RAJARATA UNIVERSITY OF SRI LANKA
FACULTY OF APPLIED SCIENCES

B.Sc. (General) Degree
Second Year - Semester I Examination - October/November 2015

COM 2306 - VISUAL PROGRAMMING

Time Allowed: Two (02) hours.

INSTRUCTIONS TO CANDIDATES

- This paper contains five (05) questions on 06 pages. Answer **any four (04)** Questions.
- The total maximum mark attainable for this examination is 100.The marks assigned for each question and section, thereof are indicated in parentheses.
- This is a closed book examination.
- Mobile phones or any other communication devices are not permitted.
- Clearly state the assumptions you make. If you have any doubts regarding the interpretation of the wording of a question, make your own decision, but clearly state it on the script.

1.

a) Following C# class contains an error. The error can be corrected by changing only one line in the program. Write the correct program to display "*Hello World*" in the console.

```
class A {
        string text1 = "Hello";
        string text2 = "World";
        object obj;
        obj= text1 + text2;
        string text3 = obj;
        Console.WriteLine(text3);

}
```

(04 marks)

b) Write a program that applies bonus points to given scores in the range [1…9] 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 prints an error message.
  Hint - Use switch-cases

(05 marks)

c) Write a program, which creates an array of **20 elements of type integer** and initializes each of the elements with a value equals to the value of index multiplied by 5. Print the values of elements of the array to the console.

(04 marks)

d) Write a program, which finds the **most frequently occurring element** in an array.
Example:

a. Input :- 4,1,1,4,2,3,4,4,1,2,4,9,3
b. Output :- Number 4 occurs 5 times

(04 marks)

e) Write a method that finds **maximum value in a given integer array.** Write a program to test that the method works correctly.

(04 marks)

f) Write a method that prints the digits of a given decimal number in a reversed order. For example 256, must be printed as 652. Hint – use the % operator.

(04 marks)

2.

a) Write down the advantages of a Visual Programming Language.

(03 marks)

b) What does it call by Event Driven Programming?

(03 marks)

c) Write down the features of C# programming language.

(03 marks)

d) What are the functions and features of Common Language Runtime (CLR)?

(03 marks)

e) What are the differences between events and methods?

(03 marks)

f) Explain the following three ways of triggering events using suitable examples.

- When user triggers an event
- When Objects trigger their own events
- When the operating system triggers events

(04 marks)

g) Explain the functions of "EventArgs e" and "object sender" parameters in events.

(03 marks)

h) What are the advantages of debugging a program?

(03 marks)

3.

a) Define the terms "class" and "object" in object oriented programming.

(03 marks)

b) Write a C# code to create a class named "Rectangle" to represent a rectangle.

- Two fields called width and height in double type with private access modifier.
- A constructor to initialize the width and height variables.
- A method called CalcPerimeter() to calculate the perimeter of the rectangle and it should return the double type perimeter value.

(05 marks)

c) Define constructor overloading using suitable examples.

(03 marks)

d) What are the advantages of using interfaces over abstract classes with related to object oriented concepts?

(03 marks)

e) Similar to Rectangle class, If there are more other shapes called "Square", "Triangle", "Circle" and "Rhombus", and assume all these shapes has the common behavior to

calculate the perimeter of their own shapes. Explain how the program can be modified according to the object oriented concepts.

(04 marks)

f) Explain method overriding by using suitable examples.

(03 marks)

g) Write a code segment to demonstrate the dynamic binding and polymorphism concepts by using above modified program in section 3(e).

(04 marks)

4.

a) You have observed that some general algorithm can be used for different purposes by changing some steps of the algorithm. What is the most suitable design pattern that can be used to implement that algorithm?

(04 marks)

b) Assume there is a class called Box and need to sort a set of Box objects. You are going to use available sorting facility in C#.

I. What are the class(es) and interface(s) you need to use.

II. Assuming two Box objects can be compared by *volume* of the boxes, provide an implementation for following method for the relevant interface.

(04 marks)

```
public int compareTo(Object object) {

}
```

c) Following program is needed to modify to apply the Singleton design pattern. Apply the changes and rewrite the program.

(04 marks)

```
public class MyDeviceDriver {
        public static MyDeviceDriver mdd;

        public MyDeviceDriver () {
        }

        ____ static MyDeviceDriver getInstance() {
                // implement the code to return the A class object.
        }
}
```

d) What are the mechanisms that are used in singleton design pattern to ensure that only one instance of MyDeviceDriver class is created, when more than one threads try to get instance of MyDeviceDriver objects at the same time.

(04 marks)

e) What is the most suitable design pattern that can be used to encapsulate an iteration? Following program is an example for that design pattern. Implement the code where mentioned in the following program.

(05 marks)

```
public interface Iterator {
        boolean hasNext();
        Object next();
}
public class MenuIterator implements Iterator {
        MenuItem[] items;
        int position = 0;
        public MenuIterator(MenuItem[] items) {
                // implement the code
        }
        public Object next() {
                // implement the code
        }
        public boolean hasNext() {
                // implement the code
        }
}
```

f) Write a simple class to demonstrate the Factory Design Pattern in order to return object of "pencil", "eraser" and "book" when a Stationary Inventory System is going to add to the system a set of Stationary items. Writing only Factory class is sufficient.

(04 marks)

5.

a) Write down the c#.NET code to display message box as depicted in figure1 when click the "Submit" button in the user interfsce. The message should include the name, and age given by the user and the title should be changed acording to the selected gender value.

(07 marks)

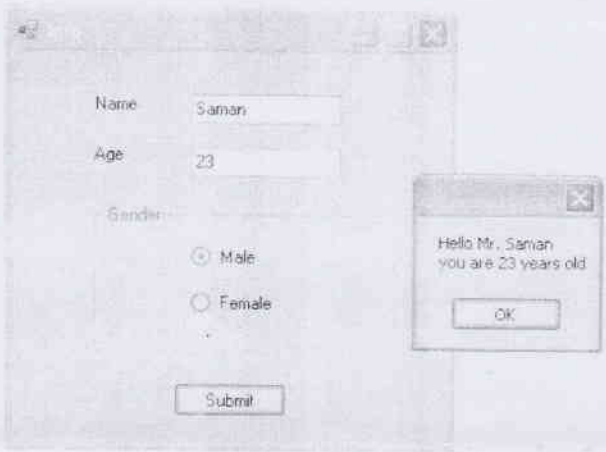

Figure 1

b) There are two Forms called "Form1" and "Form2". We need to open "Form2" using a button inside "Form1". Write a small code segment inside the button in order to perform above function.

(06 marks)

c) Write a code segment, in order to prevent from multiple form creation of "Form2" when click the "Submit" button in Form1.

(06 marks)

d) Write the C#.NET code for "Form2", to display completely on the "Form1".

(06 marks)