

UNIVERSITY OF THE FREE STATE
DEPARTMENT OF COMPUTER SCIENCE AND INFORMATICS

RIS 114

DATE: 7 March 2013

TIME: 180 minutes

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MODERATOR: Dr. L. de Wet

MARKS: 120
(+4 bonus marks)

SECTION A

- Answer the following questions on the answer sheet that is provided.
- The computer must be **switched off** while you are busy with Section A.

1. Give an example of a volatile storage medium. (1)
2. Give an alternative name for the IEEE1394 standard. (1)
3. What do the following abbreviations stand for?
 - 3.1 USB
 - 3.2 PSU
 - 3.3 OS
 - 3.4 OOP
 - 3.5 GUI
 - 3.6 bit
 - 3.7 DVD
 - 3.8 CPU
 - 3.9 BIOS
 - 3.10 UTF
 - 3.11 RAM
 - 3.12 IDE
 - 3.13 .cs (file extension)(13)
4. What does the **u** stand for in **ushort**? (1)
5. What is a compiler? (2)
6. Explain the difference between source code and object code. (2)
7. Explain the difference between an object and a class. Give examples. (2)
8. Explain the difference between a method and a property. (2)
9. Explain the difference between a method and a method call. (2)
10. Explain the difference between an event and an event handler. Give examples. (2)
11. What is the role of .Net in programming? (2)
12. How many bits are in a byte? (1)
13. Convert 230_{10} to a binary number. Show the intermediate steps. (2)
14. Convert 230_{10} to a hexadecimal number. Use your answer in 13. (1)
15. Convert $1100\ 0101_2$ to a decimal number. Show the intermediate steps. (2)
16. Add the two binary numbers: 1100, 1101. Show all intermediate steps. (2)
17. Subtract: $1110 - 0110$. Show all intermediate steps. (2)
18. Write down the value of **a** in each case: (8)
 - 18.1 `int a = 17 % 5 ;`
 - 18.2 `double a = 17 / 5;`
 - 18.3 `int a = 17 / 5;`
 - 18.4 `int a = 17 / 5.0;`
 - 18.5 `int a = 7; a++;`
 - 18.6 `int b = 7; int a = b++;`
 - 18.7 `double a = 12.3456;`
`a = (int)(a*1000) / 1000.0;`
 - 18.8 `int b = 3;`
`int a = 4;`
`a *= ++b;`

19. What is a constructor? (3)
20. Identify the various elements in the following lines of code. You may choose from the following list:
assignment, class, namespace, object, constructor call, equals, instantiate, property, literal, scope, parameter, event, message, type, variable, method call
- 20.1 System.Windows.Form frmMain = new Form(); (6)
- 20.2 int a = 5; (4)
- 20.3 Console.Write("Press any key..."); (3)
21. What do the following words mean in the context of coding: (6)
- 21.1 IntelliSense
- 21.2 indenting
- 21.3 comment
- 21.4 scope
- 21.5 debugging
- 21.6 control (noun)

[70]

NB. You must submit Section A before you may switch on the computer to do Section B.

SECTION B

- Answer the following questions by developing the solutions in C#.
- Make sure that you enter your name, student number and question number for every question in a comment block at the top of the code window. You will not get marks if you do it, but you will lose 3 marks for every question if you don't do it. You might even get zero for the entire test if you don't do it!
- Make sure that you give appropriate names to all controls and variables.
- Create the following folder on the T-drive in the format Studentnumber_Surname, e.g. 2009123456_Blignaut
- **Note that this is not an open-book test.**

Question 1

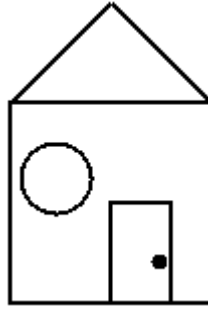
Use CSEC to develop a Console application that will allow the user to enter any number of bytes as input and then display the equivalent number of gigabytes, megabytes, kilobytes and remaining bytes. Remember that there are 1024 bytes in a kilobyte, 1024 kilobytes in a megabyte and 1024 megabytes in a gigabyte. Declare all numeric variables as **long**. Display the output as in the example:

200200200200 bytes = 186 GB, 461 MB, 808 KB, 8 B

Save your program as T:\RIS114\Studentnumber_Surname_Question1.cs. (12)

Question 2

Use CSEC to develop a graphics application with the following picture.



Save your program as T:\RIS114\Studentnumber_Surname_Question2.cs. (12)

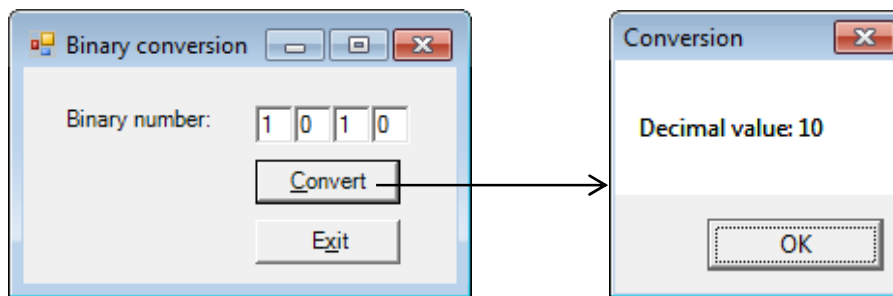
Question 3

Use CSEC to develop a Windows Forms application such as in the screen print. The form must contain a label, four text boxes and two buttons. The text boxes' property for **MaxLength** must have the value of 1. This means that no more than 1 character may be entered into each text box.

The program takes a binary number (which is entered into the 4 text boxes) and converts it to a decimal number. Assume that the user will enter only 1's and 0's in the text boxes. Remember that the **Text** property of a text box takes a **string** value which should be parsed to a numeric (e.g. **int**) before you can do calculations.

The **Click** event handler of the **Convert** button should calculate the decimal equivalent of the binary number and display the result in a message box.

The **Exit** button must terminate the application.



Notes:

- Start with the label and buttons
- Do not waste time to get the layout exactly as in the example. If it looks more or less as above it is OK.
- If you cannot do the conversion, display a message box with the message "Sorry, Prof. This is too difficult for me!"

Save your program as T:\RIS114\Studentnumber_Surname_Question3.cs. (30)

ANSWER SHEET

Student number: _____

Name and surname: _____

1. Volatile storage medium: _____

2. IEEE1394 : _____

3.1 USB _____

3.8 CPU _____

3.2 PSU _____

3.9 BIOS _____

3.3 OS _____

3.10 UTF _____

3.4 OOP _____

3.11 RAM _____

3.5 GUI _____

3.12 IDE _____

3.6 bit _____

3.13 .cs (file extension) _____

3.7 DVD _____

4. **u** in **ushort**? _____

5. Compiler:

6. Source code: _____

Object code: _____

7. Object: _____

Class: _____

8. Method: _____

Property: _____

9. Method: _____

Method call: _____

10. Event: _____

Event handler: _____

11. Role of .Net:

12. Bits in a byte: _____

13. Convert to binary: 230_{10}

14. Convert to hex: 230_{10}

15. Convert to decimal: $1100\ 0101_2$

16. $1100 + 1101$

17. $1110 - 0110$

18.1 `int a = 17 % 5 ;` _____

18.2 `double a = 17 / 5;` _____

18.3 `int a = 17 / 5;` _____

18.4 `int a = 17 / 5.0;` _____

18.5 `int a = 7;`
`a++;` _____

18.6 `int b = 7;`
`int a = b++;` _____

18.7 `double a = 12.3456;`
`a = (int)(a*1000) / 1000.0;` _____

18.8 `int b = 3;`
`int a = 4;`
`a *= ++b;` _____

19. Constructor:

20.1 System _____
Form _____
frmMain _____
= _____
new _____
Form() _____

20.2 int _____
a _____
= _____
5 _____

20.3 Console _____
Write _____
"Press any key" _____

21.1 IntelliSense _____

21.2 indenting _____

21.3 comment _____

21.4 scope _____

21.5 debugging _____

21.6 control (noun) _____

MEMORANDUM

Section A

1. Volatile storage medium: RAM / Internal memory ✓
2. IEEE1394 : Firewire ✓
- 3.1 USB Universal Serial Bus ✓
- 3.2 PSU Power Supply Unit ✓
- 3.3 OS Operating System ✓
- 3.4 OOP Object oriented programming ✓
- 3.5 GUI Graphical user interface ✓
- 3.6 bit binary digit ✓
- 3.7 DVD Digital Versatile/Video Disk ✓
- 3.8 CPU Central Processing Unit ✓
- 3.9 BIOS Basic Input Output System ✓
- 3.10 UTF Unicode Transformation Format ✓
- 3.11 RAM Random Accessible Memory ✓
- 3.12 IDE Integrated Development Environment ✓
- 3.13 .cs (file extension) C Sharp ✓
4. **u in ushort?** Unsigned ✓
5. Compiler:
Software ✓ that translates ✓ code in a human understandable format to machine understandable format
6. Source code: Human understandable / text ✓
Object code: Machine understandable / executable ✓
7. Object: Thing, e.g. a specific chair ✓
Class: Group/type of objects, e.g. all chairs ✓
8. Method: Code that describes action of an object ✓
Property: Describes behaviour or appearance of an object ✓
9. Method: Code that describes the method details ✓
Method call: Code that calls a method (described somewhere else) to be executed. ✓
10. Event: Something that happens to an object, e.g. click. ✓
Event handler: Method that is executed when the event occurs. ✓
11. Role of .Net: Library/collection ✓ of code ✓ that is ready to be used
12. Bits in a byte: 8 ✓

13. Convert to binary: 230_{10}

$$230/2 = 115 \text{ rem } 0$$

$$115/2 = 57 \text{ rem } 1$$

$$57/2 = 28 \text{ rem } 1$$

$$28/2 = 14 \text{ rem } 0$$

$$14/2 = 7 \text{ rem } 0$$

$$7/2 = 3 \text{ rem } 1$$

$$3/2 = 1 \text{ rem } 1$$

$$1/2 = 0 \text{ rem } 1$$

Thus $230_{10} = 1110\ 0110_2$ ✓✓

14. Convert to hex: $230_{10} = E6_h$ ✓

15. Convert to decimal: $1100\ 0101_2$

$$2^7 + 2^6 + 2^2 + 2^0 = 128 + 64 + 4 + 1 = 197$$
 ✓✓

16. 1100

$$+ \underline{1101}$$

$$\underline{11001}$$
 ✓✓

17. 1110

$$- \underline{0110}$$

$$\underline{1000}$$
 ✓✓

18.1 `int a = 17 % 5 ;` 2✓

18.2 `double a = 17 / 5;` 3✓

18.3 `int a = 17 / 5;` 3✓

18.4 `int a = 17 / 5.0;` Error✓

18.5 `int a = 7;`
`a++;` 8✓

18.6 `int b = 7;`
`int a = b++;` 7✓

18.7 `double a = 12.3456;`
`a = (int)(a*1000) / 1000.0;` 12.345✓

18.8 `int b = 3;`
`int a = 4;`
`a *= ++b;` 16✓

19. Constructor:

Method✓ that is executed when an object is instantiated✓ with the same name✓ as the class that it belongs to.

20.1	System Form frmMain = new Form()	namespace ✓ class ✓ object ✓ assignment ✓ instantiate ✓ constructor ✓
20.2	int a = 5	class / type ✓ object / variable ✓ assignment ✓ literal ✓
20.3	Console Write "Press any key"	class ✓ method ✓ parameter ✓
21.1	IntelliSense	List of available members of a namespace or class. ✓
21.2	indenting	Left alignment of code to the right of previous open brace ✓
21.3	comment	Notes to humans. Ignored by compiler. ✓
21.4	scope	All code between a specific set of braces ✓
21.5	debugging	Finding and correcting errors in the code ✓
21.6	control (noun)	Group of objects in a GUI that are visible and can be added to a form ✓

Section B**Question 1**

```

public static void Main()
{
    //Input
    Console.Write("Bytes : "); ✓
    string sBytes = Console.ReadLine(); ✓
    long bytes = long.Parse(sBytes); ✓

    //Processing
    long GB = bytes / (1024*1024*1024); ✓
    bytes = bytes % (1024*1024*1024); ✓
    long MB = bytes / (1024*1024); ✓
    bytes = bytes % (1024*1024); ✓
    long KB = bytes / 1024; ✓
    bytes = bytes % 1024; ✓

    //Output
    Console.WriteLine("{0} bytes = {1} GB, {2} MB, {3} KB, {4} B",
        sBytes, GB, MB, KB, bytes); ✓✓✓

    //Exit program
    Console.WriteLine("\n\nPress any key to exit ...");
    Console.ReadKey();
} //End of Main

```

Question 2

```

public void DrawGraphics()
{
    DrawRectangle (Color.Black, 2, 20, 100, 100, 100); ✓✓
    DrawLine (Color.Black, 2, 20, 100, 70, 50); ✓✓
    DrawLine (Color.Black, 2, 70, 50, 120, 100); ✓✓
    DrawEllipse (Color.Black, 2, 25, 120, 35, 35); ✓✓
    DrawRectangle (Color.Black, 2, 70, 150, 30, 50); ✓✓
    FillEllipse(Color.Black, 90, 175, 8, 8); ✓✓

} //End of DrawGraphics method

```

Question 3

```

public class CProgram
{
    static TextBox txt3, txt2, txt1, txt0; ✓✓

    //Main method
    public static void Main()
    {
        //Declare and instantiate form
        Form frmMain = new Form();
        frmMain.StartPosition = FormStartPosition.CenterScreen;
        frmMain.Text = "Binary conversion"; ✓
        frmMain.Width = 240;
        frmMain.Height = 150;

        //Label
        Label lblBinaryNumber = new Label(); ✓
        lblBinaryNumber.Left = 20; ✓
        lblBinaryNumber.Top = 20; ✓
        lblBinaryNumber.Text = "Binary number: "; ✓
        lblBinaryNumber.Parent = frmMain; ✓
    }
}

```

```

//Text boxes
txt3 = new TextBox(); txt2 = new TextBox();
txt1 = new TextBox(); txt0 = new TextBox(); ✓✓
txt3.Width = txt2.Width = txt1.Width = txt0.Width = 20; ✓
txt3.Top = txt2.Top = txt1.Top = txt0.Top = 20; ✓
txt3.MaxLength = txt2.MaxLength = txt1.MaxLength = txt0.MaxLength = 1; ✓
txt3.Text = txt2.Text = txt1.Text = txt0.Text = "0"; ✓
txt3.Parent = txt2.Parent = txt1.Parent = txt0.Parent = frmMain; ✓
txt3.Left = 120; txt2.Left = 140; txt1.Left = 160; txt0.Left = 180; ✓✓

//Button to convert
Button btnConvert = new Button(); ✓
btnConvert.Text = "&Convert"; ✓
btnConvert.Left = txt3.Left; ✓
btnConvert.Top = txt3.Top + txt3.Height + 8; ✓
btnConvert.Click += btnConvert_Click; ✓
btnConvert.Parent = frmMain; ✓

//Button to exit application
Button btnExit = new Button();
btnExit.Text = "E&xit";
btnExit.Left = txt3.Left;
btnExit.Top = btnConvert.Top + btnConvert.Height + 8;
btnExit.Click += btnExit_Click;
btnExit.Parent = frmMain;

//Run application and display form
Application.Run(frmMain);
} //End of Main

//Event handler for Click event of btnExit
private static void btnExit_Click(object sender, EventArgs e)
{
    Application.Exit();
} //End of btnExit_Click

private static void btnConvert_Click(object sender, EventArgs e) ✓
{
    int iDecimal = int.Parse(txt3.Text) * 2 * 2 * 2
                + int.Parse(txt2.Text) * 2 * 2
                + int.Parse(txt1.Text) * 2
                + int.Parse(txt0.Text) ; ✓✓✓✓
    MessageBox.Show("Decimal value: " + iDecimal.ToString(), "Conversion" ); ✓✓
} //btnConvert_Click

} //End of class

```