2.0 * 3.14 * radius;
            return perimeter;
        }
        public double calcArea()
        {
            area = 3.14 * radius * radius;
            return Math.Round(area, 2); //no need for the Math.Round
        }
        public void dispResult()
        {
            Console.WriteLine("\nPerimeter of the Circle= " + calcPer());
            Console.WriteLine("Area of the Circle= " + calcArea());
        }
    }

    class ISATest
    {

        static void Main(string[] args)
        {
            circle x = new circle();
            Console.Write("Enter the radius of the circle : ");
            double radius = Convert.ToDouble(Console.ReadLine());
            x.setRadius(radius);
            x.dispResult();
            Console.ReadLine();
        }
    }
}
```

```
C:\Users\z-xon\source\repos\  X  +  ▾
Enter the radius of the circle : 3

Perimeter of the Circle= 18.84
Area of the Circle= 28.26
```

**Part3 Q2 Answer:**

```
using System;
namespace ISA {
    class EvenNumbers
    {
        static void Main(string[] args)
        {
            int[] arr = new int[10];
            Console.WriteLine("Enter the array elements: ");
            for (int i = 0; i < 10; i++)
            {
                arr[i]=Convert.ToInt32(Console.ReadLine());
            }
            Console.WriteLine();
            Console.WriteLine("EVEN ELEMENTS IN THE ARRAY");
            for (int i = 0; i < 10; i++)
            {
                if (arr[i] % 2 == 0)
                    Console.WriteLine(arr[i] + " is an even element");
            }
            Console.ReadLine();
        }
    }
}
```

```
C:\Users\z-xon\source\repos\  X + | v
Enter the array elements:
12
1
7
3
5
6
8
10
14
9

EVEN ELEMENTS IN THE ARRAY
12 is an even element
6 is an even element
8 is an even element
10 is an even element
14 is an even element
```

**Part 1: Multiple Choice Questions (write answers on the external answer sheet, 2 Marks each)**

1. The run-time layer of .NET is known as \_\_\_\_\_
  - a. Base Class Library
  - b. Common Language Runtime**
  - c. Common Type System
  - d. None of the above
  
2. \_\_\_\_\_ is a tool window in the Visual Studio IDE that displays the contents of a solution.
  - a. Solution Explorer**
  - b. Properties Window
  - c. Toolbox
  - d. Server Explorer
  
3. The mechanism of packing of data and functions into a single component is called?
  - a. Polymorphism
  - b. Overloading
  - c. Encapsulation**
  - d. Inheritance
  
4. Which of the following is not an Integer data type?
  - a. Char**
  - b. Byte
  - c. Short
  - d. Long
  
5.  $a += 1$  is equivalent to \_\_\_\_\_
  - a.  $a = a * 1$
  - b.  $a = a --;$
  - c.  $a + 1 = a;$
  - d.  $a = a + 1;$**
  
6. Which of the following loops will always execute at least once?
  - a. for
  - b. while
  - c. do-while**
  - d. foreach



7. In C#, the access modifier used to access methods from anywhere, including outside the class is known as \_\_\_\_\_
- Private
  - Protected
  - C. Public**
  - None of the above
8. Consider the array int [ ] A = {12, 14, 18, 6, 9}. Which of the following is the output of the statement Console.WriteLine(A[2] / 3);?
- 2
  - 4
  - 3
  - d. 6**
9. Which of the following is false about constructors?
- a.** Constructor is a method which is called when an object is no more required
  - Constructors have the same name as the class itself
  - Constructors do not specify a return type
  - None of the above
10. The operator used to access member function of a class is \_\_\_\_\_
- :
  - b. .**
  - ::
  - #



## Part 2: Short Essay Questions (6 marks each)

[30 Marks]

- Describe how a .Net application is compiled and executed.
- What will be the output of the following code?

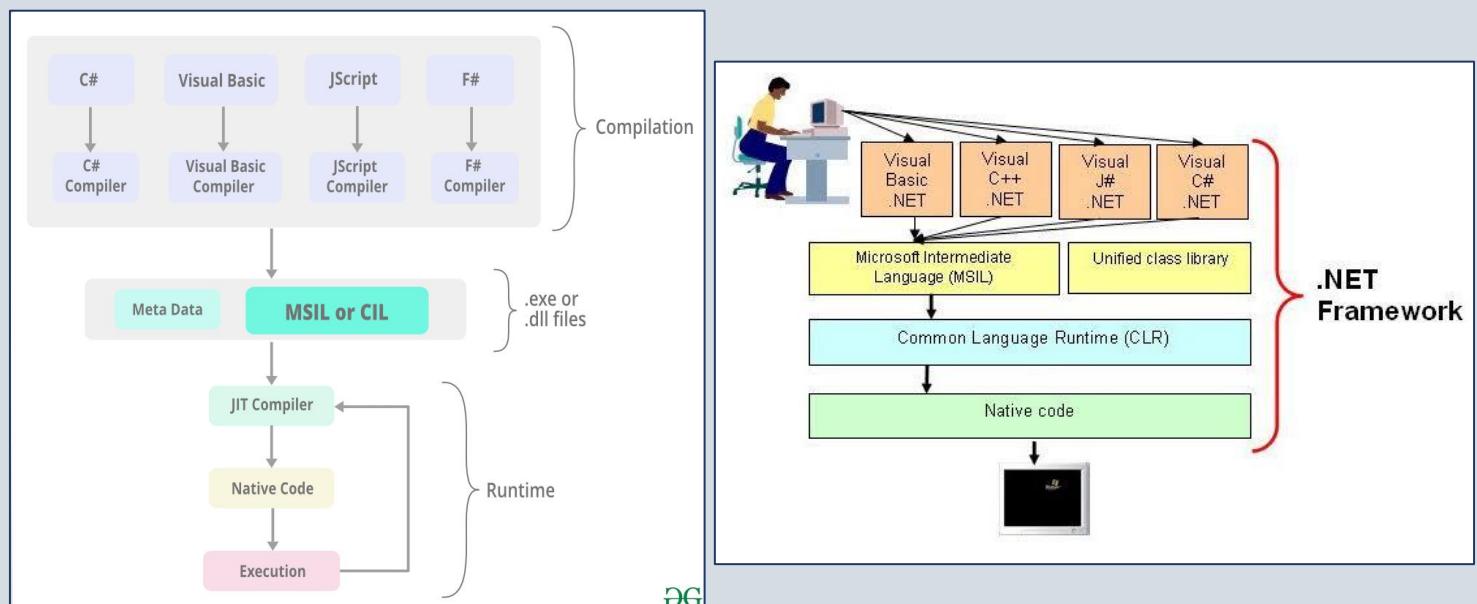
```
class Program
{
    static void mod(ref int[] a)
    {
        for (int i = 0; i < a.Length; i++)
        {
            a[i] = a[i] % 2;
            Console.WriteLine(a[i] + " ");
        }
    }
}
```

Output:  
0  
1  
0  
0  
1  
1

**Part2 Q1 Answer:** (ليس لازماً النقل بالحرف من سلайдات المقرر حاول الاختصار وإيصال الفكرة)

- A .NET programming language (C#, VB.NET, J# etc.) does not compile into executable code; instead, it compiles into an intermediate code called Microsoft Intermediate Language (MSIL).
- Each .NET-aware compiler produces nearly identical CIL instructions. Therefore, all languages can interact within a well-defined binary base.
- During the run time, the CLR's just-in-time compiler converts MSIL into machine language, which is then run on the host machine.

صور توضيحية:



```

    }

}

static void Main(string[] args)
{
    int[] P = new int[] {10,5,6,8,9,1};
    mod(ref P);
    Console.ReadLine();
}
}

```

3. How to handle exceptions in C# using try/catch statements? Explain with an example.

4. Rewrite the following using while loop:

```

int a;
for (a = 0; a <= 100; a+=10)
Console.WriteLine(a);

```

```

int a = 0;
while (a <= 100)
{
    Console.WriteLine(a);
    a += 10;
}

```

5. Write any 6 data type conversion methods in C#.

- |                |               |
|----------------|---------------|
| 5- ToBoolean() | 1-ToInt32()   |
| 6- ToChar()    | 2-ToInt64()   |
| 7- ToDouble()  | 3-ToDecimal() |
| 8-ToInt16()    | 4-ToByte()    |

### Part 3: Problem Solving Questions

[50 Marks]

1. Write a C# program to find the largest number in an array of numbers with 10 elements.

Read the array values from keyboard.

Already Solved

[20 Marks]

#### Sample I/O

```

using System;
using System.Collections.Generic;
using System.Linq;
using System.Text;
using System.Threading.Tasks;

namespace LargestNumber
{
    class Program
    {
        static void Main(string[] args)
        {
            int[] arr = new int[10];
            int max = arr[0];
            for (int i = 0; i < arr.Length; i++)
            {
                Console.WriteLine("Enter element " + (i + 1));
                arr[i] = int.Parse(Console.ReadLine());
                if (arr[i] > max)
                    max = arr[i];
            }
            Console.WriteLine("The largest number in array is " + max);
        }
    }
}

```

## Part2 Q3 Answer:

A try block is used to partition code that might be affected by an exception. Associated catch blocks are used to handle any resulting exceptions. The code that causes an exception is enclosed in the try block. A catch statement is added immediately after to handle Exception, if it occurs.

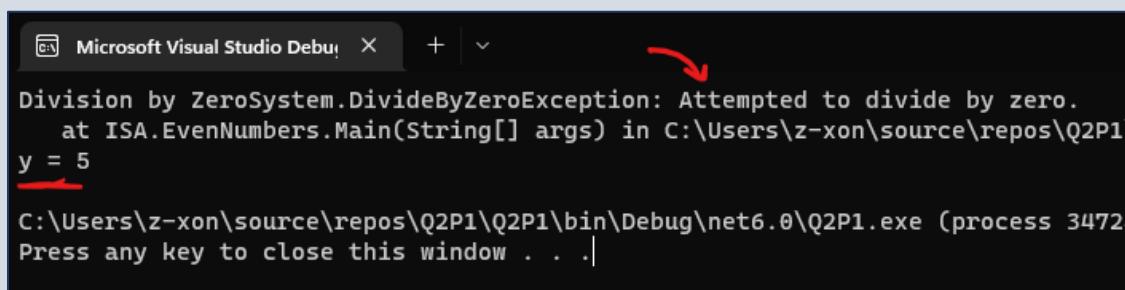
We can handle exceptions by following these tasks:

- 1- Find the problem (Hit the exception)
- 2- Inform that an error has occurred (Throw the exception)
- 3- Receive the error information (Catch the exception)
- 4- Take corrective actions (Handle the exception)

Example:

```
namespace ISA {
    class ExceptionByZero
    {
        static void Main(string[] args)
        {
            int a = 10;
            int b = 0;
            int x = 2;
            try
            {
                int c = a / b;
            }
            catch(Exception ex)
            {
                Console.WriteLine("Division by Zero" + ex);
            }
            int y = a / x;
            Console.WriteLine("y = " + y);
        }
    }
}
```

Dividing by zero leads to an Arithmetic error (Exception) we catch that error using catch block and throw it after handling the exception.



The screenshot shows the Microsoft Visual Studio Debug window. It displays the following error message:

```
Microsoft Visual Studio Debug + ▾
Division by ZeroSystem.DivideByZeroException: Attempted to divide by zero.
   at ISA.ExceptionByZero.Main(String[] args) in C:\Users\z-xon\source\repos\Q2P1\...
y = 5
C:\Users\z-xon\source\repos\Q2P1\Q2P1\bin\Debug\net6.0\Q2P1.exe (process 3472)
Press any key to close this window . . .
```

A red arrow points from the text "Division by Zero" in the error message to the corresponding line in the code above. Another red arrow points from the word "y = 5" to the line where "y" is assigned a value of 5 in the code.

2. Write a C# application that implements a class 'Sphere' with the following members.
- Three private data members 'radius', 'volume' and 'area' of double data type.
  - Four methods, setRadius(), calcVol(), calcArea() and dispResult()
    - setRadius() – to set the radius of the sphere as per the user input.
    - calcVol() – to calculate the volume of the sphere using the formulae  $V = \frac{4}{3} \pi r^3$  [Hint: Value of  $\pi$  is 3.14]
    - calcArea() – to calculate the surface area of the sphere using the formulae  $A = 4\pi r^2$
    - dispResult() – to display the volume and area of the sphere.

In the Main method, create an object of the 'sphere' class, read the value of radius and use the object to call the methods to display the output as shown below. [15 Marks]

#### Sample I/O

```
Enter the radius of the sphere: 10
The volume of the sphere is 4188.79
The surface area of the sphere is 1256.64
```

3. A company gives bonus to its employee as per the table below. Write a program to read the basic salary of an employee, calculate the bonus amount and total salary and display it. [Total salary = basic salary + bonus amount].

Basic Salary	Bonus Amount
More than or equal to 1000	15% of basic salary
Less than 1000 and greater than or equal to 500	20% of basic salary
Less than 500 and greater than or equal to 300	30% of basic salary
Less than 300 and greater than or equal to 100	35% of basic salary
Less than 100	40% of basic salary

[15 marks]

#### Sample I/O

```
Enter the basic salary: 1000
Bonus amount: 150
Total salary: 1150
```

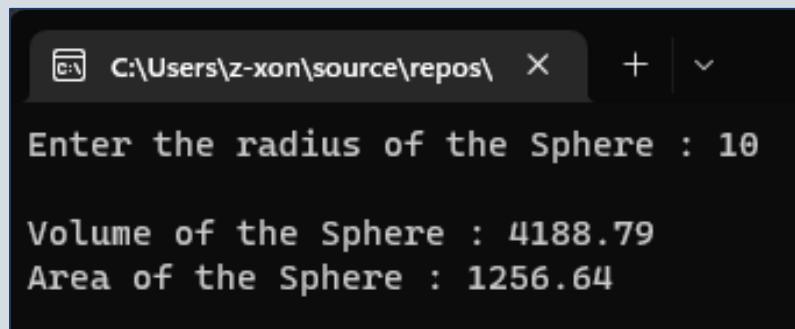
End of Questions



**Part3 Q2 Answer:**

```
using System;
namespace ISA {
    class Sphere
    {
        private double radius, volume, area;

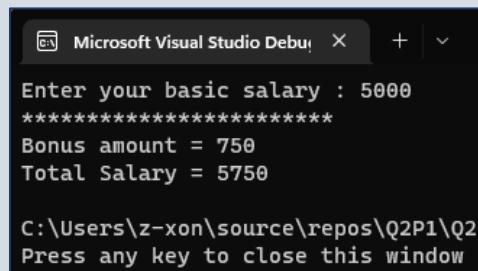
        public void setRadius(double r)
        {
            radius = r;
        }
        public double calcVol()
        {
            //  $4.0/3 * 3.14 * radius * radius * radius$ 
            volume = 4.0 / 3 * Math.PI * Math.Pow(radius, 3);
            return Math.Round(volume, 2); //return volume; is enough
        }
        public double calcArea()
        {
            //  $4 * 3.14 * radius * radius$ 
            area = 4 * Math.PI * Math.Pow(radius, 2);
            return Math.Round(area, 2); //return area; is enough
        }
        public void dispResult()
        {
            Console.WriteLine("\nVolume of the Sphere : " + calcVol());
            Console.WriteLine("Area of the Sphere : " + calcArea());
        }
        static void Main(string[] args)
        {
            Sphere x = new Sphere();
            Console.Write("Enter the radius of the Sphere : ");
            double radius = Convert.ToDouble(Console.ReadLine());
            x.setRadius(radius);
            x.dispResult();
            Console.ReadLine();
        }
    }
}
```



### Part3 Q3 Answer:

```
using System;
namespace ISA {
    class CompanySalary
    {

        static void Main(string[] args)
        {
            int salary;
            double bonus, total;
            Console.WriteLine("Enter your basic salary : ");
            salary = Convert.ToInt32(Console.ReadLine());
            Console.WriteLine("*****");
            if (salary >= 1000)
            {
                bonus = salary * 15 / 100;
                total = salary + bonus;
                Console.WriteLine("Bonus amount = " + bonus);
                Console.WriteLine("Total Salary = " + total);
            }
            else if (salary < 1000 && salary >= 500)
            {
                bonus = salary * 20 / 100;
                total = salary + bonus;
                Console.WriteLine("Bonus amount = " + bonus);
                Console.WriteLine("Total Salary = " + total);
            }
            else if (salary < 500 && salary >= 300)
            {
                bonus = salary * 30 / 100;
                total = salary + bonus;
                Console.WriteLine("Bonus amount = " + bonus);
                Console.WriteLine("Total Salary = " + total);
            }
            else if (salary < 300 && salary >= 1000)
            {
                bonus = salary * 35 / 100;
                total = salary + bonus;
                Console.WriteLine("Bonus amount = " + bonus);
                Console.WriteLine("Total Salary = " + total);
            }
            else
            {
                bonus = salary * 40 / 100;
                total = salary + bonus;
                Console.WriteLine("Bonus amount = " + bonus);
                Console.WriteLine("Total Salary = " + total);
            }
        }
    }
}
```



The screenshot shows a Microsoft Visual Studio Debug window. The console output is as follows:

```
Microsoft Visual Studio Debug X + | v
Enter your basic salary : 5000
*****
Bonus amount = 750
Total Salary = 5750

C:\Users\z-xon\source\repos\Q2P1\Q2P1
Press any key to close this window .
```

## Part 1: Multiple Choice Questions (write answers on the external answer sheet, 2 Marks each)

---

1. A .NET programming language compiles into an intermediate code called \_\_\_\_\_
  - a. CLR
  - b. MSIL
  - c. CTS
  - d. None of the above
2. Which of the following component is available to all .NET programming languages?
  - a. Common Language Runtime
  - b. Common Language Specifications
  - c. Component Object Model
  - d. Base class libraries
3. Which of the following is a conditional operator?
  - a. !
  - b. ?
  - c. ?==
  - d. <<

Ternary Operator ?:

condition ? statement 1 : statement 2
4. Which of the following is a correct declaration of variables 'a' and 'b'?
  - a. int a=4; b=4;
  - b. int a=b=4;
  - c. int a=4, b=4;
  - d. None of the above
5. a \*=1 is equivalent to \_\_\_\_\_
  - a. a=a\*1;
  - b. a=a--;
  - c. a+1=a;
  - d. a=a+1;
6. The loop `for (int i=10; i>0; i-=3)` will execute \_\_\_\_\_ number of times.
  - a. 9
  - b. 5
  - c. 4
  - d. 0

i = 10, 7, 4, 1  
4 times
7. Every C# program has at least one class with a method known as \_\_\_\_\_?
  - a. Static
  - b. Main
  - c. String
  - d. None of the above

8. Consider the array `int[] A = { 45, 40, 15, 5, 10 };` Which of the following is the output of the statement `Console.WriteLine(A[1]/5);`?
- 2
  - 0
  - 9
  - 8
9. The process of using two methods with the same name and with different parameters in a class is called \_\_\_\_\_?
- Inheritance
  - Multiplexing
  - Method overloading**
  - Encapsulation
10. Which of the following is not a part of exception handling?
- try
  - finally
  - thrown**
  - catch

```
try
{
    // put the code here that
    // may raise exceptions
}
catch
{
    // handle exception here
}
finally
{
    // final cleanup code
}
```

## Part 2: Short Essay Questions (6 marks each)

[30 Marks]

1. a. Briefly explain single character literals and string literals in C# with examples. [4 Marks]

Solution:

- A single-character literal (or simply character constant) contains a single character enclosed within a pair of single quotation marks.
  - Examples → 'a', 'L', 'z', etc.  
(explanation – 1 mark, example – 1 mark)
- A string literal is a sequence of characters enclosed between double quotes. The characters may be alphabets, digits, special characters and blank spaces.
  - Examples → "hello", "900", "\$89", etc.  
(explanation – 1 mark, example – 1 mark)

- b. State whether the following variable names are valid/ invalid. If a variable is Invalid, state the reason, why is it so? [2 Marks]

Variable Name	Valid/ Invalid	Reason
float	Invalid	because it is a keyword.
12Sum	Invalid	because it starts with a digit
abc	Valid	
First num	Invalid	because of the space in between.

[0.5 mark each for the correct answer with the reason]

2. What will be the output of the following code?

[6 Marks]

```
namespace ConsoleApp20
{
    class Program
    {
        static void Plus(ref int[] AR)
        {
            for (int i = 0; i < AR.Length; i++)
            {
                AR[i] = AR[i] + 3;
                Console.WriteLine(AR[i] + " ");
            }
        }
        static void Main(string[] args)
        {
            int[] MM = new int[] { 13, 10, 22, 4, 9, 17 };
            Plus(ref MM);
            Console.ReadLine();
        }
    }
}
```

Solution:

```
16
13
25
7
12
20
```

[1 mark each]

الوصف غير مطلوب في السؤال فقط  
اذكر ثلاثة أنواع مع الأمثلة

3. Explain any three types of Inheritance with examples in C#.

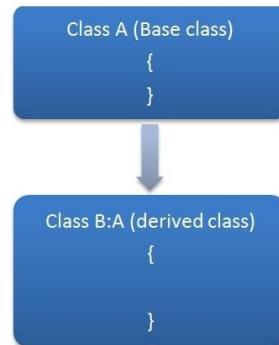
[6 Marks]

Solution:

Single-level Inheritance → It is the type of inheritance in which there is one base class and one derived class.

Example

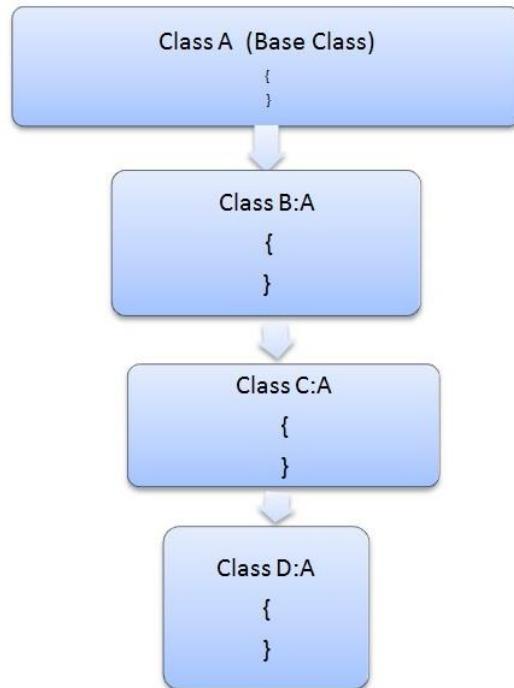
```
class A
{
    //this is base class
}
class B : A
{
    //this is derived class
}
```



Hierarchical Inheritance → This is the type of inheritance in which there are multiple classes derived from one base class.

Example

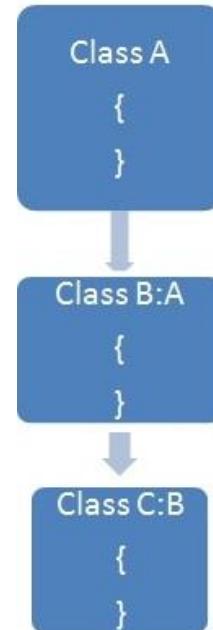
```
class A
{
//this is base class
}
class B:A
{
//this is derived class
}
class C:A
{
//this is derived class
}
}
class D:A
{
//this is derived class
}
}
```



Multi-level Inheritance → When one class is derived from another derived class then this type of inheritance is called multilevel inheritance.

Example

```
class A
{
//this is base class
}
class B:A
{
//this is derived class
}
class C:B
{
//this is derived class
}
```



4. Rewrite the following using while loop:

[6 Marks]

```
int i, P = 1;
for (i = 1; i <= 5; i += 1)
{
    P = P * i;

}
```

Solution: ( 1mark each for correct line statement)

```
int i=1, P = 1;
while(i <= 5)
{
    P = P * i;
    i += 1;
}
```

5. The following C# code contains syntax errors. Identify the errors and write the correction opposite to each line of code. If there is no error in a line, write NO ERROR.

[6 Marks]

CODE	ERRORS
class Program	NO ERROR
{	NO ERROR
static Main(string[] args)	Return type is missing - void
{	NO ERROR
int num1, num2;	NO ERROR
Console.WriteLine("Enter the numbers);	" is missing
num1 = Convert.ToInt32(Console.WriteLine());	Console.ReadLine()
Num2 = Convert.ToInt32(Console.ReadLine());	Wrong variable name. It should be num2.
Result = (num1+num2)/2;	The variable Result is not declared.
Console.WriteLine("The average is {0}" Result);	, is missing after "
Console.ReadLine();	NO ERROR
}	NO ERROR
}	NO ERROR

[1 mark for each]

**[50 Marks]**

## Part 3: Problem Solving Questions

---

1. Write a C# program to find the sum of elements in a given array of numbers with 10 elements. Read the array values from keyboard. **[20 Marks]**

Sample I/O

```
Enter the array elements
1
2
3
1
6
3
7
0
1
5
The sum of the elements in the array is 29
```

Sample Solution:

```
namespace ConsoleApp18
{
    class Program
    {
        static void Main(string[] args)
        {
            int[] A = new int[10]; //2.5 MARKS
            Console.WriteLine("Enter the array elements"); //1 MARK
            for (int i = 0; i < 10; i++) //4 MARKS
            {
                A[i] = Convert.ToInt32(Console.ReadLine()); //3 MARKS
            }
            int sum=0; //1 MARK
            for (int i = 0; i < 10; i++) //4 MARKS
            {
                sum = sum + A[i]; //2.5 MARKS
            }
            Console.WriteLine("The sum of the elements in the array is {0}", sum); //2 MARKS
            Console.ReadLine();
        }
    }
}
```

2. Write a C# application to implement a class "Num" with the following members.
- One private data member 'NN' of int data type.
  - Implement the constructor Num( ) to accept 'NN' from the user.
  - Implement two methods, CheckNum (), and OddEven ()
- i. CheckNum() → to check whether the number 'NN' is positive, negative, or zero.
  - ii. OddEven() → to check whether the number 'NN' is an odd number, or an even number.

In the Main method, create an object of the above class and use the object to call the methods to display the output as shown below.

[15 Marks]

Sample I/O

```
Enter a number : -23
The number -23 is negative
The number -23 is an odd number
```

Sample Solution:

```
namespace ConsoleApp18{
    public class Num
    {
        private int NN; //0.5 MARK
        public Num() //0.5 MARK
        {
            Console.Write("Enter a number : ");
            NN = int.Parse(Console.ReadLine()); //1 MARK
        }
        public void CheckNum() //0.5 MARK
        {

            if (NN > 0) //1 MARK
                Console.WriteLine("The number " + NN + " is positive"); //1 MARK
            else if (NN < 0)
                Console.WriteLine("The number " + NN + " is negative"); //1 MARK
            else
                Console.WriteLine("The number is zero"); //1 MARK
        }
        public void OddEven() //0.5 MARK
        {
            if (NN % 2 == 0) //1 MARK
                Console.WriteLine("The number " + NN + " is an even number"); //1 MARK

            else
                Console.WriteLine("The number " + NN + " is an odd number"); //1 MARK
        }
    }
    class Program{
        static void Main(string[] args){
            Num n1 = new Num(); //1 MARK
            n1.CheckNum(); //1 MARK
            n1.OddEven(); //1 MARK
            Console.ReadLine();
        }
    }
}
```

3. Write a program to calculate and print the Electricity bill of a given customer. Read the units consumed by the user from the keyboard and display the total amount to pay as per the table below. [Total Amount to pay = Units \* Charge]

[15 marks]

Units	Charge/Unit
<=200	1.5
201-400	1.8
401-600	2.1
601-800	2.5
>800	2.7

#### Sample I/O

```
Enter the unit consumed by the customer : 300
Total Amount to pay = 540
```

#### Sample Solution:

```
namespace ConsoleApp19
{
    class Program
    {
        static void Main(string[] args)
        {
            int un;                                     //0.5 MARK
            double chg, gramt;                         //1 MARK

            Console.Write("Enter the unit consumed by the customer : "); //0.5 MARK
            un = Convert.ToInt32(Console.ReadLine());           //1 MARK
            if (un <= 200)                                //1 MARK
                chg = 1.50;                               //0.5 MARK
            else if (un > 200 && un <= 400)             //1.5 MARKS
                chg = 1.80;                               //0.5 MARK
            else if (un > 400 && un <= 600)             //1.5 MARKS
                chg = 2.1;                                //0.5 MARK
            else if (un > 600 && un <= 800)             //1.5 MARKS
                chg = 2.5;                                //0.5 MARK
            else
                chg = 2.7;                                //0.5 MARK
            gramt = un * chg;                           //2 MARKS

            Console.WriteLine("Total Amount to pay = {0}\n",gramt); //1.5 MARK
            Console.ReadLine();
        }
    }
}
```

## Part 1: Multiple Choice Questions (write answers on the external answer sheet, 2 Marks each)

1. The .NET building block which describes all possible data types and programming constructs in C# is known as \_\_\_\_\_
- Base Class Library
  - Common Language Runtime
  - Common Type System
  - None of the above
2. \_\_\_\_\_ is a tool window in the Visual Studio IDE that displays the contents of a solution.
- Solution Explorer
  - Properties Window
  - Toolbox
  - Server Explorer
3. Which of the following is not an example of a C# keyword?
- sum
  - public
  - default
  - for
4. Which of the following data type is used to hold numbers containing fractional parts?
- char
  - float
  - double
  - Both (b) and (c)
5.  $a += 3$  is equivalent to \_\_\_\_\_
- $a = a * 3$
  - $a = a + 3;$
  - $a + 1 = a;$
  - $a = a + 1;$
6. Which of the following is true about if-else statements?
- In an if-else statement, the statements inside 'else' block never executes.
  - In an if-else statement, the statements inside 'else' block always executes.
  - In an if-else statement, the statements in 'else' block executes only if the Boolean expression is false.
  - None of the above
7. Which of the following is an example of a static method?
- Main()
  - Public
  - Internal
  - None of the above

8. Consider the array int[] A = { 10, 8, 6, 4, 0 }; Which of the following is the output of the statement Console.WriteLine(A[0]/2);?

a. 2  
b. 4  
**c. 5**  
d. 0

9. Which of the following is false about constructors?

a. Constructor is a method which is called when an object is no more required (destructor)  
**b. Constructors have the same name as the class itself.**  
c. Constructors do not specify a return type  
d. None of the above

10. \_\_\_\_\_ is an example of a run-time error.

a. Missing semicolon (syntax error)  
**b. Dividing an integer by zero**  
c. Missing parenthesis ()  
d. Missing brackets ()

```
int [] arr = {0,2};  
int a = 4 / arr[0];  
Console.WriteLine(a);  
run time error: divide by 0
```

## **Part 2: Short Essay Questions (6 marks each)**

[30 Marks]

- 1. Briefly explain the following with examples.**

[6 Marks]

- a. Nested if-else statement

It is way - decision statement and is used in conjunction an expression

- b. Switch-case**

c) \* has a built-in multi-way decision statement known as a switch. It will choose from different case to choose a certain case based on the value it will be the output of the following code? [6 Marks] In switch.

2. What will be the output of the following code?

[6 Marks]

```
class Program
{
    static void Change(ref int [] A)
    {
        for (int i = 0; i < A.Length; i++)
        {
            A[i] = A[i] + 2;
        }
    }

    static void Main(string[] args)
    {
        int[] P = new int[] { 10, 5, 6, 8, 9, 1 };
        Change(ref P);
        for (int i = 0; i < P.Length; i++)
        {
            Console.WriteLine(P[i] + " ");
        }
        Console.ReadLine();
    }
}
```

**Output:**

12
7
8
10
11
3

## Part2 Q1 Answer:

Nested if-else statement:

A nested if in C is an if statement that is the target of another if statement.  
Nested if statements mean an if statement inside another if statement.

Example: (ممكن تستخدم مثل اسهل فقط افهم الفكرة)

```
using System;
class Student
{
    static void Main(string[] args)
    {
        int i = 10;
        if (i == 10)
        {
            if (i < 15)
            {
                Console.WriteLine("i is smaller than 15\n");
            }
            if (i < 12)
            {
                Console.WriteLine("i is smaller than 12 too");
            }
            else
                Console.WriteLine("i is greater than 15");
        }
    }
}
```

Switch-case:

switch statement allows a variable to be tested for equality against a list of values. Each value is called a case, and the variable being switched on is checked for each switch case.

Example: (ممكن تستخدم مثل اسهل فقط افهم الفكرة)

```
int day = 4;
switch (day)
{
    case 6:
        Console.WriteLine("Today is Saturday.");
        break;
    case 7:
        Console.WriteLine("Today is Sunday.");
        break;
    default:
        Console.WriteLine("Looking forward to the Weekend.");
        break;
}
```

## Declaration and Creation

```
int[,] myArray;
myArray = new int[3,4]; or int[,] myArray = new int [3,4];
```

## Initialization

```
int[,] myArray = { {0,0,0,3},  
                  {1,1,1,1},  
                  {2,2,2,2} };
```

Already Solved

3. Briefly explain two-dimensional arrays. How to declare, create and initialize a two-dimensional array? Explain with an example. [6 Marks]

- represent a particular value in matrix by using two subscripts such as  $V_{ij}$   
 it allows us to define such table of item by using two-dimensional array

4. Rewrite the following using while loop:

Already Solved

[6 Marks]

```
int []M = new int [] {2,3,1,7,8,3,9,1,2,0};  
int i;  
for (i = 0; i < 10; i+=1)  
Console.WriteLine(M[i]);
```

## Answer

```
int []M = new int [] {2,3,1,7,8,3,9,1,2,0}  
int i=0;  
while (i<10){  
    Console.WriteLine (M[i]);  
    i+=1;
```

5. The following C# code contains syntax errors. Identify the errors and write the correction opposite to each line of code. If there is no error in a line, write NO ERROR.

[6 Marks]

CODE	ERRORS
class Program	NO ERROR
{	NO ERROR
static void (string[] args)	Missing Main - Static void Main
{	Missing Main - Static void Main
p, q;	Data Type Missing - int p, q;
Console.ReadLine("Input two numbers");	Wrong statement - Console.WriteLine("");
p = Convert.ToInt32(Console.ReadLine());	NO ERROR
q = Convert.ToInt32(Console.ReadLine());	Wrong method -ToInt32()
if(p<q)	Capital P should be small like declared
Console.WriteLine("{0} is the smallest");	Missing the value after comma - p
else	NO ERROR
Console.WriteLine("{0} is the smallest",q);	NO ERROR
Console.ReadLine();	NO ERROR
}	NO ERROR
}	NO ERROR

## Part 3: Problem Solving Questions

[50 Marks]

1. Write a C# program to display the odd elements in a given array of 10 elements. Read the array values from keyboard. [20 Marks]

### Sample I/O

```
Enter the array elements
1
2
3
4
5
6
7
8
9
10
Odd elements are
1
3
5
7
9
```

```
using System;
class IsOddElements
{
    static void Main(string[] args)
    {
        int[] arr = new int[10];
        Console.WriteLine("Enter the array elements");
        for (int i=0; i < arr.Length; i++)
        {
            arr[i] = Convert.ToInt32(Console.ReadLine());
        }
        Console.WriteLine("Odd elements are");
        for (int i=0; i < arr.Length; i++)
        {
            if (arr[i] % 2 != 0)
            {
                Console.WriteLine(arr[i]);
            }
        }
    }
}
```

### Already Solved

2. Write a C# application that implements a class 'Square' with the following members.

- Three private data members 'side', 'perimeter' and 'area' of double data type.
- Four methods, setSide(), calcPer(), calcArea() and dispResult()
  - setSide() – to set the length of the side s of the square as per the user input.
  - calcPer() – to calculate the perimeter of the square using the formulae  $P = 4 \times s$
  - calcArea() – to calculate the area of the square using the formulae  $A = s^2$
  - dispResult() – to display the perimeter and area of the square.

In the Main method, create an object of the 'Square' class, read the value of length of side and use the object to call the methods to display the output as shown below. [15 Marks]

### Sample I/O

```
Enter the length of the side of square : 3
Perimeter of the Square= 12
Area of the Square= 9
```

3. A company gives commission to its salesmen as per the sales target amount below. Write a program to read the basic salary and sales target amount, calculate the commission and total salary of a salesman and display it. [Total salary = basic salary + commission]. [15 marks]

Sales Target Amount	Commission
More than or equal to 500	30% of sales target amount
Less than 500 and greater than or equal to 400	25% of sales target amount
Less than 400 and greater than or equal to 300	20% of sales target amount
Less than 300 and greater than or equal to 100	15% of sales target amount
Less than 100	10% of sales target amount

Already Solved النسب كانت مختلفة

Sample I/O

```
Enter your basic salary: 550 ✓
Enter your sales target amount: 350 ✓
*****
Commission= 70
Total Salary= 620
```

٧٣

$550 + 70$

Class Program

```
static void Main (string[] args)
{
    Console.WriteLine ("Enter your basic salary :");
    double Sal = Convert.ToDouble (Console.ReadLine ());
    Console.WriteLine ("Enter your sales target amount :");
    double targetAmount = Convert.ToDouble (Console.ReadLine ());
    double commission;
    if (targetAmount >= 500)
        commission = 0.30 * targetAmount;
    else if (targetAmount < 500 && targetAmount >= 400)
        commission = 0.25 * targetAmount;
    else
        commission = 0.10 * targetAmount;
    double toSalary = sal + commission;
    Console.WriteLine ("Commission = " + commission);
    Console.WriteLine ("Total Salary = " + toSalary);
```

## Part 1: Multiple Choice Questions (write answers on the external answer sheet, 2 Marks each)

1. A .NET program compiles into an intermediate code, which is known as \_\_\_\_\_  
 b. MSIL  
 c. Common Type System  
 d. None of the above
2. When a new C# application is created, the IDE creates a \_\_\_\_\_ with a single project.  
 a. Solution  
 c. Toolbox  
 b. Properties  
 d. Server
3. Which of the following is an example of a real literal?  
 a. '2.5f'  
 c. 2.5f  
 b. 23  
 d. "12"
4. Which of the following is not a floating-point data type?  
 a. Char  
 b. float  
 c. double  
 d. All of the above
5. \_\_\_\_\_ is an example of an equality operator in C#.  
 a. =  
 b. !=  
 c. <  
 d. &&
6. Which of the following is a replacement of if-else statement?  
 a. Relational operator  
 c. Ternary operator  
 b. Unary operator  
 d. Logical operator

1. B
2. A
3. C
4. A
5. B
6. C
7. C
8. D
9. B
10. A

- ANSWER KEY**
7. In C#, the access modifier used to access methods from anywhere, including outside the class is known as \_\_\_\_\_  
 c. Public  
 a. Private  
 b. Protected  
 d. None of the above
  8. Consider the array `int[] A = { 10, 8, 6, 4, 0 };` Which of the following is the output of the statement `Console.WriteLine(++A[0]);`?  
 a. 8  
 c. 10  
 b. 9  
 d. 11
  9. Which of the following is true about constructors?  
 b. Constructors have the same name as the class itself  
 a. Constructor is a method which is called when an object is no more required  
 c. Constructors specify a return type  
 d. None of the above
  10. C# handles an exception that is not caught by any of the previous catch statements using \_\_\_\_\_ statement.  
 a. Finally  
 c. throws  
 b. try  
 d. catch

## Part 2: Output and Short Essay Questions (6 marks each) [30 Marks]

1. Differentiate between if-else statement and conditional operator with the help of examples.

[6 Marks]

If-else statement	Conditional operator
<ul style="list-style-type: none"><li>An <b>if</b> statement identifies which statement to run based on the value of a Boolean expression.</li><li>If the Boolean-expression is true, then the true-block statements otherwise, the false-block statement(s) are executed</li></ul> <p><u>Example:</u> Bool isEven; if (number % 2 == 0) {     isEven = true; } else {     isEven = false; }</p>	<ul style="list-style-type: none"><li>Conditional operator is a substitute for if...else statement. The syntax of ternary operator is: <b>Condition ? Expression 1: Expression 2</b></li><li>If the expression stated by Condition is true, the result of Expression1 is returned by the ternary operator.</li><li>If it is false, the result of Expression2 is returned.</li></ul> <p><u>Example:</u> bool isEven = (number % 2 == 0) ? true : false ;</p>

2. What will be the output of the following code?

[6 Marks]

```
class Program
{
    static void Change(ref int [] A)
    {
        for (int i = 0; i < A.Length; i++)
        {
            if (i < 3)
                A[i] = A[i] + 1;
        }
    }

    static void Main(string[] args)
    {
        int[] P = new int[] { 2,4,6,8,10,12 };
        Change(ref P);
        for (int i = 0; i < P.Length; i++)
        {
            Console.WriteLine(P[i] + " ");
        }
        Console.ReadLine();
    }
}
```

Output:

3  
5  
7  
8  
10  
12

3. Differentiate between constructor and destructor. Explain with an example. [6 Marks]

Constructor	Destructor
<ul style="list-style-type: none"><li>A <b>constructor</b> enables an object to initialize itself when it is created.</li><li>Constructors have the same name as the class itself.</li><li>they do not return any value.</li></ul> <pre>class employee {     employee ()     {         Console.WriteLine("employee's Constructor");     } }</pre>	<ul style="list-style-type: none"><li>A <b>destructor</b> is opposite to a constructor. It is a method called when an object is no more required.</li><li>The name of the destructor is the same as the class name and is preceded by a tilde (~). Like constructors.</li><li>a destructor has no return type</li></ul> <pre>class employee {     ~employee ()     {         Console.WriteLine("employee's destructor ");     } }</pre>

4. Rewrite the following using for loop: [6 Marks]

```
int i=0;  
while(i<10)  
{  Console.WriteLine(i*2);  
    i = i + 1; }
```

```
for(int i=0; i<10 ; i= i+1)  
{  
    Console.WriteLine(i*2);  
}
```

5. What is the output of the following C# code : [6 Marks]

```
int x,y,z,A;  
x = 2;  
y = 3;  
z = 3;  
A = x++ - y-- + --z;  
Console.WriteLine(x + " " + y + " " + z + " " + A);
```

Output:

3 2 2 1

### Part 3: Problem Solving Questions

[50 Marks]

1. Write a C# program to find the smallest element and largest element in a given array of 10 elements. Read the array values from keyboard. [20 Marks]

#### Sample I/O

```
Enter the array elements
2
3
6
9
7
8
23
5
1
2
The smallest element in the array is 1
The Largest element in the array is 23
```

```
using System;
class Program
{
    static void Main(string[] args)
    {
        int[] array = new int[10];
        int largest;
        Console.WriteLine("Enter the array elements");
        for (int i = 0; i < array.Length; i++)
        {
            array[i] = Convert.ToInt32(Console.ReadLine());
        }
        largest = array[0];
        for (int i = 1; i < array.Length; i++)
        {
            if (array[i] > largest)
                largest = array[i];
        }
        Console.WriteLine("The largest element in the array is "+ largest);
        Console.ReadLine();
    }
}
```

2. Write a C# application that implements a class 'Cube' with the following members.
- Three private data members 'side', 'volume' and 'surfacearea' of double data type.
  - Four methods, `setSide()`, `calcVol()`, `calcSA()` and `showResult()`
    - `setSide()` – to set the length of the side ( $s$ ) of the cube as per the user input.
    - `calcVol()` – to calculate the volume of the cube using the formulae  $V = s \times s \times s$
    - `calcSA()` – to calculate the surface area of the cube using the formulae  $A = 6s^2$
    - `showResult()` – to display the volume and surface area of the cube.

In the Main method, create an object of the 'Cube' class, read the value of length of side and use the object to call the methods to display the output as shown below. [15 Marks]

Already Solved

Sample I/O

```
Enter the length of the side of cube : 3
Volume of the Cube= 27
Surface Area of the Cube= 54
```

3. Write a C# program that accept a numerator and denominator value from the user and Calculate result as follows:

Result = numerator/denominator

Use exception handling to ensure that all run time errors are handled. [15 Marks]

```
using System;
class ISAEerror
{
    static void Main(string[] args)
    {
        Console.Write("Enter the numerator: ");
        int numerator = Convert.ToInt32(Console.ReadLine());
        Console.Write("Enter the denominator: ");
        int denominator = Convert.ToInt32(Console.ReadLine());
        int r;
        try
        {
            r = numerator / denominator;
            Console.WriteLine("Result = " + r);
        }
        catch(Exception ex)
        {
            Console.WriteLine("Division by zero");
        }
    }
}
```

# M107 Exams

نماذج اختبارات المقرر في النسخة القديمة، المقرر يحوي على معلومات محذوفة من المقرر الحالي.  
انصح بالرجوع الى سلайдات المقرر الحالي **M109** والتأكد من السؤال اذ يعتبر من ضمن المقرر أم لا.

## Part 1: Multiple Choice Questions

[20 Marks]

(Write answers on the external answer sheet, 2 Marks each)

1. What is the size of char data type in C#?

- a. 1 byte
- b. 1 bit
- c. 2 bytes
- d. 2 bits

2. Which of the following is a keyword in C#?

- a. for
- b. class
- c. while
- d. All of the above

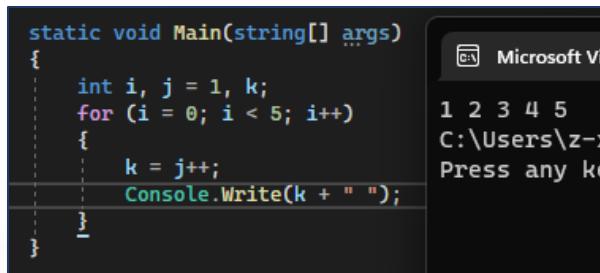
3. Which of the following statements can be used to skip a part of a loop?

- a. break
- b. goto
- c. continue
- d. return

4. What will be the output of the following C# code:

```
int i, j = 1, k;
for (i = 0; i < 5; i++)
{
    k = j++;
    Console.Write(k + " ");
}
```

- a. 01234
- b. 12345
- c. 246810
- d. 13579



```
static void Main(string[] args)
{
    int i, j = 1, k;
    for (i = 0; i < 5; i++)
    {
        k = j++;
        Console.Write(k + " ");
    }
}
```

5. \_\_\_\_\_ is an example of method in ArrayList Class

- a. Add
- b. Clear
- c. Count
- d. All of the above

6. A variable declared inside a method is known as:

- a. global
- b. public
- c. serial
- d. local

7. Which of these keywords is used to manually throw an exception?

- a. try
- b. throw
- c. finally
- d. catch

8. Which of the following is the correct declaration of values to integer variables a and b?

- a. int a=30 ; b=38.5;
- b. int a = b =30;
- c. int a=32 ; int b=45;
- d. int a=23 , b=34.9;

9. Which of the following value is assigned to x, If  $x=3+3*3$  in C#?

- a. 27
- b. 12
- c. 3
- d. 18

10. Which of the following is the correct way to create an object of the class student?

- a. student student1 = new student();
- b. student pqr =new student();
- c. student abc = new student();
- d. All of the above



## **Part 2: Short Essay Questions (6 marks each)**

**[30 Marks]**

1. Create a class called `employee` in C# with the following data.

`employeeCode`

`employeeName`

`employeeSalary`

Use appropriate data types and access modifiers for the above member variables.

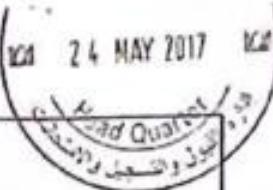
### Answer

```
class employee{  
    public int employeeCode;  
    public String employeeName;  
    public double employeeSalary;  
}
```

2. What is a destructor in C#? Explain with the help of an example.

A destructor is opposite to a constructor. It is a method called when an object is no more required. The name of the destructor is the same as the class name and is preceded by a tilde (~). Like constructors, a destructor has no return type

```
class employee  
{  
    ~employee ()  
    {  
        Console.WriteLine("employee's destructor is called");  
    }  
}
```



3. What will be the output of the following code snippet?

```
class Program
{
    static void Main(string[] args)
    {
        int i, j;
        int[,] arr = new int[3, 3];
        for (i = 0; i <= 2; ++i)
        {

            for (j = 0; j < 2; ++j)
            {

                arr[i, j] = i * 3 + i * 3;
                Console.WriteLine(arr[i, j]);
            }
        } Console.ReadLine();
    }
}
```

Output

00661212

4. What is exception? How to handle exceptions in C#? Explain with an example.

An exception is an indication of a problem that occurs during a program's execution. Exception handling enables us to create applications that can resolve exceptions. To handle an exception, we need to place the code within the try block.

When an exception occurs inside the try block, the control looks for the catch block and raises an exception that is handled in the catch block. At least one catch and/or a finally block must follow the try block. The finally block executes regardless of whether a try block executes successfully or an exception occurs. Below is the simple skeleton for the try, catch and finally blocks:

```
try
{
}
catch
{
}
finally
```

تابع للسؤال السابق

5.

Rewrite the following c# switch statement using the if-else statement:

```
switch(B)  
{  
  
case 2:  
case 4: Console.WriteLine("Hai");  
    break;  
case 6:  
case 8: Console.WriteLine("Hello");  
    break;  
default: Console.WriteLine("Good Bye");  
    break;  
}
```

Answer

```
if(B==2 || B==4)  
    Console.WriteLine("Hai");  
  
else if(B==2 || B==4)  
    Console.WriteLine("Hello");  
  
else  
    Console.WriteLine("Good Bye");
```

### Part 3: Problem Solving Questions

[50 Marks]

Already Solved

1. Write a C# application to prompt the user for the radius of a sphere and call method `SphereArea` to calculate and display the surface area of the sphere. Use the following formula to calculate the area:

$$A = 4 \pi r^2$$

[15 Marks]

1-

#### Answer

```
using System;
namespace Final
{
    class Program
    {
        static void Main(string[] args)
        {
            double radius;
            Console.WriteLine("Enter the radius: ");
            radius = Convert.ToDouble(Console.ReadLine());
            SphereArea(radius);

            Console.ReadKey();
        }
        public static void SphereArea(double radius)
        {
            double A;
            A = 4.0 * 3.14 * radius * radius;
            Console.WriteLine("Sphere Area = "+A);
        }
    }
}
```

2. Write a C# application to find the biggest number in an array of 10 integers. The user should enter the 10 integers from the keyboard. Print the result in the following format:

*The biggest number in the array= Answer*

Already Solved

[15 Marks]

```
using System;
namespace Final
{
    class Final
    {
        static void Main(string[] args)
        {
            int biggest;
            int[] array = new int[10];
            for (int i = 0; i < 10; i++)
            {
                Console.Write("Enter the element: ");
                array[i] = Convert.ToInt32(Console.ReadLine());
            }
            biggest = array[0];
            for (int i = 1; i < 10; i++)
            {
                if (array[i] > biggest)
                    biggest = array[i];
            }
            Console.WriteLine("\nThe biggest number in the array = " + biggest);

            Console.ReadKey();
        }
    }
}
```

Already Solved

3. Write a C# application that implements a class 'BankAccount'. Define three data members 'TotalAmount', 'Deductions' and 'BalanceAmount' of double data type and four public methods Balance(), Debit (), Credit(), and GetData () in the class. In the Main method, create an object of the 'BankAccount' class called BA and use the object to call the Balance () method and the GetData () method. Define the methods as follows:-

[20 Marks]

**Balance ()**

- i. Set the value of TotalAmount as 5000 and Deductions as 1000.
- ii. Calculate the BalanceAmount,  
[BalanceAmount = TotalAmount – Deductions].
- iii. Display the BalanceAmount.

**Debit ()**

- i. Read a DebitAmount entered by the user.
- ii. Update the BalanceAmount [BalanceAmount = BalanceAmount – DebitAmount].
- iii. Display the updated BalanceAmount.

**Credit ()**

- i. Read a CreditAmount entered by the user.
- ii. Update the BalanceAmount [BalanceAmount = BalanceAmount + CreditAmount].
- iii. Display the updated BalanceAmount.

**GetData ()**

- i. Display the list of choices ('d' for Debit and 'c' for Credit) to the user.
- ii. Read the choice of the user.
- iii. If the user option is 'd' call the Debit () method, otherwise call the Credit() method.

```
using System;
namespace Final
{
    class BankAccount
    {
        private double TotalAmount;
        private double Deductions;
        private double BalanceAmount;

        public void Balanc()
```

```
{  
    Deductions = 1000;  
    TotalAmount = 5000;  
    BalanceAmount = TotalAmount - Deductions;  
    Console.WriteLine("The updated balance amount = " + BalanceAmount);  
}  
public void Credit()  
{  
    Console.Write("Enter The Credit Amount: ");  
    double CreditAmount = Convert.ToDouble(Console.ReadLine());  
    BalanceAmount = BalanceAmount + CreditAmount;  
    Console.WriteLine("The updated balance amount = " + BalanceAmount);  
}  
  
public void Debit()  
{  
    Console.Write("Enter The Debit Amount: ");  
    double DebitAmount = Convert.ToDouble(Console.ReadLine());  
    BalanceAmount = BalanceAmount - DebitAmount;  
    Console.WriteLine("The updated balance amount = " + BalanceAmount);  
}  
public void GetData()  
{  
    Console.Write("Enter 'd' for debit 'c' for credit: ");  
    char option = Convert.ToChar(Console.ReadLine());  
    switch (option)  
    {  
        case 'd':  
            Debit(); break;  
        default:  
            Credit(); break;  
    }  
}  
static void Main(string[] args)  
{  
    BankAccount BA = new BankAccount();  
    BA.Balanc();  
    BA.GetData();  
    Console.ReadKey();  
}  
}
```

[20 Marks]

**Part 1: Multiple Choice Questions**

(Write answers on the external answer sheet, 2 Marks each)

1. Which of the following is an 8-bit unsigned integer data type?

- a. byte
- b. bool
- c. long
- d. double

Source: [Click Here](#)

2. Which of the following translates bytecode into machine code at runtime?

- a. MSIL
- b. Interpreter
- c. Just In Time (JIT) compiler
- d. None of the above

3. Which of the following is an invalid variable name?

- a. A9
- b. TOTAL SUM
- c. TOTAL
- d. TOTAL\_SUM

4. Which of the following operator has the lowest precedence?

- a. -
- b. >>
- c. \*
- d. &&

5. Consider the array int [ ] P = {1, 3, 6, 5, 9}. Which of the following is the output of the statement Console.WriteLine(P[2] / 3);?

- a. 1
- b. 2
- c. 3
- d. -1

6/3

2

6. Which of the following is a C# access specifier?

- a. Static
- b. Protected
- c. Void
- d. None of the above

7. Which of the following is a valid method definition? [findBig is the method name]

- a. findBig public int (int a, int b) { Method body }
- b. public int findBig (int a, int b) { Method body }
- c. int findBig public (int a, int b) { Method body }



- d. None of the above
8. Which of the following statement is valid about inheritance?
- a. C# does not support multiple inheritance.
  - b. The base class inherits the derived class member variables and member methods.
  - c. The derived class is created first before the base class
  - d. None of the above
9. Which of the following is the correct way of decrementing the variable 'z'?
- a. z-- = 1;
  - b. z = 1 -;
  - c. z -= 1; C
  - d. --z --;
10. Which of the following block contains the code that could throw an exception?
- a. Try T
  - b. Catch
  - c. Exception
  - d. None of the above

## Part 2: Short Essay Questions (6 marks each)

[30 Marks]

1. What will be the output of the following code snippet?

```
class Program
{
    static void Main(string[] args)
    {
        int[] a = { 2, 3, 1, 3, 2, 3, 5, 2, 4, 5 };
        for (int i = 0; i < a.Length; i++)
        {
            if (a[i] < 3)
                continue;
            Console.WriteLine(a[i] + 2);
        }
        Console.ReadLine();
    }
}
```

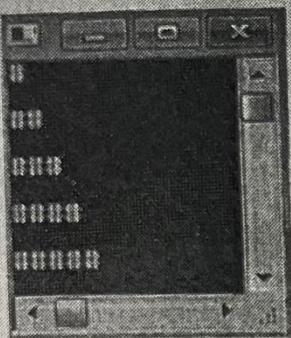
Output:

5  
5  
5  
7  
6  
7



2. Complete the program (Program 1) given below to get the following output.

Output



```
##  
###  
####  
#####  
######
```



Program 1

```
static void Main(string[] args)  
{  
    int i, j;  
  
    // Write code here  
}
```

for

```
static void Main(string[] args)  
{  
    int i, j;  
    for (i = 1; i <= 5; i++)  
    {  
        Console.WriteLine();  
        for (j = 1; j <= i; j++)  
        {  
            Console.Write("#");  
        }  
    }  
}
```

3. Rewrite the following using do-while loop:

```
static void Main(string[] args)  
{  
    int p;  
    for (p = 0; p <= 10; p += 2)  
    {  
        Console.WriteLine(p);  
    }  
    Console.Read();  
  
}
```

```
static void Main(string[] args)  
{  
    int p = 0;  
    do  
    {  
        Console.WriteLine(p);  
        p += 2;  
    } while (p <= 10);  
    Console.Read();  
}
```

4. Differentiate between "continue" and "break" statements in C#.

5. Explain any three Access Modifiers in C#.

**Part2 Q4 Answer:** (الأفضل الفهم وكتابة الإجابة حسب فهمك اضغط هنا لمقارنة أبسط)

Difference's	Break	Continue
Main Purpose	It terminates the execution of remaining iteration of the loop.	It terminates only the current iteration of the loop.
After Break/Continue	'break' resumes the control of the program to the end of loop enclosing that 'break'.	'continue' resumes the control of the program to the next iteration of that loop enclosing 'continue'.
Causes	It causes early termination of loop	It causes early execution of the next iteration.
Continuation	'break' stops the continuation of loop.	'continue' do not stops the continuation of loop. It only stops the current iteration.
Other use	'break' can be used with 'switch' and 'label'.	'continue' can not be executed with 'switch' and 'labels'

**Part2 Q5 Answer:**

MODIFIER	ACCESSIBILITY CONTROL
Private	Member is accessible only within the class containing the member.
Public	Member is accessible from anywhere outside the class as well. It is also accessible in derived classes.
protected	Member is visible only to its own class and its derived classes.

## Part 3: Problem Solving Questions

[50 Marks]

1. Write a C# application to prompt the user for the radius (r) and height (h) of a cone and call method ConeVolume to calculate and display the volume of a cone. Use the following formula to calculate the volume:

$$V = \frac{1}{3}\pi r^2 h$$

Hint: Value of  $\pi$  is 3.14

Already Solved

```
Enter the radius of cone:  
1  
Enter the height of cone:  
2  
The volume of cone is 2.89333333333333
```

2. Write a C# program to count the number of positive numbers, negative numbers and zeros in an integer array of 10 elements. Read the array values from the keyboard.

int pos=0;  
int neg=0;  
int zero=0;

[15 Marks]

```
Enter the element :  
2  
Enter the element :  
-8  
Enter the element :  
-4  
Enter the element :  
-6  
Enter the element :  
12  
Enter the element :  
-5  
Enter the element :  
0  
Enter the element :  
0  
Enter the element :  
2  
Enter the element :  
4  
Number of positive numbers = 4  
Number of negative numbers = 4  
Number of zeros = 2
```



3. Write a C# application that implements a class 'Student' with the following members.

- i. Six public data members 'quiz1', 'quiz2', 'coursework', 'mid', 'finalmark, and 'totalmarks' of integer data type.

**Part3 Q2 Answer:**

```
using System;
class ISA
{
    static void Main(string[] args)
    {
        int[] a = new int[10];
        int i, positiveCount, negativeCount, zerosCount;
        positiveCount = 0; negativeCount = 0; zerosCount = 0;
        for (i = 0; i < 10; i++)
        {
            Console.WriteLine("Enter the element :");
            a[i] = Convert.ToInt32(Console.ReadLine());
        }
        for (i = 0; i < 10; i++)
        {
            if (a[i] > 0)
            {
                positiveCount++;
            }
            else if (a[i] < 0)
            {
                negativeCount++;
            }
            else
            {
                zerosCount++;
            }
        }
        Console.WriteLine(" ");
        Console.WriteLine("Number of positive numbers = " + positiveCount);
        Console.WriteLine("Number of negative numbers = " + negativeCount);
        Console.WriteLine("Number of zeros = " + zerosCount);
        Console.ReadLine();
    }
}
```

```
C:\Users\z-xon\source\repos\ x + ^

Enter the element :
2
Enter the element :
-8
Enter the element :
-4
Enter the element :
-6
Enter the element :
12
Enter the element :
-5
Enter the element :
0
Enter the element :
0
Enter the element :
2
Enter the element :
4

Number of positive numbers = 4
Number of negative numbers = 4
Number of zeros = 2
```

- II. A default constructor to display the message "Student Marks".
- III. Three public methods, calcCourseWork(), calcTotal(), and disResult().
1. calcCourseWork() – calculate and return the course work using the formulae "coursework = quiz1 + quiz2".
  2. calcTotal() – calculate and return the totalmarks using the formulae "totalmarks = coursework + mid + finalmark".
  3. disResult() – display coursework, mid, finalmark and total marks.

In the Main method, input the marks of quiz1, quiz2, mid, and final mark through the keyboard. Create an object of the 'Student' class and set the class variables quiz1, quiz2, mid, and final mark of the object using the input values. Use the object to call the methods to display the output as shown below.

[20 Marks]

```
Enter Quiz 1 marks:  
8  
Enter Quiz 2 marks:  
7  
Enter Mid Exam marks:  
17  
Enter Final Exam marks:  
36  
  
Student Marks  
*****  
Course Work = 15  
Mid Exam = 17  
Final Exam = 36  
Total Marks = 68
```

---

End of Questions



### Part3 Q3 Answer:

```
using System;
class Student
{
    public int quiz1, quiz2, coursework, mid, finalmark, totalmarks;
    public Student()
    {
        Console.WriteLine("Student Marks");
        Console.WriteLine("*****\n");
    }
    public int calcCourseWork()
    {
        coursework = quiz1 + quiz2;
        return coursework;
    }
    public int calcTotal()
    {
        totalmarks = coursework + mid + finalmark;
        return totalmarks;
    }
    public void disResult()
    {
        Console.WriteLine("\nCourse Work = " + calcCourseWork());
        Console.WriteLine("Mid Exam = " + mid);
        Console.WriteLine("Final Exam = " + finalmark);
        Console.WriteLine();
        Console.WriteLine("Total Marks = " + calcTotal());
    }
    static void Main(string[] args)
    {
        Student x = new Student();

        Console.WriteLine("Enter Quiz 1 marks:");
        x.quiz1 = Convert.ToInt32(Console.ReadLine());
        Console.WriteLine("Enter Quiz 2 marks:");
        x.quiz2 = Convert.ToInt32(Console.ReadLine());
        Console.WriteLine("Enter Mid Exam marks:");
        x.mid = Convert.ToInt32(Console.ReadLine());
        Console.WriteLine("Enter Final Exam marks:");
        x.finalmark = Convert.ToInt32(Console.ReadLine());
        x.disResult();
    }
}
```

```
Microsoft Visual Studio Debug X

Student Marks
*****
Enter Quiz 1 marks:
8
Enter Quiz 2 marks:
7
Enter Mid Exam marks:
17
Enter Final Exam marks:
36

Course Work = 15
Mid Exam = 17
Final Exam = 36

Total Marks = 68
```

## **Part 1: Multiple Choice Questions**

**[20 Marks]**

**(Write answers on the external answer sheet, 2 Marks each)**

---

1. What is the size of 'char' data type?
  - a. 8 bit
  - b. 16 bit
  - c. 12 bit
  - d. 20 bit
  
2. Which of the following is NOT an Arithmetic operator in C#.NET?
  - a. /
  - b. %
  - c. \*\*
  - d. +
  
3. Which of these keywords is not a part of exception handling?
  - a. try
  - b. thrown
  - c. finally
  - d. catch
  
4. Consider the array int [ ] P = {12, 14, 10, 6, 8}. Which of the following is the output of the statement `Console.WriteLine(P[3] / 2);`?
  - a. 3
  - b. 6
  - c. 5
  - d. 4
  
5. Which of the following is a keyword in C#?
  - a. for
  - b. id
  - c. name
  - d. dept

6. Which of the following is the correct way of incrementing the variable 'p'?

- a. **p += 1;**
- b. **p =+ 1;**
- c. **p ++ 1;**
- d. **++p ++;**

7. What is the output of the following piece of code?

```
int k, j=1;
k=j++ - 1;
Console.WriteLine(k);
a. 0
b. 1
c. 2
d. -1
```

8. Select the output for the following piece of code.

```
int A = 3;
do
{
    A--;
}
while (A < 0);
Console.WriteLine(A);
a. 1
b. 0
c. 2
d. -1
```

9. The capability of an object in C# to take number of different forms and hence display behavior as according is known as:

- a. Abstraction
- b. Polymorphism**
- c. Encapsulation
- d. None of the above

10. Which of the following is the correct way to create an object of the class **Sample**?

- a. Sample s;
- b. s=new Sample();
- c. Sample s = new Sample( ).**
- d. Sample new s;

## Part 2: Short Essay Questions (6 marks each)

[30 Marks]

1. Complete the program (Program 1) given below so as to get the following output.

Output

Already Solved before

```
55555
4444
333
22
1
```

Program 1

```
static void Main(string[] args)
{
    int i,j;
    // Write the codes here
}
```

**Solution:**

```
static void Main(string[] args)
{
    int i, j;
    for (i = 5; i > 0; i--) // 2 Marks
    {
        for (j = 1; j <= i; j++) // 2 Marks
        {
            Console.Write(i); // 1 Mark
        }
        Console.WriteLine("\n"); // 1 Mark
    }
    Console.ReadLine();
}
```

2. What will be the output of the following code snippet?

```
class Program
{
    static void Main(string[] args)
    {

        int[] a = { 5, 3, 6, 8, 1, 3, 7, 8, 2, 10 };
        int i=0;
        while (i < 10)
        {
            Console.WriteLine(a[i] + 2);
            i = i + 2;
        }
        Console.ReadLine();
    }
}
```



7  
8  
3  
9  
4

( 1.2 Marks for each value)

3. Differentiate between ‘continue’ and ‘break’ statements in C# with examples.

**(3 marks for difference and 3 marks for example)**

**Solution:**

“continue” statement is used to pass the control to next iteration. This statement can be used with – “while”, “for”, “foreach” loops. “break” statement is used to exit the loop.

Example: continue

```
class Program
{
    static void Main(string[] args)
    {
        int i;
        for (i = 0; i < 10; i++)
            if (i == 5)
                continue;
            else
                Console.WriteLine(i);
        Console.ReadLine();
    }
} //Output - 012346789
```

Example: break

```
class Program
{
    static void Main(string[] args)
    {
        int i;
        for (i = 0; i < 10; i++)
            if (i == 5)
                break;
            else
                Console.WriteLine(i);
        Console.ReadLine();
    }
} // Output - 01234
```

4. Consider the following program. What will be the output (a) if the value of q is 5 and (b) if the value of q is 10?

( 3 marks for each)

```
static void Main(string[] args)
{
    try
    {
        int p, q;
        p = 20;
        Console.WriteLine("Enter the value of q");
        q = int.Parse(Console.ReadLine());
        int r = p / (q - 5);
        Console.WriteLine("Arab");
    }
    catch (Exception e)
    {
        Console.WriteLine("Open");
    }
    finally
    {
        Console.WriteLine("University");
    }

    Console.ReadLine();
}
```

**Solution:**

- a) If the value of q is 5, the output is OpenUniversity
- b) If the value of q is 10, the output is ArabUniversity

5. The following C# code contains syntax errors. Identify the errors and write the correction opposite to each line of code. If there is no error in a line, write NO ERROR.  
**(1 mark for each error)**

CODE	ERRORS	
class Program	NO ERROR	
	{ is missing	
static void Main(string[] args)	Spelling mistake - void	
{	NO ERROR	
int i, j, k	;	is missing
Console.WriteLine("Enter two numbers");	Console.WriteLine("Enter two numbers");	
i = int.Parse(Console.ReadLine());	NO ERROR	
j = int.Parse(Console.ReadLine());	NO ERROR	
K = i * j;	Wrong variable name - K	
Console.WriteLine["Value of k=" + k];	Wrong brackets - ()	
Console.ReadLine();	NO ERROR	
}	NO ERROR	
}	NO ERROR	

### Part 3: Problem Solving Questions

[50 Marks]

(Award full marks for any correct answer. As programming questions kindly use your academic judgment while marking)

**Already Solved before**

1. Write a C# application to prompt the user for the radius of a sphere and call a method *SphereVolume* to calculate and display the volume of the sphere. Use the following formula to calculate the volume:

$$V = \frac{4}{3}\pi r^3$$

[15 Marks]

**Hint: Value of pi is 3.14**

**Solution:**

```
using System;
namespace ConsoleApplication1
{
    class Program
    {
        static void Main(string[] args) // 1.5 Mark
        {
            double radius; // 1 Mark
            Console.WriteLine("Enter the radius of sphere:"); // 1 Mark
            radius = Convert.ToDouble(Console.ReadLine()); // 2.5 Marks
            SphereVolume(radius); // 2 Marks
            Console.ReadLine();
        }
        static void SphereVolume(double rad) // 2 Marks
```

```

    {
        double volume; // 1 Mark
        volume = (4.0 / 3.0) * Math.PI * Math.Pow(rad, 3); // 2.5 Marks
        Console.WriteLine("The volume of sphere is {0}", volume); // 1.5 Mark
    }
}
}

```

2. Write a C# program to count how many numbers are greater than or equal to 5 and how many numbers are less than 5, in an integer array of 10 elements. Read the array values from the keyboard.

**[15 Marks]**

```

Enter the element :12
Enter the element :14
Enter the element :5
Enter the element :6
Enter the element :2
Enter the element :1
Enter the element :7
Enter the element :9
Enter the element :1
Enter the element :7

Numbers greater than five = 7
Numbers less than five = 3

```

**Solution:**

```

using System;
class Program
{
    static void Main(string[] args) // 0.5 Mark
    {
        int[] a = new int[10]; // 1.5 Mark
        int i, grt, les; // 1 Marks
        grt = 0; les = 0; // 1 Mark
        for (i = 0; i < 10; i++) // 1.5 Marks
        {
            Console.Write("Enter the element : "); // 0.5 Mark
            a[i] = Convert.ToInt32(Console.ReadLine()); // 2 Marks
        }
        for (i = 0; i < 10; i++) // 1.5 Marks
        {
            if (a[i] >= 5) // 1 Mark
            {
                grt++; // 1 Mark
            }
            else
            {
                les++; // 1 Mark
            }
        }
        Console.WriteLine(" ");
        Console.WriteLine("Numbers greater than five = " + grt); // 1 Mark
        Console.WriteLine("Numbers less than five = " + les); // 1 Mark
        Console.ReadLine();
    }
}

```

3. Write a C# application that implements a class ‘Patient’ with the following members.
- Six private data members ‘DepositAmount’, ‘InsuranceAmount’, ‘TotalCharges’, ‘RoomCharges’, ‘LabCharges’, ‘MedCharges’ and ‘AmountDue’ of integer data type.
  - A default constructor to display the message “**Patient Bill**”.
  - Four public methods, **setMembers()**, **calcTotCharges()**, **calcAmtDue()**, and **disResult()**.
    - setMembers()** – set the values of DepositAmount, InsuranceAmount, RoomCharges, LabCharges and MedCharges as per the user input.
    - calcTotCharges()** – calculate and return the charges using the formulae “ $\text{TotalCharges} = \text{RoomCharges} + \text{LabCharges} + \text{MedCharges}$ ”.
    - calcAmtDue()** – calculate and return the amount due using the formulae “ $\text{AmountDue} = \text{TotalCharges} - (\text{DepositAmount} + \text{InsuranceAmount})$ ”.
    - disResult()** – display Deposit Amount, Insurance Amount, Total Hospital Charges and Amount Due.

In the Main method, create an object of the ‘Patient’ class, read the values of class members from the keyboard and use the object to call the methods to display the output as shown below.

[20 Marks]

```
Enter the insurance amount: 200
Enter the deposit amount: 150
Enter the room charges: 350
Enter the lab charges: 180
Enter the medicine charges: 560

PATIENT BILL

Insurance Amount = 150
Deposit Amount = 200
Hospital Charges = 1090
Amount Due= 740
```

**Solution:**

```
using System;
public class patient
{
    private int ins, dep, totch, rch, lch, mch, amt; //1 Mark
    public patient()// 2 Mark for constructor
    {
        Console.WriteLine("Patient Bill");
    }
    public void setMembers(int a, int b, int c, int d, int e) //2 Marks for
    SetMembers
    {
        dep = a;
        ins = b;
        rch = c;
        lch = d;
        mch = e;
```

```

}

public int calcTotCharges()// 2 Marks for calToCharges
{
    totch = rch + lch + mch;
    return totch;
}

public int calcAmtDue() // 2 Marks for calcAmtDue
{
    amt = totch - (dep + ins);
    return amt;
}

public void disResult() // 2 Marks for disResult
{
    Console.WriteLine("-----");
    Console.WriteLine("Insurance Amount = " + ins);
    Console.WriteLine("Deposit Amount = " + dep);
    Console.WriteLine("Hospital Charges = " + totch);
    Console.WriteLine("Amount Due= " + amt);
    Console.WriteLine("-----");
}

class Program
{
    static void Main(string[] args)
    {

        patient pt = new patient();// 2 Marks
        int a, b, c, d, e; // 0.5 Mark
        Console.Write("Enter the insurance amount: ");
        a = Convert.ToInt32(Console.ReadLine()); // 0.5 Mark
        Console.Write("Enter the deposit amount: ");
        b = Convert.ToInt32(Console.ReadLine());//0.5 Mark
        Console.Write("Enter the room charges: ");
        c = Convert.ToInt32(Console.ReadLine());// 0.5 Mark
        Console.Write("Enter the lab charges: ");
        d = Convert.ToInt32(Console.ReadLine());// 0.5 Mark
        Console.Write("Enter the medicine charges: ");
        e = Convert.ToInt32(Console.ReadLine());// 0.5 Mark
        pt.setMembers(a, b, c, d, e); // 1 Mark
        pt.calcTotCharges();// 1 Mark
        pt.calcAmtDue();// 1 Mark
        pt.disResult();// 1 Mark
        Console.ReadLine();
    }
}

```

## Part 1: Multiple Choice Questions (write answers on the external answer sheet, 2 Marks each)

[20 Marks]

1. Which of the following is not true about variable names in C#?
  - e. They can begin with a digit
  - f. Uppercase and lowercase are distinct
  - g. It should not be a keyword
  - h. White space is not allowed
2. In the C# code `String mystring;` mystring is -----
  - a. Class
  - b. Constructor
  - c. Object
  - d. None of the above
3. A method \_\_\_\_\_ an exception when that method detects that a problem has occurred.
  - a. Trys
  - b. Throws
  - c. Catches
  - d. None of the above
4. Which of the following is the correct way to assign values to an array?
  - e. `int [] marks = new int [3] {33, 45, 67};`
  - f. `int [] marks = new int [ ] {33, 45, 67};`
  - g. `int [ ] marks = {33, 45, 67};`
  - h. All of the above
5. Which of the following is true about value data types in C#?
  - e. Fixed length
  - f. Stored on the stack
  - g. Both a & b
  - h. None of the above
6. What will be the value of the variable NUM after the following code executes?

```
const int NUM = 90;  
NUM += 5;  
NUM ++;
```

```
public class ISAConstant  
{  
    static void Main(string[] args)  
    {  
        const int NUM = 90;  
        NUM += 5;  
        NUM++;  
        Console.WriteLine(NUM);  
    }  
}
```

ERROR!

إجابة غير أكيدة

- a. 90
- b. 95
- c. 96
- d. None of the above

11. Which of the following operator has the highest precedence:

- a. ++
- b. ||
- c. \*
- d. %

12. Which of the following statements can be used to jump out of a loop?

- a. break
- b. goto
- c. continue
- d. Both a & b

13. Which of the following access modifier makes a class member visible only to its own class and its derived classes?

- e. public
- f. private
- g. protected
- h. internal

14. Which of the following is correct?

- a. Data members of a class are by default public.
- b. Data members of a class are by default private.
- c. Member functions of a class are by default public.
- d. All of the above

## Part 2: Short Essay Questions (6 marks each)

[30 Marks]

1. Rewrite the following using a do-while loop:

```
int i;
for (i = 0; i <= 10 ; i++)
Console.WriteLine(i);
```

```
do
{
    Console.WriteLine(i);
    i++;
} while (i <= 10);
```

2. What will be the output of the following code snippet:

```
int n =1;
while (n<=20)
{
if (n%2==1)
    n++;
else
{
    Console.WriteLine(" "+n);
    n++;
}
}
```

Output:

2 4 6 8 10 12 14 16 18 20

3. What is an operator? Name at least 4 types of operators in C#.

An operator is a symbol; that tells the computer to perform certain mathematical or logical manipulations.

Types:

- 1- Arithmetic operators
- 2- Relational operators
- 3- Logical operators
- 4- Assignment operators
- 5- Conditional operators
- 6- Bitwise operators
- 7- Special operators

4. What is method overriding? How to implement it in C#? (خارج المفترض الحديث)

Functions in the child class with the same name and same parameter as in the base class, but with different behaviors (Implementation).

```
using System;
public class A
{
    public void print()
    {
        Console.WriteLine("Parent Method");
    }
}

public class B
{
    public void print()
    {
        Console.WriteLine("Overriding child method");
    }
}
```

5. Rewrite the following C# statement using the if-else statement:

```
Console.WriteLine(marks >= 60 ? "Pass" : "Fail");
```

```
if (marks >= 60)
    Console.WriteLine("Pass");
else
    Console.WriteLine("Fail");
```

## Part 3: Problem Solving Questions

[50 Marks]

1. Write a C# application to prompt the user for the radius (r) and height (h) of a cone and call method ConeVolume to calculate and display the volume of the cone. Use the following formula to calculate the volume:

$$V = \frac{1}{3}\pi r^2 h$$

Hint: Value of  $\pi$  is 3.14

```
Enter the radius of cone:
1
Enter the height of cone:
2
The volume of cone is 2.0943951023932
```

Solution:

```
using System;
namespace ISA
{
    public class Cone
    {
        static void Main(string[] args)
        {
            double radius, height;
            Console.WriteLine("Enter the radius of Cone");
            radius = Convert.ToDouble(Console.ReadLine());
            Console.WriteLine("Enter the height of Cone");
            height = Convert.ToDouble(Console.ReadLine());
            coneVolume(radius, height);
            Console.ReadLine();
        }
        static void coneVolume(double r, double h)
        {
            double volume;
            volume = 1.0 / 3.0 * Math.PI * r * r * h;
            Console.WriteLine("The volume of cone is : " + volume);
        }
    }
}
```

2. Write a C# code that finds the average of the values in an integer array. User should specify the size of array. Read the array values from the keyboard, the values must be between 0 and 100.

```
Enter how many numbers you want to find the average of:  
10  
Enter the values (between 0 and 100):  
25  
10  
14  
6  
13  
13  
16  
17  
20  
8  
The average is: 14
```

**Solution:**

```
using System;  
namespace ISA  
{  
    public class Average  
    {  
        static void Main(string[] args)  
        {  
            Console.WriteLine("Enter how many numbers you want to find the average  
of:\n");  
            int size = Convert.ToInt32(Console.ReadLine());  
            int[] arr = new int[size];  
            double sum = 0;  
            Console.WriteLine("Enter the values: (between 0 and 100):\n");  
            for (int i = 0; i < arr.Length; i++)  
            {  
                if (arr[i] >= 0 && arr[i] <= 100)  
                {  
                    arr[i] = Convert.ToInt32(Console.ReadLine());  
                    sum += arr[i];  
                }  
            }  
            Console.WriteLine("The average is: " + sum / arr.Length);  
            Console.ReadKey();  
        }  
    }  
}
```

3. Write a C# program to create a class called Employee with the following:

**Data Members :** Empid , Salary, bonus

**Methods:**

Getdata- To Read Empid, Salary and bonus from the user.

**Display\_Total\_Salary:**

To calculate and display the Total salary with Employee ID;  
( totalsalary= salary+bonus)

Create an object of the Class Employee to implement it.

**Solution:**

```
using System;
namespace ISA
{
    public class Employee
    {
        public string Empid;
        public double salary, bonus;

        public void Getdata(string id, double s, double b)
        {
            Empid = id;
            salary = s;
            bonus = b;
        }
        public void Display_Total_Salary()
        {
            double totalSalary = salary + bonus;
            Console.WriteLine("The Employee ID: {0}, Total salary is: {1}", Empid,
totalSalary);
        }
        static void Main(string[] args)
        {
            Employee x = new Employee();
            Console.Write("Enter Employee ID: ");
            string Empid = Console.ReadLine();
            Console.Write("Enter the Salary: ");
            double salary = Convert.ToDouble(Console.ReadLine());
            Console.Write("Enter the Bonus: ");
            double bonus = Convert.ToDouble(Console.ReadLine());
            x.Getdata(Empid, salary, bonus);
            x.Display_Total_Salary();
            Console.ReadLine();
        }
    }
}
```

```
C:\Users\z-xon\source\repos\ + 
Enter Employee ID: 106445578
Enter the Salary: 7000
Enter the Bonus: 350
The Employee ID: 106445578, Total salary is: 7350
```

[10 marks]

**Question-1**

This question consists of 5 multiple choice items. For each item, encircle the label a, b, c, or d as your most appropriate answer. Each item carries 2 marks. You are advised not to spend more than 10 minutes on this question.

1-	In an inheritance chain which of the following members of base class are accessible to the derived class members?			
	a- static	b- <u>public</u>		
	c- private	d- shared		
2-	Which of the following is the correct way to create an object of the class <u>Sample</u> ?			
	a- <u>Sample s = new Sample();</u>	b- Sample s;		
	c- s = new Sample();	d- Sample s = Sample();		
3-	Which of the following are reuse mechanisms available in C#?			
	a- <u>Inheritance</u>	b- Encapsulation		
	c- Polymorphism	d- Containership		
4-	What will be the output of the C# code snippet given below?  int num = 1, z = 5; if(!(num <= 0)) Console.WriteLine( ++num + z++ + " === " + ++z ); else Console.WriteLine( --num + z-- + " === " + --z );			
	a- 5 === 6	b- 6 === 5		
	c- 6 === 6	d- <u>7 === 7</u>		
5-	Which of the following is the correct output for the C# code snippet given below?  Console.WriteLine(10 + 13.0 / 2 + " ===== " + 13 % 3);			
	a- 16 ===== 3	b- 16 ===== 4		
	c- 11.5 ===== 3	d- <u>16.5 ===== 1</u>		

**Question-2****[5 marks]**

What does the following C# program will print? You are advised not to spend more than 20 minutes on this question.

```
class Question2
{
    public static void Main(string[] args)
    {
        int[] array = {20, 40, 30, 10, 50};
        int length = array.Length;
        int[] array2 = new int[length];
        for (int i = 0; i < length; i++)
        {
            array2[length - i - 1] = array[i];
        }
        for (int i = 0; i < length; i++)
        {
            Console.Write(array2[i] + " ");
        }
        Console.ReadKey();
    }
}
```

**Solution:**

50    10    30    40    20

**Question-3****[9 marks]**

The following is C# program with its expected output. This program has nine missing parts, the missing parts are labelled from **a** to **i**. You are required to find the missing parts so that the program will display exactly the given output. And then write each label with its corresponding missing part in your answer book. You are advised not to spend more than 20 minutes on this question.

```
class Question3
{
    public static void Main(string[] args)
    {
        string[] array = { a, b, c, d };
```

```

    for (int e = 0; index < f; index++)
    {
        Console.WriteLine("g[{0}] = h", i, array[index]);
    }
    Console.ReadKey();
}
}

```

The output

```

Element[0] = M105
Element[1] = M107
Element[2] = M129
Element[3] = M130

```

**Solution:**

- a- "M105"
- b- "M107"
- c- "M129"
- d- "M130"
- e- index
- f- array.length or 4
- g- Element
- h- {1}
- i- index

**Question-4**

**[12 marks]**

Write C# program that prompts the user to enter an integer number between 1 and 9 inclusive. The program applies **bonus points** to the given scores by the following rules:

- If the score is between 1 and 3, the program multiplies it by 10.
- If the score is between 4 and 6, the program multiplies it by 100.
- If the score is between 7 and 9, the program multiplies it by 1000.

If the score is 0 or more than 9, the program will terminate, otherwise the program will prompt the user again to enter a new number. You are advised not to spend more than 25 minutes on this question.

**Solution:**

```
class Question
{
    public static void Main(string[] args)
    {
        int num; //0.5 marks
        Console.WriteLine("Enter a number between 1 and 9"); //0.5 marks
        Console.WriteLine("Enter 0 or any number > 9 to exit");//0.5 marks
        num = Convert.ToInt32(Console.ReadLine()); //1.5 marks

        while (num >= 1 && num <= 9) //2 marks
        {
            if (num < 4) //1 mark
                Console.WriteLine("num = {0}, After multiplication num = {1}",
                    num, (num * 10)); //0.5 marks
            else if (num < 7) //1.5 marks
                Console.WriteLine("num = {0}, After multiplication num = {1}",
                    num, (num * 100)); //0.5 marks
            else //0.5 marks
                Console.WriteLine("num = {0}, num * 10 = {1}", num,
                    (num * 1000)); //0.5 marks
            Console.WriteLine();
            Console.WriteLine("Enter a number between 1 and 9"); //0.5 marks
            Console.WriteLine("Enter 0 or any number > 9 to exit");//0.5 marks
            num = Convert.ToInt32(Console.ReadLine()); // 1.5 marks
        }
        Console.ReadKey();
    }
}
```

**Question-5****[14 marks]**

Write C# program that has the following specifications:

- 1- Method **getMax()** with two integer parameters, that returns the maximum of the two numbers, or returns 0 if they are equal.
- 2- Method **getLast()** with an integer parameter, that returns the English name of the last digit of a given number. Example: for 512 returns "two"; for 1024 returns "four".
- 3- Method **reverseNum()** with an integer parameter, that returns the digits of a given decimal number in a reversed order. Example: for 256 returns 652.
- 4- Main method that:
  - a. Creates an object to invoke the implemented methods.
  - b. Prompts the user to enter two integer numbers.
  - c. Tests the method **getMax()** by passing the two entered numbers as parameters.
  - d. Tests the method **getLast()** by passing one of the two entered numbers as a parameter.
  - e. Tests the method **reverseNum()** by passing one of the two entered numbers as a parameter.

You are advised not to spend more than 30 minutes on this question.

**Solution:**

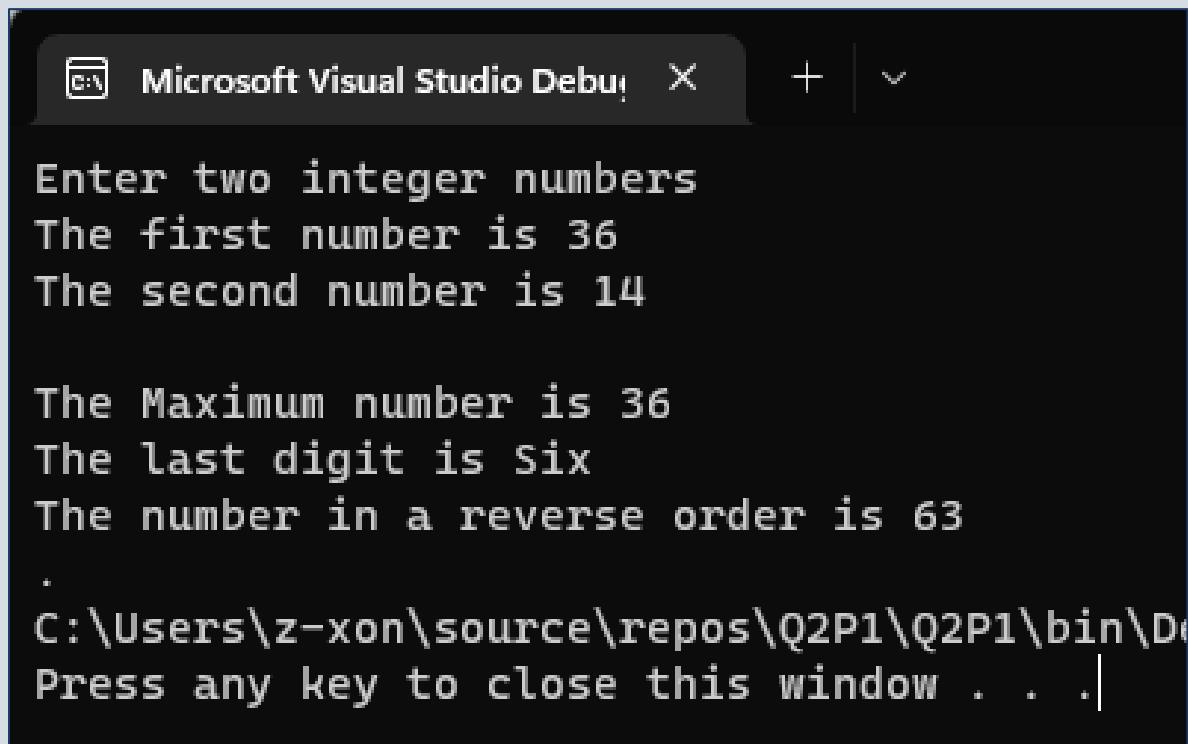
```
using System;
class Question5
{
    public int getMax(int num1, int num2)//0.5 mark
    {
        if (num1 > num2) return num1; //0.5 marks
        else if (num2 > num1) return num2; //0.5 mark
        else return 0; //0.5 marks
```

```

public string getLast(int num) //0.5 marks
{
    string lastDigit = null; //0.125 marks
    int lastInt = num % 10; //0.25 marks
    switch (lastInt) //0.5 marks
    {
        case 0:                                         //0.25 marks for each case
            lastDigit = "Zero";
            break;
        case 1:
            lastDigit = "One";
            break;
        case 2:
            lastDigit = "Two";
            break;
        case 3:
            lastDigit = "Three";
            break;
        case 4:
            lastDigit = "Four";
            break;
        case 5:
            lastDigit = "Five";
            break;
        case 6:
            lastDigit = "Six";
            break;
        case 7:
            lastDigit = "Seven";
            break;
        case 8:
            lastDigit = "Eight";
            break;
        case 9:
            lastDigit = "Nine";
            break;
    }
    return lastDigit; //0.5 marks
}
public string reverseNum(int num) //0.5 mark
{
    int d = 0; //0.25 marks
    string reverse = ""; //0.25 marks
    while (num != 0) //0.5 marks
    {
        d = num % 10; //0.5 marks
        reverse = reverse + d; //0.5 marks
        num = num / 10; //0.5 marks
    }
    return reverse; //0.5 marks
}
public static void Main(string[] args)
{
    Question5 test = new Question5(); // 0.5 mark
    Console.WriteLine("Enter two integer numbers"); // 0.5 marks
    Console.Write("The first number is ");
    int num1 = Convert.ToInt32(Console.ReadLine()); // 0.5 marks
    Console.Write("The second number is ");
    int num2 = Convert.ToInt32(Console.ReadLine()); // 0.5 marks
    Console.WriteLine();
}

```

```
        Console.WriteLine("The Maximum number is {0}", test.getMax(num1, num2)); //  
0.5 mark  
        if (num1 > num2)  
        {  
            Console.WriteLine("The last digit is {0}", test.getLast(num1)); // 0.5  
mark  
            Console.WriteLine("The number in a reverse order is {0}",  
test.reverseNum(num1)); // 0.5 mark  
        }  
        else  
        {  
            Console.WriteLine("The last digit is {0}", test.getLast(num2)); // 0.5  
mark  
            Console.WriteLine("The number in a reverse order is {0}",  
test.reverseNum(num2)); // 0.5 mark  
        }  
        Console.ReadKey();  
    }  
}
```



The screenshot shows a Microsoft Visual Studio Debug window. The title bar says "Microsoft Visual Studio Debug". The window displays the following text:

```
Enter two integer numbers  
The first number is 36  
The second number is 14  
  
The Maximum number is 36  
The last digit is Six  
The number in a reverse order is 63  
  
.  
C:\Users\z-xon\source\repos\Q2P1\Q2P1\bin\Debug  
Press any key to close this window . . .|
```

**Part 1: Multiple Choice Questions** (write answers on the external answer sheet, 2 Marks each) **[20 Marks]**

---

1. Which of the following is not an Integer data type:
  - a. Char
  - b. Byte
  - c. Short
  - d. Long
2. Which of the following is the incorrect way to increment the value of variable a by 1?
  - a. ++a
  - b. a += 1
  - c. a = a+1
  - d. a++1
3. In C#, by default all variables are passed
  - a. By memory
  - b. **By value**
  - c. By reference
  - d. By address
4. Code in the \_\_\_\_\_ block is always executed
  - a. try
  - b. catch
  - c. exception
  - d. **finally**
5. Which of the following statements correctly declares a 2-dimensional integer array
  - a. int [,] myArray;
  - b. int [][] myArray;
  - c. int[2] myArray;
  - d. all of the above
6. Which of the following loops will always execute at least once:
  - a. for
  - b. while
  - c. **do while**
  - d. foreach
7. Which of the following is not a value data type:
  - a. Integer
  - b. Long
  - c. **String**
  - d. Char
8. \_\_\_\_\_ parameters do not create a new storage location
  - a. Value
  - b. Reference
  - c. Output
  - d. **Both b & c**

9. What will be the output of the following code:

```
int i;
for(i = 0; i<=10; i++)
{
    if(i == 4)
    {
        Console.Write(i + " "); continue;
    }
    else if (i != 4)
        Console.Write(i + " ");
    else
        break;
}
a. 1 2 3 4 5 6 7 8 9 10
b. 1 2 3 4
c. 0 1 2 3 4 5 6 7 8 9 10
d. 4 5 6 7 8 9 10
```

10. Which of the following is correct:

- a. Data members of a class are by default public.
- b. Data members of a class are by default private.
- c. Member functions of a class are by default private.
- d. Both b & c

## Part 2: Short Essay/ Output Questions

[40 Marks]

1. Write any two C# statements that decrement 1 from the int variable a. [5 Marks]

**Solution: (Any two of the following – 2.5 marks each)**

```
a = a - 1;
a -= 1;
a--;
--a;
```

2. Create a class **Student** that contains a single attribute **stdName**. Write a one argument constructor to initialize the argument. Write another method that simply prints the student's name on the screen.

[8 Marks]

**Solution:**

```
class Student // 1 Mark
{
    public String stdName; // 1 Mark

    public Student(String name) // 1.5 Mark
    {
        this.stdName = name; // 2 Mark
```

```

    }

    public void DisplayName() // 1.5 Mark
    {
        Console.WriteLine("The student name is " + this.stdName); // 1Mark
    }
}

```

Already Solved before

3. What is an exception? How are try, catch and finally blocks used in exception handling?  
[7 Marks]

**Sample Solution: (3 Marks for definition and 4 Marks for Explanation)**

An exception is an indication of a problem that occurs during a program's execution. Exception handling enables us to create applications that can resolve exceptions. To handle an exception, we need to place the code within the try block.

When an exception occurs inside the try block, the control looks for the catch block and raises an exception that is handled in the catch block. At least one catch and/or a finally block must follow the try block. The finally block executes regardless of whether a try block executes successfully or an exception occurs. Below is the simple skeleton for the try, catch and finally blocks:

```

try
{
}
catch
{
}
finally
{
}

```

4. What is the output of the following piece of code:

[7 Marks]

```

namespace ConsoleApplication1
{
    class Sample
    {
        int i;
        Single j;
        public void SetData(int i, Single j)
        {
            i = i;
            j = j;
        }
        public void Display()
        {
            Console.WriteLine(i + " " + j);
        }
    }
}

```

```

        }
    }
class MyProgram
{
    static void Main(string[ ] args)
    {
        Sample s1 = new Sample();
        s1.SetData(10, 5.4f);
        s1.Display();
    }
}

```

Already Solved before

**Solution:** (3.5 Marks each)

**0 0**

Already Solved before

5. Rewrite the following if-else statement using the ternary operator: [5 Marks]

```

if (grade >= 60)
    Console.WriteLine("Passed");
else
    Console.WriteLine("Failed");

```

**Solution:**

```
Console.WriteLine(grade >= 60 ? "Passed" : "Failed");
```

### **Mark Distribution**

```

Console.WriteLine // 1 Mark
grade >= 60 ?      // 1 Mark
"Passed"          // 1 Mark
:                 // 1 Mark
"Failed"         // 1 Mark

```

6. What is the difference between prefix and postfix decrement operators? Give an example. [8 Marks]

**Solution:** (4 Marks for Difference, and 4 Marks for Example- The full 4 Marks can be awarded for any examples, even without values in the example)

Prefix Operators are the Operators which are placed before the variables to perform tasks. Postfix Operators are placed after the variables to perform tasks.

Already Solved before

Prefix: --x (First decrease value then use it in expression)

```
int a = 2;
```

```
int b = --a;
```

After these statements execute, value of both a, b is 1.

PostFix: x-- (First use it in expression, then decrease value by 1 of x)

```
int a = 2;
```

```
int b = a--;
```

After these statements execute, value of a=1, b=2.

[40 Marks]

### Part 3: Problem Solving Questions

---

1. Write a C# program to find the largest number in a given array of numbers with 10 elements. Read the array values from keyboard.

Already Solved before

[20 Marks]

**Marks can be given for any logic for the correct result**

Solution:

```
namespace ArrayMax
{
    class Program // 1 Marks
    {
        static void Main(string[] args) // 1 Marks
        {
            int[] nums = new int[10]; // 3 Marks
            int max = -1; // 1 Mark
            Console.WriteLine("Enter the elements of the array."); // 2 Marks
            for (int i = 0; i < nums.Length; i++) // 4 Marks
            {
                nums[i] = Convert.ToInt32(Console.ReadLine()); // 2 Marks
                if (nums[i] > max) // 2 Marks
                    max = nums[i]; // 2 Marks
            }
            Console.WriteLine("The maximum number in the given Array is " + max);
            Console.ReadLine();
        }
    }
}
```

**Already Solved before**

- a. Write a C# application to prompt the user for the radius of a sphere and call method SphereArea to calculate and display the surface area of the sphere. Use the following formula to calculate the area:

$$A = 4 \pi r^2$$

**[20 Marks]**

**Marks can be given for any logic / equation for the correct result**

**Solution:**

```
using System;
namespace ConsoleApplication1
{
    class Program // 1 Mark
    {
        static void Main(string[] args) // 1 Mark
        {
            double radius; // 1 Mark

            Console.WriteLine("Enter the radius of sphere:"); // 2 Marks
            radius = Convert.ToDouble(Console.ReadLine()); // 2 Marks

            SphereArea(radius); // 3 Marks
            Console.ReadLine();
        }

        static void SphereArea(double rad) // 3 Marks
        {
            double area; // 1 Mark
            area = 4.0 * Math.PI * Math.Pow(rad, 2); or area = 4.0 * 3.14 * rad *
rad; // 4 Marks
            Console.WriteLine("The surface area of sphere is {0}", area); // 2
Marks
        }
    }
}
```

**Part 1: Multiple Choice Questions** (write answers on the external answer sheet, 2 Marks each)

**[20 Marks]**

11. A Constructor

- a. is used to create objects
- b. must have the same name as the class it is declared within
- c. maybe overloaded
- d. all of the above**

12. A variable declared inside a method is called a \_\_\_\_\_ variable.

- a. Static
- b. Private
- c. Local**
- d. b and c

13. Defining two methods with the same name but with different parameters is called

- a. Loading
- b. Overloading**
- c. Encapsulation
- d. Overriding

14. A \_\_\_\_\_ block encloses the code that could throw an exception.

- a. Try**
- b. Catch
- c. Exception
- d. Error

15. \_\_\_\_\_ parameters are used to pass results back to the calling method

- a. Input
- b. Reference
- c. Value
- d. Output**

16. Which of the following is not an assignment operator:

- a. \=**
- b. %=
- c. +=
- d. \*=

17. What will be the output of the following C# code:

```
int i, j = 1, k;
for (i = 0; i<5; i++)
{
    k = j++ + ++j;
    Console.Write(k + " ");
}
```

- a. 8 4 16 12 20
- b. 4 8 12 16 20**
- c. 4 8 16 32 64
- d. 2 4 6 8 10

18. The total number of elements in an array can be found using

- a. Max
- b. Length**
- c. All
- d. Count

19. Which of the following is the correct way to declare an object of class testClass:

- a. testClass t = new testClass();**
- b. testClass t;
- c. t = new testClass();
- d. All of the above

20. Which of the following is correct:

- a. Data members of a class are by default public.
- b. Data members of a class are by default private.**
- c. Member functions of a class are by default public.
- d. All of the above

## Part 2: Short Essay Questions (5 marks each)

[30 Marks]

1. Rewrite the following using a for loop:

Already Solved before

```
int i = 0;
do
{
    Console.WriteLine(i);
    i += 1;
} while (i <= 10);
```

**Solution:**

```
int i;
for (i = 0; i <= 10; i++)
    Console.WriteLine(i);
```

2. What will be the output of the following code:

```
namespace ConsoleApplication1{
class Program {
    static void Main(string[] args){
        int[] arr = new int[] { 1, 2, 3, 4, 5 };
        fun(ref arr);
        Console.ReadLine();
    }
}
```

```

static void fun(ref int[] a){

    for (int i = 0; i <a.Length; i++){
        a[i] = a[i] * 5;
        Console.WriteLine(a[i] + " ");
    }
}

```

**Output:**

**5 10 15 20 25**

3. Explain the two types of arrays in C#.

**Solution:**

An array is a collection of related instances either value or reference types. Arrays possess an immutable structure in which the number of dimensions and size of the array are fixed at instantiation.

C# Supports Single and Multidimensional.

Single Dimensional Array: it is sometimes called vector array consists of single row.

Multi-Dimensional Array: are rectangular & consists of rows and columns.

4. Explain any three types of access modifiers that can be applied to classes and their members.

**Solution:**

**Already Solved before**

Access modifiers are keywords used to specify the declared accessibility of a member or a type.

- **public:** The type or member can be accessed by any other code in the same assembly or another assembly that references it.
- **private:** The type or member can be accessed only by code in the same class or struct.
- **protected:** The type or member can be accessed only by code in the same class or struct, or in a class that is derived from that class.
- **Internal:** The type or member can be accessed by any code in the same assembly, but not from another assembly.

5. Rewrite the following C# statement using the if-else statement:

Already Solved before

```
Console.WriteLine(grade >= 60 ? "Passed" :"Failed");
```

Solution:

```
if (grade >= 60)
    Console.WriteLine("Passed");
else
    Console.WriteLine("Failed");
```

6. What is the difference between prefix and postfix increment operators? Give an example.

Solution:

Prefix Operators are the Operators which are placed before the variables to perform tasks.  
Postfix Operators are placed after the variables to perform tasks. E.g.

**Prefix:  $++x$  (First increase value then use it in expression)**

```
int a = 1;
int b = ++a;
```

After these statements execute, value of both a, b is 2.

**PostFix:  $x++$  (First use it in expression, then increase value by 1 of x)**

```
int a = 1;
int b = a++;
```

After these statements execute, value of a=2, b=1.

## Part 3: Problem Solving Questions

[50 Marks]

1. Write a C# program that takes a numerator and denominator value from the user. Calculate result as follows:

**Result = numerator/denominator**

Use exception handling to ensure that all run time errors are handled. [15 Marks]

**Solution:**

```
namespace ISA
{
    class Program
    {
        static void Main(string[] args)
        {
            int numerator, denominator, result;

            Console.WriteLine("Enter Numerator:");
            numerator = Convert.ToInt32(Console.ReadLine());

            Console.WriteLine("Enter Denominator:");
            denominator = Convert.ToInt32(Console.ReadLine());

            try
            {
                result = numerator / denominator;
                Console.WriteLine("The result is {0}", result);

            }
            catch (DivideByZeroException e)
            {
                Console.WriteLine(e.Message);
            }
            Console.ReadLine();
        }
    }
}
```

2. Lulu Hypermarkets has announced the following sale on purchase of items: - [15 marks]

PURCHASE AMOUNT	DISCOUNT
0-100	5.0%
101 - 200	7.5%
201 - 300	10.0%
>300	15.0%

Write a C# program that asks a customer to enter the purchase amount, and then displays the net amount to be paid by the customer.

**Solution:**

```
using System;
class Program
{
    public static void Main()
    {
        double amt, discount;
        Console.WriteLine(" Enter the Purchase Amount: ");
        amt = Convert.ToDouble(Console.ReadLine());
        if (amt <= 100)
            discount = 0.05 * amt;
        else if ((amt > 100) && (amt <= 200))
            discount = 0.075 * amt;
        else if ((amt > 200) && (amt <= 300))
            discount = 0.1 * amt;
        else
            discount = 0.15 * amt;
        Console.WriteLine("Net to be paid= " + (amt - discount));
    }
}
```

Already Solved before

- a. Write an application to implement a simple calculator application. The user should enter 2 numbers and the required operator (\*, /, +, -). Print the result in the following format:

**FirstNumber Operator SecondNumber = Answer**

**[20 Marks]**

**Solution:**

```
namespace ISA
{
    class Program
    {
        static void Main(string[] args)
        {
            int first, second, answer;
            Char op;

            Console.WriteLine("Enter first number:");
            first = Convert.ToInt32(Console.ReadLine());
            Console.WriteLine("Enter second number:");
            second = Convert.ToInt32(Console.ReadLine());
            Console.WriteLine("Enter the operator (/, *, +, -):");
            op = Convert.ToChar(Console.ReadLine());

            switch (op)
            {
                case '/':
```

```
        {
            answer = first / second;
            Console.WriteLine(first + " " + op + " " + second + " = " +
answer);
            break;
        }
    case '*':
    {
        answer = first * second;
        Console.WriteLine(first + " " + op + " " + second + " = " +
answer);
        break;
    }
    case '+':
    {
        answer = first + second;
        Console.WriteLine(first + " " + op + " " + second + " = " +
answer);
        break;
    }
    case '-':
    {
        answer = first - second;
        Console.WriteLine(first + " " + op + " " + second + " = " +
answer);
        break;
    }
    default:
        Console.WriteLine("Invalid operator");
        break;
    }
    Console.ReadLine();
}
}
```

```
C:\Users\z-xon\source\repos> Enter first number:  
10  
Enter second number:  
2  
Enter the operator (/, *, +, -):  
*  
10 * 2 = 20
```

**Part 1: Multiple Choice Questions** (write answers on the external answer sheet, 2 marks each) **[20 Marks]**

This whole page is solved in the previous exam.

محلول في النموذج السابق

1. A Constructor
  - a. is used to create objects ✓
  - b. must have the same name as the class it is declared within ✓
  - c. maybe overloaded ✓
  - d. all of the above
  
2. A variable declared inside a method is called a \_\_\_\_\_ variable.
  - a. Static
  - b. Private
  - c. Local
  - d. b and c
  
3. Defining two methods with the same name but with different parameters is called
  - a. Loading
  - b. Overloading
  - c. Encapsulation
  - d. Overriding
  
4. A \_\_\_\_\_ block encloses the code that could throw an exception.
  - a. Try
  - b. Catch
  - c. Exception
  - d. Error
  
5. \_\_\_\_\_ parameters are used to pass results back to the calling method
  - a. Input
  - b. Reference
  - c. Value
  - d. Output
  
6. What will be the output of the following C# code?

```
int i, j = 1, k;
for (i = 0; i < 5; i++)
{
    k = j++ + ++j;
    Console.Write( k + " " );
}
```

  - a. 8 4 16 12 20
  - b. 4 8 12 16 20
  - c. 4 8 16 32 64
  - d. 2 4 6 8 10

7. Which of the following is not an assignment operator:

- a. `\=`
- b. `%=`
- c. `+=`
- d. `*=`

8. The total number of elements in an array can be found using

- a. Max
- b. Length
- c. Count
- d. All

9. Which of the following is the correct way to declare an object of class testClass:

- a. `testClass t = new testClass();`
- b. `testClass t;`
- c. `t = new testClass();`
- d. All of the above

10. Which of the following is correct:

- a. Data members of a class are by default public.
- b. Data members of a class are by default private.
- c. Member functions of a class are by default public.
- d. All of the above

This whole page is solved  
in the previous exam.

محلول في النموذج السابق

## Part 2: Short Essay Questions (5 marks each)

[30 Marks]

1. Rewrite the following using a for loop:

```
int i = 0;
do
{
    Console.WriteLine(i);
    i += 1;
} while (i <= 10);
```

This whole page is solved  
in the previous exam.

محلول في النموذج السابق

2. What will be the output of the following code:

```
namespace ConsoleApplication1
{
    class Program
    {
        static void Main(string[] args)
        {
            int[] arr = new int[] { 1, 2, 3, 4, 5 };
            fun(ref arr);
            Console.ReadLine();
        }

        static void fun(ref int[] a)
        {
            for (int i = 0; i < a.Length; i++)
            {
                a[i] = a[i] * 5;
                Console.Write(a[i] + " ");
            }
        }
    }
}
```

3. Explain the two types of arrays in C#.
4. Explain any three types of access modifiers that can be applied to classes and their members.
5. Rewrite the following C# statement using the if-else statement:  
`Console.WriteLine(grade >= 60 ? "Passed" : "Failed");`
6. What is the difference between prefix and postfix increment operators? Give an example.

## Part 3: Problem Solving Questions

[50 Marks]

Q1

Already Solved

Write a C# program that takes a numerator and denominator value from the user. Calculate result as follows:

Result = numerator/denominator

Use exception handling to ensure that all run time errors are handled.

Q2

Already Solved

Write a C# application to prompt the user for the radius of a sphere and call method SphereVolume to calculate and display the volume of the sphere.

Use the following formula to calculate the volume:

$$V = \frac{4}{3}\pi r^3$$

Hint: Value of pi is 3.14

Q3

Write an application to implement a simple calculator application. The user should enter 2 numbers and the required operator (\*, /, +, -). Print the result in the following format:

FirstNumber Operator SecondNumber = Answer

Q4

Already Solved

Create a class called **Teacher** in C# with the following data.[4 Marks]

teacherID  
teacherName  
teacherSalary

Use appropriate data types and access modifiers for the above member variables.

```
namespace ISA
{
    class Teacher
    {
        public int teacherID;
        public string teacherName;
        public double teacherSalary;
    }
}
```

# **Mock Exams**

## **Part 1: Multiple Choice Questions** (write answers on the external answer sheet, 1.5 Marks each) [15 marks]

---

1. Which of the following is an example of a static method?
  - a. **Main()**
  - b. Public
  - c. Internal
  - d. None of the above
2. Which of the following is not an example of a C# keyword?
  - a. **sum**
  - b. public
  - c. default
  - d. for
3. The .NET building block which describes all possible data types and programming constructs in C# is known as \_\_\_\_\_
  - a. Base Class Library
  - b. Common Language Runtime
  - c. **Common Type System**
  - d. None of the above
4. \_\_\_\_\_ is a tool window in the Visual Studio IDE that displays the contents of a solution.
  - a. **Solution Explorer**
  - b. Properties Window
  - c. Toolbox
  - d. Server Explorer
5. What is the output of the following statements in C#?

```
int a;
a=3;
a=a*3;
a=a++;
a= a--;
Console.WriteLine( a);
```

  - a. 8
  - b. **9**
  - c. 7
  - d. 10
6. Which of the following is a replacement of if-else statement?
  - a. Relational operator
  - b. Unary operator
  - c. **Ternary operator**
  - d. Logical operator
7. In C#, which of the following is the least permissive access modifier?
  - a. **Private**

- b. Protected
  - c. Public
  - d. None of the above
8. Consider the array `int[] A = { 10, 8, 6, 4, 0 };` Which of the following is the output of the statement  
`A[2]= A[2]++;`  
`Console.WriteLine(A[2]++); ?`
- a. 8
  - b. 4
  - c. 7
  - d. 6
9. Which of the following is true about constructors?
- a. Constructor is a method which is called when an object is no more required
  - b. Constructors have the same name as the class itself
  - c. Constructors specify a return type
  - d. None of the above
10. Which of these keywords is used to manually throw an exception?
- a. try
  - b. throw
  - c. finally
  - d. catch

## Part 2: Short Essay Questions (6 marks each)

[30 Marks]

1. Briefly explain unary operators in C# with examples.

[6 Marks]

Solution:

The C# unary operator is widely used for increment or decrement value by 1. This operator is widely used with loop constructs to increment/ decrement loop by 1.

++ Increment Operator:

This operator is pronounced as increment operator. It is used for incrementing value by 1. It is used in C# programming by two types: Pre-increment (`++i`) and Post-increment (`i++`). In pre-increment, first it increments by 1 then loop executes whereas in Post-increment, the loop executes first, then it increments by 1.

Example: `++a;`

— Decrement Operator:

It is used for decrementing the value by one. It has also two types: Pre-Decrement (`-i`) and Post Decrement (`i-`). In pre-decrement the value is decremented by one then loop executes whereas in post-decrement the loop is executed and then the value decrements by one.

Example: `a--;`

2. Explain the syntax of conditional operator in C#.

[6 marks]

Syntax:

Exp1 ? Exp2 : Exp3;

Where Exp1, Exp2, and Exp3 are expressions.

The value of a ? expression is determined like this: Exp1 is evaluated. If it is true, then Exp2 is evaluated and becomes the value of the entire? expression. If Exp1 is false, then Exp3 is evaluated and its value becomes the value of the expression

3. What is the output of the following program? Justify your answer for the output. [6 Marks]

```
public static void Main(string[] args)
{
    int []M = new int [] {2,3,1,7,8,3,9,1,2,0};
    int i;
    for (i = 0; i < 10+2; i+=2)
        Console.WriteLine(M[i]);
}
```

Ans:

2

1

8

9

2

Run-

time exception (line 11): Index was outside the bounds of the array.

4. What will be the output of the following code?

[6 Marks]

```
public class Program{
    static void Change(ref int [] A)      {
        for (int i = 0; i < 4; i++)      {
            if (i < 3)
                A[i] = A[i] + 1;      }
    }

    public static void Main(string[] args)      {
        int[] P = new int[] { 2,4,6,8,10,12 };
        Change(ref P);
        for (int i = 0; i < 4; i++)      {
            Console.WriteLine(P[i] + " ");
        }
        Console.ReadLine();
    }
}
```

Ans:

3

5

7

8

5. Rewrite the following using for loop:

[6 Marks]

```
int i=0;
while(i<10)
{
    Console.WriteLine(i*2);
    i = i + 1;
}
```

Ans:

```
for (int i=0; i<10; i++)
    Console.WriteLine(i * 2);
```

## Part 3: Problem Solving Questions

[50 Marks]

1. Write a C# program to merge two Arrays with 5 elements in each. Display the content of the merged Array. Find the smallest and largest elements in the merged Array. Read the array values from keyboard.

[20 Marks]

Sample I/O

```
Enter the array1 elements
1
2
3
4
5
Enter the array2 elements
1
2
3
4
5
Merged Array
2
4
6
8
10
The smallest element in the array is 2
The Largest element in the array is 10
```

Sample Solution:

```
public static void Main(string[] args) {
    int[] A = new int[5];
    Console.WriteLine("Enter the array1 elements");
```

```

        for (int i = 0; i < 5; i++)
        {
            A[i] = Convert.ToInt32(Console.ReadLine());
        }
        int[] B = new int[5];
        Console.WriteLine("Enter the array2 elements");
        for (int i = 0; i < 5; i++)
        {
            B[i] = Convert.ToInt32(Console.ReadLine());
        }
        int[] C = new int[5];
        for (int i = 0; i < 5; i++)
        {
            C[i] = A[i] + B[i];
        }
        Console.WriteLine("Merged Array ");
        for (int i = 0; i < 5; i++)
        {
            Console.WriteLine(C[i]);
        }
        int min = C[0];
        for (int i = 0; i < 5; i++)
        {
            if (min > C[i])
                min = C[i];
        }
        int max = C[0];
        for (int i = 0; i < 5; i++)
        {
            if (max < C[i])
                max = C[i];
        }
        Console.WriteLine("The smallest element in the array is {0}", min);
        Console.WriteLine("The Largest element in the array is {0}", max);
    }
}

```

2. Write a C# application that implements a class ‘Cube’ with the following members.
- Three private data members ‘side’, ‘volume’ and ‘surfacearea’ of double data type.
  - Four methods, setSide(), calcVol(), calcSA() and showResult()
    - setSide() – to set the length of the side (s) of the cube as per the user input.
    - calcVol() – to calculate the volume of the cube using the formulae  $V = s^3$
    - calcSA() – to calculate the surface area of the cube using the formulae  $A = 6s^2$
    - showResult() – to display the volume and surface area of the cube.

In the Main method, create an object of the ‘Cube’ class, read the value of length of side and use the object to call the methods to display the output as shown below. [15 Marks]

#### Sample I/O

Enter the length of the side of cube : 3
Volume of the Cube= 27
Surface Area of the Cube= 54

#### Sample Solution:

```

namespace ConsoleApp23{
    public class Cube
    {

```

```

private double s, V, Ar;
public void SetSide(double b)
{
    s = b;
}
public void CalcVol()
{
    V = s * s * s;
}
public void CalcSA()
{
    Ar = 6 * s * s; //
}
public void ShowResult()
{
    Console.WriteLine();
    Console.WriteLine("Volume of the Cube= " + V);
    Console.WriteLine("Surface Area of the Cube= " + Ar);
}
class Program {
    static void Main(string[] args) {
        Cube c = new Cube();
        double s;
        Console.Write("Enter the length of the side of cube : ");
        s = double.Parse(Console.ReadLine());
        c.SetSide(s);
        c.CalcVol();
        c.CalcSA();
        c.ShowResult();
        Console.ReadLine();
    }
}

```

3. Write an application to implement a simple calculator application. The user should enter 2 numbers and the required operator (\*, /, +, -). Print the result in the following format:

*FirstNumber Operator SecondNumber = Answer*

[15 Marks]

Solution:

```

namespace ConsoleApplication1
{
    class Program
    {
        static void Main(string[] args)
        {
            int first, second, answer; // 1 mark
            Char op;

            Console.WriteLine("Enter first number:");
            first = Convert.ToInt32(Console.ReadLine());
            Console.WriteLine("Enter second number:");
            second = Convert.ToInt32(Console.ReadLine());
            Console.WriteLine("Enter the operator (/, *, +, -):");
            op = Convert.ToChar(Console.ReadLine());

            switch (op)
            {
                case '/':

```

```
        {
            answer = first / second;
            Console.WriteLine(first+" "+op+" "+second+" = "+answer);
            break;
        }
    case '*':
    {
        answer = first * second;
        Console.WriteLine(first + " " + op + " " + second + " = " + answer);
        break;
    }
    case '+':
    {
        answer = first + second;
        Console.WriteLine(first + " " + op + " " + second + " = " + answer);
        break;
    }
    case '-':
    {
        answer = first - second;
        Console.WriteLine(first + " " + op + " " + second + " = " + answer);
        break;
    }
    default:
        Console.WriteLine("Invalid operator");
        break;
    }
    Console.ReadLine();
}
}
```

**Part 1: Multiple Choice Questions** (write answers on the external answer sheet, 2 Marks each) **[20 Marks]**

---

1. Which of the following statement is *not correct* about C# language?
  - a. C# language is case sensitive
  - b. C# is object oriented programming language
  - c. C# language doesn't support multiple inheritance
  - d. C# language is just an extension to C language
  
2. What is the size of *char* data type in C#?
  - a. 1 byte
  - b. 1 bit
  - c. 2 bytes
  - d. 2 bits
  
3. What is the use of a default constructor?
  - a. It is used for creating the object
  - b. It is used for initializing fields of a class with default values
  - c. It is used for creating sub classes
  - d. None of the above
  
4. Which of the following is not a unary operator in C#?
  - a. >
  - b. ++
  - c. !
  - d. --
  
5. A variable declared inside a method is known as:
  - a. global
  - b. public
  - c. serial
  - d. local
  
6. What is the default value of *bool* in C#?
  - a. false
  - b. true
  - c. 1
  - d. None of the above

7. What will be the output of the following C# code:

```
int i, j = 1, k;
for (i = 0; i < 5; i++)
{
    k = j++;
    Console.WriteLine(k + " ");
}
```

- a. 0 1 2 3 4
- b.** 1 2 3 4 5
- c. 2 4 6 8 10
- d. 1 3 5 7 9

8. How many strings are created in the memory after the execution of the following piece of code?

```
string s="hello";
s = s + "good";
s = s + "morning";
```

- a.** 1
- b. 3
- c. 2
- d. 0

9. What is an object oriented programming language?

- a.** An object oriented programming language is a language which exhibits 4 properties, abstraction, encapsulation, inheritance and polymorphism
- b. An object oriented programming language is a language which supports only inheritance and polymorphism
- c. An object oriented programming language is a language which supports only object creation
- d. An object oriented programming language is a language which supports only objects, classes and methods

10. Which of the below access modifier must not be used while declaring virtual methods?

- a. public
- b.** private
- c. protected
- d. protected internal

## Part 2: Short Essay Questions

[30 Marks]

1. What is polymorphism? Briefly Explain.
2. Explain the functionality of CLR in DOT NET.
3. Differentiate between unary, binary and ternary operators in C# with examples.
4. Rewrite the following using a do-while loop:

```
int i;  
for (i = 0; i <= 10 ; i++)  
Console.WriteLine(i);
```

Already Solved

5. What will be the output of the following code:

```
namespace ConsoleApplication2  
{  
    class Program  
    {  
        static void Main(string[] args)      {  
            int[] AB = new int[] { 1, 2, 3, 4, 5 };  
            test(ref AB);  
            Console.ReadLine();  
        }  
  
        static void test(ref int[] PQ)      {  
            for (int i = 0; i < PQ.Length; i++)  
            {  
                PQ[i] = PQ[i] + i;  
                Console.Write(PQ[i] + " ");  
            }  
        }  
    } // class  
}
```

Output:

1 3 5 7 9

6. Rewrite the following C# switch statement using the if-else-if statement:

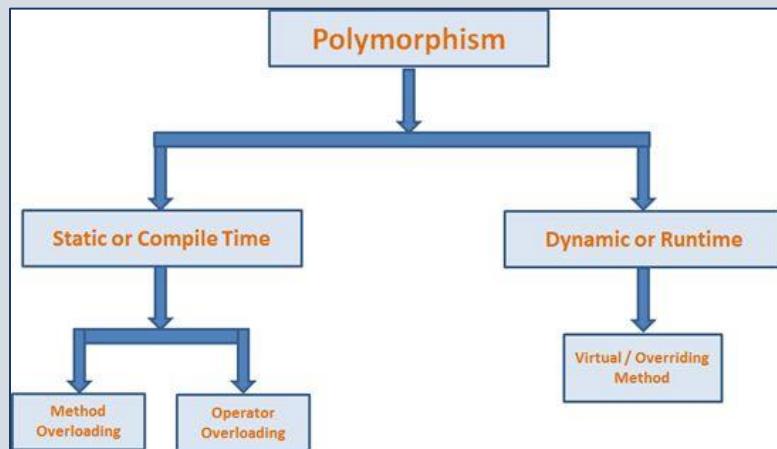
```
switch(B)  
{  
case 2:  
case 4: Console.WriteLine("Hai");  
break;
```

Already Solved

## خارج المقرر الحديث (الإجابة من قوّل، تقدّر تُستخدم أي إجابة أخرى) (Part2 Q1 Answer:

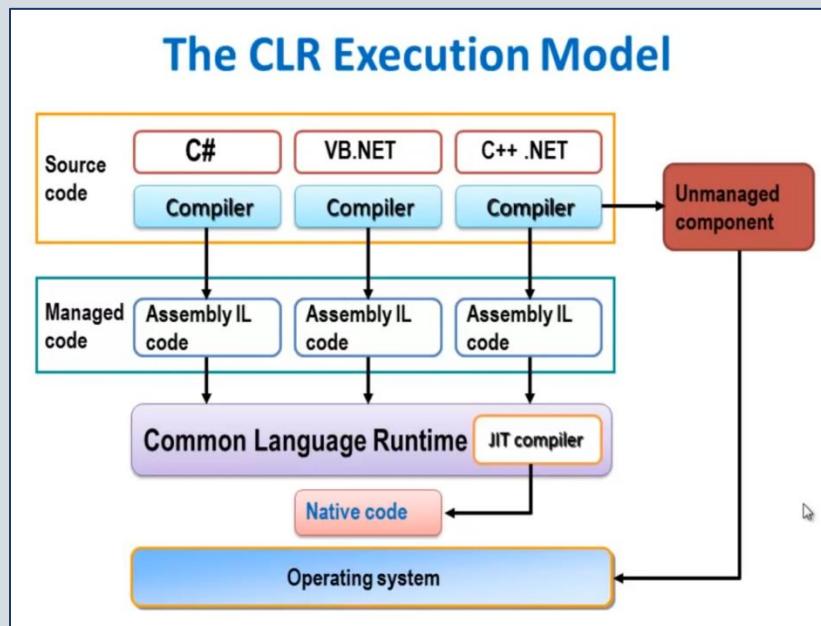
polymorphism means having many forms. In object-oriented programming paradigm, polymorphism is often expressed as 'one interface, multiple functions'.

Polymorphism can be static or dynamic. In static polymorphism, the response to a function is determined at the compile time. In dynamic polymorphism, it is decided at run-time.



## Part2 Q2 Answer:

Common Language Runtime (CLR) is programming that manages the execution of programs written in any of several supported languages, allowing them to share common object-oriented classes written in any of the languages.



## Part2 Q3 Answer:

### Unary Operators: (صورة توضيحية أضغط هنا)

Unary operators in C# language are used to increment / decrement the value of a variable or to negate the value of a Boolean variable / Expression etc. Unary operator is performed on only one operand / variable.

Unary Operators	Operation	Example
++	Increment Operator	15++ is 16, ++15 is 16
--	Decrement Operator	16-- is 15, --16 is 15

### Binary Operator:

Binary operators are those operators that work with two operands. For example, a common binary expression would be  $a + b$  the addition operator (+) surrounded by two operands. The binary operators are further subdivided into arithmetic, relational, logical, and assignment operators.

باختصار أي عملية بين حدين هي تندرج تحت الـ Binary Operator

Binary Operators	Operation	Example: A=60 B=13
&	Binary AND Operator copies a bit to the result if it exists in both operands.	$(A \& B) = 12$ , which is 0000 1100
	Binary OR Operator copies a bit if it exists in either operand.	$(A   B) = 61$ , which is 0011 1101
*	Arithmetic Operators operator multiplies two operands	$(A * B) = 780$

### Ternary operator:

Ternary operator is a Conditional operator in C#. It takes three arguments and evaluates a Boolean expression.

Example: `b = (a == 1) ? 20 : 30;`

```
case 6:  
case 8: Console.WriteLine("Hello");  
        break;  
  
default: Console.WriteLine("Good Bye");  
        break;  
}
```

### Part 3: Problem Solving Questions

[50 Marks]

1. Write a C# program that takes two integers from the user and then checks whether the product of two integers are divisible by 7. [20 Marks]

2. Write a C# application to prompt the user for the radius and height of a cone and call method **Volume** to calculate and display the volume of the cone. Use the following formula to calculate the volume:

$$A = \pi r^2 \frac{h}{3}$$
 [15 Marks]

Hint: Value of pi is 3.14

3. Write a C# application to find the biggest number in an array of 10 integers. The user should enter the 10 integers from the keyboard. Print the result in the following format:

*The biggest number in the array= Answer* Already Solved

[15 Marks]

In addition there are some questions covering the concept of Classes, Inheritance and Exception.

**Part2 Q1 Answer:**

```
using System;
namespace ISA
{
    public class Cone
    {
        static void coneVolume(int multi)
        {
            if (multi % 7 == 0)
            {
                Console.WriteLine("\nDivisible by 7");
            }
            else
            {
                Console.WriteLine("\nNot divisible by 7");
            }
        }
        static void Main(string[] args)
        {
            int num1, num2;
            Console.Write("Enter the first number: ");
            num1 = Convert.ToInt32(Console.ReadLine());
            Console.Write("Enter the second number: ");
            num2 = Convert.ToInt32(Console.ReadLine());
            int product = num1 * num2;
            Console.WriteLine("The product of the numbers is: " + product);
            coneVolume(product);
            Console.ReadLine();
        }
    }
}
```

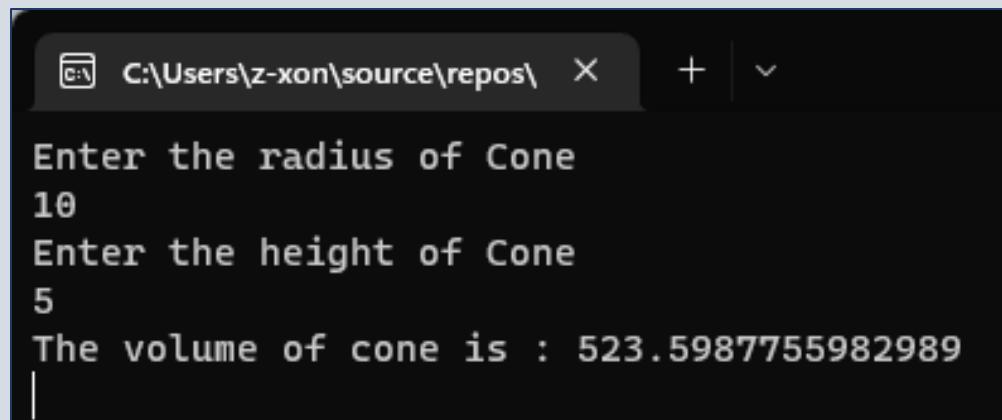
```
C:\Users\z-xon\source\repos\  X  +  ▾
```

```
Enter the first number: 7
Enter the second number: 13
The product of the numbers is: 91

Divisible by 7
```

**Part2 Q2 Answer:**

```
using System;
namespace ISA
{
    public class Cone
    {
        static void coneVolume(double r, double h)
        {
            double volume;
            volume = Math.PI * r * r * h / 3.0;
            Console.WriteLine("The volume of cone is : " + volume);
        }
        static void Main(string[] args)
        {
            double radius, height;
            Console.WriteLine("Enter the radius of Cone");
            radius = Convert.ToDouble(Console.ReadLine());
            Console.WriteLine("Enter the height of Cone");
            height = Convert.ToDouble(Console.ReadLine());
            coneVolume(radius, height);
            Console.ReadLine();
        }
    }
}
```



The screenshot shows a terminal window with the following text output:

```
C:\Users\z-xon\source\repos\  X + | ~
```

```
Enter the radius of Cone
10
Enter the height of Cone
5
The volume of cone is : 523.5987755982989
```

**1. is the size of 'float' data type?**

- a. 10 bytes
- b. 4 bytes**
- c. 6 bytes
- d. 8 bytes

**2. What is a Constructor? Give an example of overloaded constructors. [6 Marks]**

C# supports a special type of method, called a constructor, that **enables an object to initialize itself** when it is created. Constructors have the same name as the class itself. Secondly, **they do not specify a return type**, not even void. This is because they do not return any value. Overloaded constructor methods are several different constructor definitions with different parameter lists. The difference may be in either the number or type of arguments. That is, each parameter list should be unique.

```
class Room
{
    public double length;
    public double breadth;
    public Room(double x, double y) // constructor 1
    {
        length = x;
        breadth = y;
    }
    public Room(double x) // constructor 2
    {
        length = breadth = x;
    }
}
```

# Random Multiple- Choice Questions

أسئلة خيارات متعددة ما بين النظري واسئلة Tracing مختلفة عن الأسئلة السابقة.  
الشكر موصول لمن قام بجمعها والإجابة عليها، تمت مراجعتها من قبل ISA

1. CLR is the .NET equivalent of \_\_\_\_\_.

- A. Java Virtual Machine
- B. Common Language Runtime
- C. Common Type System
- D. Common Language Specification

Ans: A

3. The \_\_\_ language allows more than one method in a single class.

- A. C#
- B. J#
- C. C++
- D. C

Ans: A

5. In C#, a subroutine is called a \_\_\_\_\_.

- A. Function
- B. Metadata
- C. Method
- D. Managed code

Ans: C

6. All C# applications begin execution by calling the \_\_\_ method.

- A. Class()
- B. Main()
- C. Submain()
- D. Namespace

Ans: B

7. A \_\_\_\_\_ is an identifier that denotes a storage location.

- A. Constant
- B. Reference type
- C. Variable
- D. Object

Ans: C

8. \_\_\_\_\_ are reserved, and cannot be used as identifiers.

- A. Keywords
- B. literal
- C. variables
- D. Identifiers

Ans: A

10. The character pair ?: is a \_\_\_\_\_ available in C#.

- A. Unary operator
- B. Ternary operator
- C. Decision operator
- D. Functional operator

Ans: B

11. In C#, all binary operators are \_\_\_\_\_.

- A. Center-associative
- B. Right-associative
- C. Left-associative
- D. Top-associative

Ans: C

**12.** An \_\_\_\_\_ is a symbol that tells the computer to perform certain mathematical or logical manipulations.

- A. Operator
- B. Expression
- C. Condition
- D. Logic

Ans: A

**13.** A \_\_\_\_\_ is any valid C# variable ending with a colon.

- A. goto
- B. Label
- C. Logical
- D. Bitwise

Ans: B

**14.** C# has \_\_\_\_\_ operator, useful for making two way decisions.

- A. Looping
- B. Functional
- C. Exponential
- D. Conditional

Ans: D

**15.** \_\_\_\_\_ causes the loop to continue with the next iteration after skipping any statements in between.

- A. Loop
- B. Exit
- C. Break
- D. Continue

Ans: D

16. An \_\_\_ is a group of contiguous or related data items that share a common name.

- A. Operator
- B. Integer
- C. Exponential
- D. **Array**

Ans: D

17. Arrays in C# are \_\_\_\_ objects.

- A. **Reference**
- B. Logical
- C. Value
- D. Arithmetic

Ans: A

18. Multidimensional arrays are sometimes called \_\_\_\_\_ Arrays.

- A. Square
- B. Triangular
- C. **Rectangular**
- D. Cube

Ans: C

19. \_\_\_\_\_ parameters are used to pass results back to the calling method.

- A. Input
- B. Reference
- C. Value
- D. **Output**

Ans: D

20. The formal-parameter-list is always enclosed in \_\_\_\_\_.

- A. Square
- B. Semicolon
- C. Parenthesis
- D. Colon

Ans: C

21. \_\_\_\_\_ variables are visible only in the block they are declared.

- A. System
- B. Global
- C. Local
- D. Console

Ans: C

22. C# does not support \_\_\_\_\_ constructors.

- A. parameterized
- B. parameter-less
- C. Class
- D. Method

Ans: B

24. Struct's data members are \_\_\_\_\_ by default.

- A. Protected
- B. Public
- C. Private
- D. Default

Ans: C

**26. The methods that have the same name, but different parameter lists and different definitions is called\_\_\_\_\_.**

- A. Method Overloading
- B. Method Overriding
- C. Method Overwriting
- D. Method Overreading

Ans: A

**27. The C# provides special methods known as \_\_\_\_\_ methods to provide access to data members.**

- A. Loop
- B. Functions
- C. Methods
- D. Accessor

Ans: D

**28. When an instance method declaration includes the abstract modifier, the method is said to be an \_\_\_\_\_.**

- A. Abstract method
- B. Instance method
- C. Sealed method
- D. Expression method

Ans: A

**29. The theory of \_\_\_\_\_ implies that user can control the access to a class, method, or variable.**

- A. Data hiding
- B. Encapsulation
- C. Information Hiding
- D. Polymorphism

Ans: B

**30. Inheritance is \_\_\_\_\_ in nature.**

- A. Commutative
- B. Associative
- C. Transitive**
- D. Iterative

Ans: C

**31. The point at which an exception is thrown is called the \_\_\_\_\_.**

- A. Default point
- B. Invoking point
- C. Calling point
- D. Throw point**

Ans: D

**32. In C#, having unreachable code is always an \_\_\_\_\_.**

- A. Method
- B. Function
- C. Error**
- D. Iterative

Ans: C

**33. C# treats the multiple catch statements like cases in a \_\_\_\_\_ statement.**

- A. If
- B. Switch**
- C. For
- D. While

Ans: B

**35. The reason that C# does not support multiple inheritances is because of \_\_\_\_\_.**

- A. Method collision
- B. Name collision**
- C. Function collision
- D. Interface collision

Ans: B

**36. \_\_\_\_\_ is a set of devices through which a user communicates with a system using interactive set of commands.**

- A. Console**
- B. System
- C. Keyboard
- D. Monitor

Ans: A

**39. In Microsoft Visual Studio, \_\_\_\_\_ technology and a programming language such as C# is used to create a Web based application.**

- A. JAVA
- B. J#
- C. VB.NET
- D. ASP.NET**

Ans: D

**50. The \_\_\_\_\_ parentheses that follow \_\_\_\_\_ indicate that no information is passed to Main ().**

- A. Empty, class
- B. Empty, submain
- C. Empty, Main**
- D. Empty, Namespace

Ans: C

**51. Is it possible to store multiple data types in System.Array?**

- A. Yes
- B. No**

Ans: B

**53. Which of the following is the root of the .NET type hierarchy?**

- A. System.Object**
- B. System.Base
- C. System.Root
- D. System.Parent

Ans: A

**54. C# does not support:**

- A. abstraction
- B. polymorphism
- C. multiple inheritance**
- D. inheritance

Ans: C

**56. Which of the following jobs are NOT performed by Garbage Collector?**

1. Freeing memory on the stack.
  2. Avoiding memory leaks.
  3. Freeing memory occupied by unreferenced objects.
  4. Closing unclosed database collections.
  5. Closing unclosed files.
- (A) 1, 2, 3  
**(B) 1, 4, 5**  
(C) 3, 5  
(D) 3, 4

Ans: B

**57. Which of the following statements is correct about Managed Code?**

- A. Managed code is the code that runs on top of Windows.  
**B. Managed code is the code that is written to target the services of the CLR.**  
C. Managed code is the code where resources are Garbage Collected.  
D. Managed code is the code that is compiled by the JIT compilers.

Ans: B

**58. How does assembly versioning in .NET prevent DLL Hell?**

- A. The runtime checks to see that only one version of an assembly is on the machine at any one time.  
B. The compiler offers compile time checking for backward compatibility.  
**C. .NET allows assemblies to specify the name AND the version of any assemblies they need to run.**  
D. It doesn't.

Ans: C

**59. Which of the following is/are not types of arrays in C#?**

- A. Single-Dimensional
- B. Multidimensional
- C. Jazzed arrays
- D. Jagged arrays

Ans: C

**60. A variable which is declared inside a method is called a\_\_\_\_\_variable**

- A. Local
- B. Private
- C. Static
- D. Serial

Ans: A

**61. Two methods with the same name but with different parameters.**

- A. Overloading
- B. Multiplexing
- C. Duplexing
- D. Loading

Ans: A

**64. Different ways a method can be overloaded in C#.NET**

- A. Different parameter data types
- B. Different order of parameters
- C. Different number of parameters
- D. All of above

Ans: D

**65. Is it possible to change the value of a variable while debugging a C# application?**

A. Yes

B. No

Ans: A

**67. Which of the following statements is correct about the C#.NET program given below?**

```
namespace PskillsConsoleApplication
```

```
{
```

```
    class Baseclass
```

```
{
```

```
    int i;
```

```
    public Baseclass(int ii)
```

```
{
```

```
        i = ii;
```

```
        Console.Write("Base ");
```

```
}
```

```
}
```

```
    class Derived : Baseclass
```

```
{
```

```
        public Derived(int ii) : base(ii)
```

```
{
```

```
            Console.Write("Derived ");
```

```
}
```

```
}
```

```
    class MyProgram
```

```
{
```

```
        static void Main(string[ ] args)
```

```
{
```

```
        Derived d = new Derived(10);
```

```
}
```

```
} }
```

- A. The program will report an error in the statement base(ii).
- B. The program will work correctly if we replace base(ii) with base.Baseclass(ii).
- C. **The program will output: Base Derived**
- D. The program will work correctly only if we implement zero-argument constructors in Baseclass as well as Derived class.

Ans: C

#### **69. Identify which is true**

- A. **DataView ia subset of row and not columns**
- B. find can be done only on sorted columns
- C. Sorting can be done on multiple columns
- D. None of these

Ans: A

#### **70. Which of the following .NET components can be used to remove unused references from the managed heap?**

- A. Class Loader
- B. **Garbage Collector**
- C. CTS
- D. CLR

Ans: B

#### **71. A local variable**

- A. Can be used anywhere in the program
- B. **Is declared within a method**
- C. Must accept a class
- D. Represent a class object

Ans: b

## **72. An instance variable**

- A. is an object of a class
- B. represents an attribute of an object**
- C. is a method of a class
- D. a and c

Ans: b

## **73. Private Button print = new button();**

- A. creates a button control
- B. initializes a button control
- C. instantiates button control
- D. a and b
- E. a and c**

Ans: e

## **74. An instance method**

- A. Represents the behavior of an object**
- B. Represents the attribute of an object
- C. Represents another class
- D. a and b

Ans: a

## **75. A Constructor**

- A. is used to create objects
- B. must have the same name as the class it is declared within
- C. is a method of a class
- D. maybe overloaded
- E. b and c**

Ans: e

**76. class Test: Form { }**

- A. Creates the class Test : Form
- B. Creates the class Test that inherits the class Form**
- C. Creates the class form that inherits the class Test
- D. a and b

Ans: b

**77. A variable declared inside a method is called a\_\_\_\_\_variable**

- A. Static
- B. Private
- C. Local**
- D. Serial
- E. b and d

Ans: c

**78. Defining two methods with the same name but with different parameters is called.**

- A. Loading
- B. Overloading**
- C. Multiplexing
- D. Duplexing

Ans: b

**79. Find any errors in the following BankAccount: Public int BankAccount() { balance = 0; }**

- A. Name
- B. Formal parameters
- C. Return type**

Ans: c

**81. String mystring; Creates a(n)**

- A. class
- B. Constructor
- C. Object
- D. a and b

Ans: c

**84. Is it possible to pass methods as arguments for other methods without modification.**

- A. True
- B. False

Ans: a

**88. Every class directly or indirectly extends the\_\_\_\_\_class.**

- A. System
- B. Object
- C. Drawing
- D. Console

Ans: b

**89. A\_\_\_\_block enclose the code that could throw an exception.**

- A. Try
- B. Catch
- C. Exception
- D. Error
- E. a and b

Ans: a

**91. To output the value of multidimensional array, Console.WriteLine(\_\_\_\_)**

- A. myArray[1][3];
- B. myArray[1..3];
- C. myArray{1}{3};
- D. myArray(1),(3);

Ans: a

**92. All methods in an abstract base class must be declared abstract.**

- A. True
- B. False

Ans: b

**94. The code public class B : A { }**

- A. Defines a class that inherits all the methods of A
- B. Defines a class that inherits the public and protected methods of A only
- C. Errors
- D. a and b

Ans: b

**95. Assuming that public class B : A { public B(int i) :base(i) {} } compiles and runs correctly, what can we conclude about the constructors in the class A?**

- A. One constructor takes an argument of type i
- B. There is only a default constructor
- C. One constructor takes an arguments of the type int
- D. False

Ans: b

**96. Classes declared with the sealed keyword cannot be base class.**

- A. True
- B. False

Ans: a

**97. A method\_\_\_\_an exception when that method detects that a problem has occurred.**

- A. Trys
- B. Catches
- C. Throws
- D. a and b

Ans: c

**98. Exception objects are derived from the class.**

- A. Try
- B. Catch
- C. Exception
- D. Event
- E. System

Ans: c

**99. An abstract class**

- A. may contain instance variables
- B. may contain constructors
- C. may extend another class
- D. a and b
- E. all of the above

Ans: e

1

```
public static void Main(string[] args)
{
    int a = 5, s = 0, c = 0;
    Proc(a, ref s, c);
    Console.WriteLine(a + " " + s + " " + c);
}
public static void Proc(int x, ref int ss, int cc)
{
    ss = x * x;
    cc = x + x + x;
}
```

**What will the output be?**

- a. 5 25 15
- b. 5 25 125
- c. 5 0 0
- d. 5 25 0

2

```
public static void Main(string[] args)
{
    int a = 2, s = 0, c = 0;
    Proc(a, ref s, ref c);
    Console.WriteLine(a + " " + s + " " + c);
}
public static void Proc(int x, ref int ss, ref int cc)
{
    ss = x * x;
    cc = x + x + x;
}
```

**What will the output be?**

- a. 2 2 2
- b. 2 4 8
- c. 2 0 0
- d. 2 4 6

3

```
public static void Main(string[] args) {
    Console.WriteLine(test(3, 3)); }

    public static int test(int x, int y) {
        return x >= y ? x + y * 3 : x + y; }
```

**What will the output be?**

- a. 12
- b. 9
- c. 8
- d. 6

4

```
public static void Main(string[] args)
{
    doit();
    void doit()
    {
        Console.WriteLine("Hi");
    }
}
```

**What will the output be?**

- a. None of the answers
- b. Hi
- c. compile time error
- d. Hi infinite times

5

```
public static void Main(string[] args)
{
    int i = 5;
    double d = 5;
    test(i);
    test(d);
}

public static void test(double a)
{
    Console.Write(" " + a);
}
```

**What will the output be?**

- a. 5 5.0
- b. 5.0 5.0
- c. compile time error
- d. 5 5

6

```
public static void Main(string[] args)
{
    Console.WriteLine(test(2, 1));
}

public static int test(int x, int y)
{
    return x == y ? x + y * 3 : x + y;
}
```

**What will the output be?**

- a. 6
- b. 3**
- c. 2
- d. 4

7

```
public static void Main(string[] args)
{
    test();
    void test()
    {
        Console.WriteLine("Hi infinite times");
    }
}
```

**What will the output be?**

- a. None of the answers
- b. Hi
- c. compile time error**
- d. Hi infinite times

8

```
public static void Main(string[] args)
{
    int i = 5;
    double d = 5.0;
    test(i);
    test(d);
}

public static void test(double a)
{
    Console.Write(" " + a);
}
```

**What will the output be?**

- a. 5 5.0
- b. 5.0 5.0
- c. compile time error
- d. 5 5**

9

```
public static void Main(string[] args)
{
    int a = 3, s = 0, c = 0;
    Proc(a, ref s, c);
    Console.WriteLine(a + " " + s + " " + c);
}
public static void Proc(int x, ref int ss, int cc)
{
    ss = x * x;
    cc = x * x * x;
}
```

**What will the output be?**

- a. 3 9 9
- b. 3 9 27
- c. 3 9 0
- d. 3 0 0

10

```
public static void Main(string[] args)
{
    doit();
    void doit()
    {
        Console.WriteLine("Hi infinite times");
    }
}
```

**What will the output be?**

- a. None of the answers
- b. Hi
- c. compile time error
- d. Hi infinite times

11

```
public static void Main(string[] args)
{
    int a = 3, s = 0, c = 0;
    Proc(a, ref s, ref c);
    Console.WriteLine(a + " " + s + " " + c);
}
public static void Proc(int x, ref int ss, ref int cc)
{
    ss = x * x;
    cc = x * x * x;
}
```

**What will the output be?**

- a. 3 9 9
- b. 3 9 27
- c. 3 3 3
- d. 3 0 0

12

```
public static void Main(string[] args)
{
    Console.WriteLine(test(5, 3));
}
public static int test(int x, int y)
{
    return x >= y ? x + y * 3 : x + y;
}
```

**What will the output be?**

- a. 3
- b. 14**
- c. 8
- d. 5

13

```
public static void Main(string[] args)
{
    Console.WriteLine(test(1, 2));
}
public static int test(int x, int y)
{
    return x == y ? x + y * 3 : x + y;
}
```

**What will the output be?**

- a. 6
- b. 3**
- c. 2
- d. 4

14

```
public static void Main(string[] args)
{
    Console.WriteLine(test(4, 4));
}
public static int test(int x, int y)
{
    return x >= y ? x + y*3 : x + y;
}
```

**What will the output be?**

- a. 9
- b. 16**
- c. 12
- d. 4

15

```
public static void Main(string[] args)
{
    test();
    void test()
    {
        Console.WriteLine("Hi");
    }
}
```

**What will the output be?**

- a. None of the answers
- b. Hi
- c. compile time error
- d. Hi infinite times

16

```
public static void Main(string[] args)
{
    int a = 5, s = 0, c = 0;
    Proc(a, ref s, c);
    Console.WriteLine(a + " " + s + " " + c);
}
public static void Proc(int x, ref int ss, int cc)
{
    ss = x * x;
    cc = x * x * x;
}
```

**What will the output be?**

- a. 5 25 15
- b. 5 25 125
- c. 5 0 0
- d. 5 25 0

17

```
public static void Main(string[] args)
{
    int i = 5;
    double d = 10;
    test(i);
    test(d);
}

public static void test(double a)
{
    Console.Write(" " + a);
}
```

**What will the output be?**

- a. compile time error
- b. 5 10.0
- c. 5.0 10.0
- d. 5 10

18

```
public static void Main(string[] args)
{
    Console.WriteLine(test(3, 1));
}
public static int test(int x, int y)
{
    return x == y ? x + y * 3 : x + y;
}
```

**What will the output be?**

- a. 3
- b. 4**
- c. 6
- d. 2

19

```
public static void Main(string[] args)
{
    int i = 10;
    double d = 10;
    test(i);
    test(d);
}

public static void test(double a)
{
    Console.Write(" " + a);
}
```

**What will the output be?**

- a. compile time error
- b. 10 10**
- c. 10.0 10.0
- d. 10 10.0

20

```
public static void Main(string[] args)
{
    int a = 2, s = 0, c = 0;
    Proc(a, ref s, c);
    Console.WriteLine(a + " " + s + " " + c);
}
public static void Proc(int x, ref int ss, int cc)
{
    ss = x * x;
    cc = x * x * x;
}
```

**What will the output be?**

- a. 2 4 8
- b. 2 4 6
- c. 2 0 0
- d. 2 4 0**

21

```
public static void Main(string[] args)
{
    int i = 5;
    double d = 10;
    test1();
    test2();
}
public static void test1()
{
    Console.Write("A");
}
public static void test2()
{
    Console.Write("a");
    test1();
}
```

**What will the output be?**

- a. AAa
- b. AaA**
- c. aAa
- d. aaA

22

```
public static void Main(string[] args)
{
    int i = 5;
    double d = 10;
    test1();
    test2();
}

public static void test1()
{
    Console.Write("a");
}
public static void test2()
{
    Console.Write("A");
    test1();
}
```

**What will the output be?**

- a. AAa
- b. AaA
- c. aAa**
- d. aaA

23

```
public static void Main(string[] args)
{
    int a = 3, s = 0, c = 0;
    Proc(a, ref s, ref c);
    Console.WriteLine(a + " " + s + " " + c);
}
public static void Proc(int x, ref int ss, ref int cc)
{
    ss = x * x;
    cc = x + x + x;

}
```

**What will the output be?**

- a. 3 9 27
- b. 3 3 3
- c. 3 0 0
- d. 3 9 9**

24

```
public static void Main(string[] args)
{
    int a = 5, s = 0, c = 0;
    Proc(a, ref s, ref c);
    Console.WriteLine(a + " " + s + " " + c);
}
public static void Proc(int x, ref int ss, ref int cc)
{
    ss = x * x;
    cc = x + x + x;

}
```

**What will the output be?**

- a. 5 25 125
- b. 5 25 15**
- c. 25 25 25
- d. 5 0 0

25	<pre> public static void Main(string[] args) {     int a = 2, s = 0, c = 0;     Proc(a, ref s, c);     Console.WriteLine(a + " " + s + " " + c); } public static void Proc(int x, ref int ss, int cc) {     ss = x * x;     cc = x + x + x; } </pre> <p><b>What will the output be?</b></p> <p>a. 2 4 8  b. 2 4 6  c. 2 0 0  <b>d. 2 4 0</b></p>
26	<pre> public static void Main(string[] args) {     int i = 10;     double d = 10.0;     test(i);     test(d); }  public static void test(double a) {     Console.Write(" " + a); } </pre> <p><b>What will the output be?</b></p> <p>a. compile time error  <b>b. 10 10</b>  c. 10.0 10.0  d. 10 10.0</p>
27	<pre> public static void Main(string[] args) {     int i = 5;     double d = 10;     test1();     test2(); } public static void test1() {     Console.Write("A"); } public static void test2() {     test1();     Console.Write("a"); } </pre> <p><b>What will the output be?</b></p> <p><b>a. AAa</b>  b. AaA  c. aAa  d. aaA</p>

28

```
public static void Main(string[] args)
{
    int a = 3, s = 0, c = 0;
    Proc(a, ref s, c);
    Console.WriteLine(a + " " + s + " " + c);
}
public static void Proc(int x, ref int ss, int cc)
{
    ss = x * x;
    cc = x + x + x;
}
```

**What will the output be?**

- a. 3 9 0
- b. 3 9 27
- c. 3 9 9
- d. 3 0 0

29

```
public static void Main(string[] args)
{
    Console.WriteLine(test(2, 2));
}

public static int test(int x, int y)
{
    return x == y ? x + y * 3 : x + y;
}
```

**What will the output be?**

- a. 8
- b. 6
- c. 4
- d. 2

30

```
public static void Main(string[] args)
{
    int i = 5;
    double d = 10;
    test1();
    test2();
}
public static void test1()
{
    Console.Write("a");
}
public static void test2()
{
    test1();
    Console.Write("A");
}
```

**What will the output be?**

- a. AAa
- b. aAa
- c. AaA
- d. aaA**

31

```
public static void Main(string[] args)
{
    int a = 2, s = 0, c = 0;
    Proc(a, ref s, ref c);
    Console.WriteLine(a + " " + s + " " + c);
}
public static void Proc(int x, ref int ss, ref int cc)
{
    ss = x * x;
    cc = x * x * x;
}
```

**What will the output be?**

- a. 2 2 2
- b. 2 4 8**
- c. 2 0 0
- d. 2 4 6

32

```
public static void Main(string[] args)
{
    Console.WriteLine(test(5, 3));
}

public static int test(int x, int y)
{
    return x == y ? x + y * 3 : x + y;
}
```

**What will the output be?**

- a. 8**
- b. 6
- c. 4
- d. 2

# Difference between 1D-Array and 2D-Array

## 1 D   A R R A Y V E R S U S 2 D   A R R A Y

### 1D ARRAY

A simple data structure that stores a collection of similar type data in a contiguous block of memory

Also called single dimensional array

Syntax:  
`data-type[] name = new  
data-type[size];`

Stores data as a list

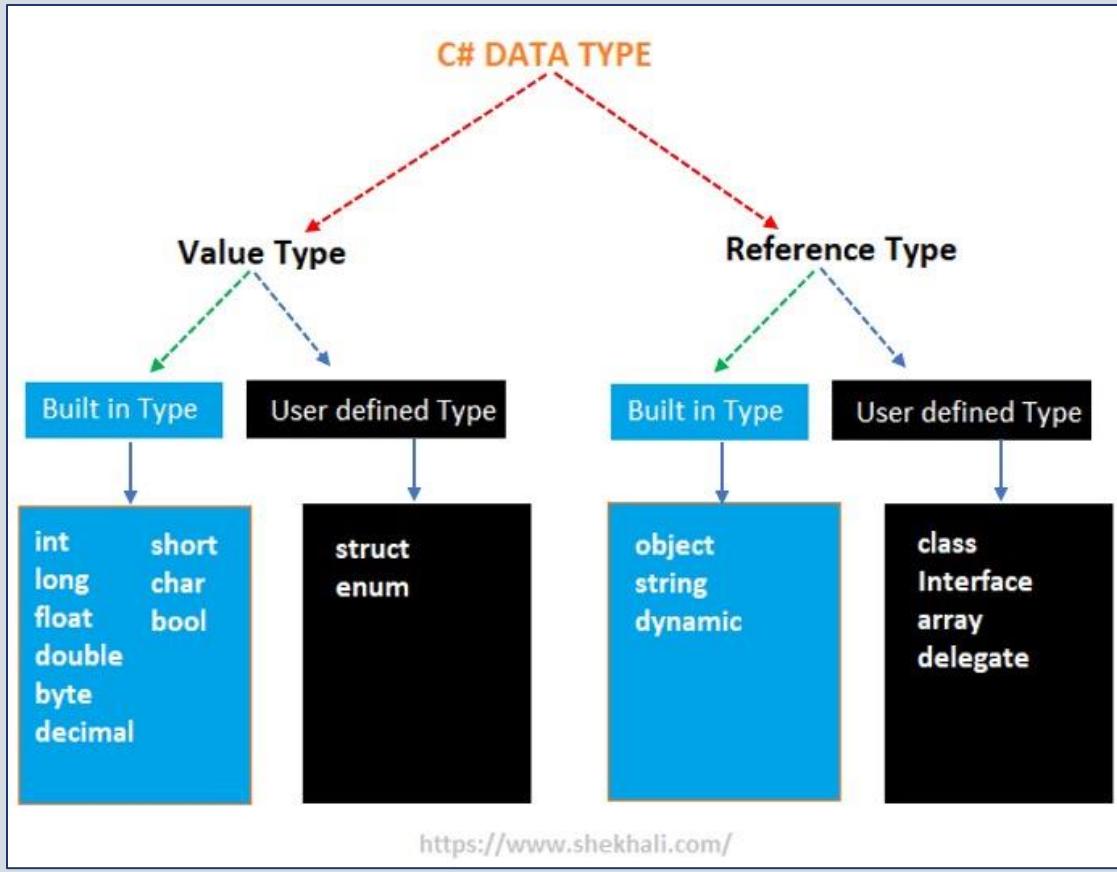
### 2D ARRAY

A type of array that stores multiple data elements of the same type in matrix or table like format with a number of rows and columns

Called multi-dimensional array

Syntax:  
`data-type[][] name = new  
data-type[rows][columns];`

Stores data in a row-column format



C# type	.Net type	Size in bytes	Description
<b>Integral Types</b>			
byte	Byte	1	May contain Integers from 0-255
S byte	SByte	1	Signed byte from -128 to 127
short	Int16	2	Ranges From -32,768, to 32,767
ushort	UInt16	2	Unsigned, ranges from 0 to 65,535
Int (default)	Int32	4	Ranges from -2,147,483,648 to 2,147,483,647
uint	UInt32	4	Unsigned, ranges from 0 to 4,294,967,295
Long	Int64	8	Ranges from -9,223,372,036,854,775,808 to 9,223,372,036,854,775,807
ulong	UInt64	8	Unsigned, ranges from 0 to 18,446,744,073,709,551,615
<b>Floating Point Type</b>			
float	Single	4	Ranges from $\pm 1.5 \times 10^{-45}$ to $\pm 3.4 \times 10^{-38}$ with 7 digits precision, Requires the suffix 'f' or 'F'
double (default)	Double	8	Ranges from $\pm 5.0 \times 10^{-324}$ to $\pm 1.7 \times 10^{308}$ with 15-16 digits Precision
<b>Other Types</b>			
bool	Boolean	1	Contains either true false
char	Char	2	Contains any single Unicode character enclosed in single quotation mark such as 'c'
decimal	Decimal	12	Ranges from $1.0 \times 10^{-28}$ to $7.9 \times 10^{28}$ with 28-29 digits precision. Requires the suffix 'm' or 'M'

# Access Modifiers and Inheritance in C#

Caller's location	public	protected internal	protected	internal	private protected	private
Within the class	✓	✓	✓	✓	✓	✓
Derived class (same assembly)	✓	✓	✓	✓	✓	✗
Non-derived class (same assembly)	✓	✓	✗	✓	✗	✗
Derived class (different assembly)	✓	✓	✓	✗	✗	✗
Non-derived class (different assembly)	✓	✗	✗	✗	✗	✗

