WEEKLY ASSIGNMENT 3

Total Time: 3 Hrs

Total Marks: 100

I. Short Questions (Best of 10) (Total Marks: 10x2 = 20)

1. Explain with example what is a delegate?
2. Explain with example what is an event?
3. What is the difference between event and a delegate?
4. How multicast delegates execute explain with code example?
5. Explain with example what is exception handling?
6. Explain the order of execution in a try catch and finally block?
7. Explain with code example the use of 'finally' keyword?
8. How 'Catch' keyword works explain with example?
9. How does a delegate handle an instance function and static function?
10. Can a delegate be part of an interface declaration, explain?
11. What are the different error scenarios and how are they handled by C# CLR to ensure program integrity?

II. Objective Questions (15x1= 15 Marks)

1. The 'ref' keyword can be used with which among the following?
   a) Static function/subroutine
   b) Static data
   c) Instance function/subroutine
   d) All of the mentioned

2. To implement delegates, the necessary condition is?
   a) class declaration
   b) inheritance
   c) runtime polymorphism
   d) exceptions

3. To generate a simple notification for an object in runtime, the programming construct to be used for implementing this idea?
   a) namespace
   b) interface
   c) delegate
   d) attribute

4. Choose the incorrect statement among the following about the delegate?
   a) delegates are of reference types
   b) delegates are object oriented

c) delegates are type safe
d) none of the mentioned

5. Which among the following is the correct statement about delegate declaration?

delegate void del(int i);

a) on declaring the delegate, a class called del is created
b) the del class is derived from the Multi-cast Delegate class
c) the del class will contain a one argument constructor and an invoke() method
d) all of the mentioned

6. Choose the incorrect statement about delegates?
a) delegates are not type safe
b) delegates can be used to implement call-back notification
c) delegate is a user defined type
d) delegates permits execution of a method in an asynchronous manner

7. Choose the correct way to call subroutine fun() of the sample class?

```
1.class a
2.{
3.     public void x(int p, double k)
4.     {
5.         Console.WriteLine("k : csharp!");
6.     }
7.}
```

a)

```
delegate void del(int i);
x s = new x();
del d = new del(ref s.x);
d(8, 2.2f);
```

b)

```
delegate void del(int p,  double k);
del d;
x s = new x();
d = new del(ref s.x);
d(8, 2.2f);
```

c)

```
x s = new x();
delegate void d = new del(ref x);
d(8, 2.2f);
```

d) all the mentioned

8. Which of the following is the correct way to call the function abc() of the given class in the following C# code?

```
1.class csharp
2.{
3.     public int abc(int a)
4.     {
5.          Console.WriteLine("A:Just do it!");
6.          return 0;
7.     }
8.}
```

a)

```
delegate void del(int a);
csharp s = new csharp();
del d = new del(ref s.abc);
d(10);
```

b)

```
csharp s = new csharp();
delegate void d = new del(ref abc);
d(10);
```

c)

```
delegate int del(int a);
del d;
csharp s = new csharp();
d = new del(ref s.fun);
d(10);
```

d) none of the mentioned

9. Which of the following is the correct way to call the subroutine function abc() of the given class in the following C# code?

```
1.class csharp
2.{
3.     void abc()
4.     {
5.          console.writeline("A:Just do it!");
6.     }
7.}
```

a)

```
csharp c = new csharp();
delegate void d = new del(ref abc);
d();
```

b)

```
delegate void del();
del d;
csharp s = new csharp();
d = new del(ref s.abc);
d();
```

c)

```
csharp s = new csharp();
delegate void del = new delegate(ref abc);
del();
```

d) None of the mentioned

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

```
{
    delegate void A(ref string str);
    class sample
    {
        public static void fun( ref string a)
        {
            a = a.Substring( 7, a.Length - 7);
        }
    }
        class Program
        {
            static void Main(string[] args)
            {
                A str1;
                string str = "Test Your C#.net skills";
                str1 = sample.fun;
                str1(ref str);
                Console.WriteLine(str);
            }
        }
    }
```

a) Test Your
b) ur C#.NET
c) ur C#.NET Skills
d) None of the mentioned

11. Select the statements which describe the correct usage of exception handling over conventional error handling approaches?
a) As errors can be ignored but exceptions cannot be ignored
b) Exception handling allows separation of program's logic from error handling logic making software more reliable and maintainable
c) try – catch – finally structure allows guaranteed clean up in event of errors under all circumstances
d) All of the mentioned

12. Which of these keywords must be used to monitor exceptions?
a) try
b) finally
c) throw
d) catch

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

```
1. class program
2. {
3.     static void main(string[] args)
4.     {
5.         int i = 5;
6.         int v = 40;
7.         int[] p = new int[4];
8.         try
9.         {
10.                 p[i] = v;
11.             }
12.             catch(IndexOutOfRangeException e)
13.             {
14.                 Console.WriteLine("Index out of bounds");
15.             }
16.             Console.WriteLine("Remaining program");
17.         }
18.     }
```

a) value 40 will be assigned to a[5];

b) The output will be:

Index out of bounds

Remaining program

c) The output will be:

Remaining program

d) None of the mentioned

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

```
1. static void Main(string[] args)
2. {
3.     try
4.     {
5.         Console.WriteLine("csharp" + " " + 1/Convert.ToInt32(0));
6.     }
7.     catch(ArithmeticException e)
8.     {
9.         Console.WriteLine("Java");
10.         }
11.         Console.ReadLine();
12.     }
```

a) csharp

b) java

c) run time error

d) csharp 0

15. Which of the following is the wrong statement about exception handling in C#.NET?

a) finally clause is used to perform clean-up operations of closing network and database connections

b) a program can contain multiple finally clauses

c) the statement in final clause will get executed no matter whether an exception occurs or not
d) all the mentioned

III. Programming Questions (Answer any 4) – (15x4 = 60)

1. Write a program with following constitutes
   - The program would represent a lottery system.
   - Every time a customer buys a lottery a random 12-digit number will be created and sent to him.
   - A lottery manager class keeps track of all the lotteries that were sold.
   - Finally, the manager class has a SelectWinner() method which randomly selects a lottery number and displays the winner's name and associated lottery number.
   - The lottery manager does not select a winner till there are at least some minimum numbers of participants in the lottery draw. (You can fix the number as your choice)
   - The lottery number and winner method must not return value rather implement event.

2. Write a C# program which has a delegate for performing some operations.
   - The delegate should be able to accept multiple input types and return multiple return types.
   - There will be 3 more classes which has compatible method signature same as the delegate and they take different input types and return different types individually.
   - The delegate is assigned to all three methods using multicast functionality.
   - When the delegate is called all three outputs must be returned and displayed.

3. Write a C# program which has the following construct
   - The Timer class need to have a functionality to start a Counter and increment the Counter by 1 every five second.
   - The Timer class need to have a Stop method with void return type which stops the counter and returns the counter value.
   - The counter property of the class must be private and outside class should not be able to access it directly.

- The Main class which calls the Timer class should have a Property IsCounterRunning which is to be set to true only when counter is started. But the Main class should not change its value, it should be changed by the Timer class after the counter is started.

4. Write a sample C# program for Courier Sorting Facility
   - There should be a Package class which defines the tracking Id, Sender Name, Receiver Name and Receiver Address.
   - There should be a PackageManager class which maintains a list of Packages present in the sorting facility.
   - The PackageManager has two methods Receive and Dispatched which can take argument of tracking ID of variable length and either add to the collection (in case of receive) or remove from collection (in case of dispatch).
   - The Package manager must have a display inventory which should show the number of packages available currently in the inventory and their information.

5. Write program for a Water pump station.
   - The Pump station has a reservoir which has a maximum water holding Limit. (1000000 Ltrs)
   - The Pump station has 3 input pumps which pumps water into the station from nearby water bodies at (100 Ltrs/Min)
   - The pump station has 10 output pumps which pumps water out of the station to different parts of the City at (10 Lts/Min)
   - At anytime any number of input and output pumps could be opened.
   - Each part of the City has their own water reserve with a maximum capacity of 10000 Ltrs.
   - When the City reserves reach 90% of their capacity, they notify the Pump station to stop pumping water and the pump station stops water supply.
   - Similarly, when the pump station reaches 90% of its capacity it automatically stops the input pumps. When its water reserve reaches 50% again it starts the input pumps.
   - When the operator starts the pump station it starts reporting the pump status (input and output) of each pump and capacity of each reservoir every minute. The output is displayed on screen.
   - Implement the program using delegates and events

6. Write a C# program having following structure

- A class which has an array of 10 elements and you can access the element by calling a method GetElement(int i) where i is the index of the elements.
- If 'i' is outside the bounds the program handles it and show a user-friendly message that the index you provided does not exist.
- Similarly, the above class must contain a method called division which divides two numbers and show you answer. Any division by 0 must be handled and shown an appropriate message.
- Finally, the same class has a third method takes two parameter an input string and an index which does calculate the string length and returns the character at index i. This method should give different error messages if a string object is null and if an index is out of bounds.
- All the functionalities must be implemented using exception handling.

IV. Design Question (1x5 = 5 marks)

1. Design an online shopping cart
   - Where a person can login and add items to his cart.
   - The cart will categorize the items into categories like vegetables, groceries, utilities, meats.
   - The person can remove items from the cart as well and modify the quantity.
   - Finally, a person can go to the payment section which contains the list of the items in his cart and the prices etc.
   - A person can either choose to pay or archive his cart for later purchase.
   - A person can view all his past purchases and associated payment information going to the history section.

   Use the concepts that were taught in the class and design a complete shopping module. No coding expected only design.