higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE (VOCATIONAL)

INTRODUCTION TO SYSTEMS DEVELOPMENT

(Second Paper**)**(Practical)

NQF LEVEL 2

(10041022)

14 March 2018 (X-Paper)
09:00–13:00

This question paper consists of 16 pages.

NCV

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TIME: 4 HOURS
MARKS: 100

INSTRUCTIONS AND INFORMATION

1. Answer ALL the questions.
2. Read ALL the questions carefully.
3. Number the answers according to the numbering system used in this question paper.
4. Write neatly and legibly.

INSTRUCTIONS TO STUDENTS AND LECTURERS

1. Students MUST be seated in the computer laboratory 30 minutes before the start of the examination to ensure that all computers have the appropriate programs.
2. These questions must be completed on a computer by making use of MS Office 2003 or a later version and VB.NET 2005 or VB.NET Express or VB.NET 2008 or later.
3. Students must make sure that they print their work immediately after they completed a question. Ensure that your examination number is on ALL printouts. NO QUESTIONS WITHOUT A PRINTED EXAMINATION NUMBER WILL BE MARKED.
4. In the event of problems such as a power failure, a computer breakdown or a printer breakdown, the invigilator will make the necessary arrangements to continue with the examination process once the problem has been resolved. Students will not be penalised with time lost under these circumstances.
5. All work on the computer should be saved at regular intervals to prevent loss of work. NO additional time may be allowed for work lost due to lack of saving.

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6. No student may print his/her work for another student, or make a memory stick available to another student or access another student's work on the network. Any attempt to access any information from or transfer information to another student in whatever manner is a contravention of the examination rules and regulations and will be viewed in an extremely serious light.

7. All printouts and screen prints done during the session MUST be handed in.

8. Make sure that your examination number appears on all printouts.

9. Students may NOT copy the source code from VB.NET to MS Word and then print it from the word processor.

10. Steps to print a VB.NET form or any other screen:

    10.1 Run the solution.

    10.2 Hold the ALT key down and press the print screen button. (This will copy the active screen.)

    10.3 Open MS Word and paste the form/screen in a new document.

    10.4 Add your examination number to the top right-hand side of your page.

    10.5 Print the page.

11. You are allowed to make use of the help files in VB.NET.

12. The following files will appear on your hard drive in the folders:

    12.1 QUESTION 1
    …\ISD L2 P2 SUPPLEMENTARY 2018\ComputerSupplies

    IMAGE: computer.png

    …\ISD L2 P2 SUPPLEMENTARY 2018\IMAGES

    12.2 QUESTION 2
    …\ISD L2 P2 SUPPLEMENTARY 2018\CarRentals

    12.3 QUESTION 3
    …\ISD L2 SUPPLEMENTARY 2018\YearMarkCalculator

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QUESTION 1

The following questions refer to the VB.NET solution called *ComputerSupplies* (*…\ISD L2 P2 SUPPLEMENTARY 2018\ComputerSupplies)* that has been saved on your computer.

Lala's Computer Shop approached you to design an interface that will help the staff to easily generate quotations.

The user has to enter the Make and Model of the computer, and then select any peripherals to be included. The user can then indicate whether or not the customer has a discount voucher, and if the customer has one, the voucher number should be entered.

The user then clicks the Print Quotation button in order to generate the new quotation.

NB: NO CODE IS REQUIRED FOR THIS QUESTION. YOU ARE ONLY REQUIRED TO CREATE THE GRAPHICAL USER INTERFACE.

FIGURE 1 below is a print screen of what the user interface should look like. The instructions which follow are a guide to help you complete the interface.



FIGURE 1

A blank interface has been saved on your computer. Open the program *ComputerSupplies*, study FIGURE 1, and follow the instructions below to complete the program interface.

1.1 Add a PICTURE BOX to the form as part of the heading:

CONTROL	NAME	IMAGE
PictureBox	picComp	Use the image saved on your computer as "computer.jpg"

(2)

1.2 Add THREE GROUP BOXES to the form, to group the Computer Details, Peripherals and Discount Voucher:

CONTROL	NAME	TEXT
Group Box	grpCompDet	Computer Details
Group Box	grpPeripherals	Peripherals
Group Box	grpDiscount	Discount Voucher

(3)

1.3 Add FIVE LABELS to the form, one for the heading, two to give instructions on what computer details to enter, one for the voucher number, and one to display the quotation:

CONTROL	NAME	TEXT	SIZE	FONT
Label	lblHeading	Lala's Computer Shop	26	Monotype Corsiva
Label	lblMake	Make	Default	
Label	lblModel	Model	Default	
Label	lblVoucher	Voucher Number	Default	
Label	lblDisplay	(Blank)	**Border:** Fixed Single **Size:** See Figure 1	

(7)

1.4 Add TWO TEXT BOXES to the form, to enter the Make and Model:

CONTROL	NAME	TEXT
Text Box	txtMake	Blank
Text Box	txtModel	Blank

(2)

1.5 Add TWO RADIO BUTTONS to the form, to indicate whether or not the customer has a discount voucher:

CONTROL	NAME	TEXT
Radio Button	radMale	Male
Radio Button	radFemale	Female

(2)

1.6 Add another TEXT BOX to the form, to enter the voucher number:

CONTROL	NAME	TEXT	Enabled
Text Box	txtVoucher	Blank	False

(2)

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1.7 Add THREE CHECKBOXES to the form, to choose the subjects:

CONTROL	NAME	TEXT
Checkbox	chkKeyboard	Keyboard
Checkbox	chkMouse	Mouse
Checkbox	chkMonitor	Monitor

(3)

1.8 Add THREE BUTTONS to the form, one to register the student, one to clear all the fields on the form, and one to exit the program. Also add keyboard shortcuts to each button as shown in FIGURE 1:

CONTROL	NAME	TEXT	Font Size
Button	btnQuotation	&Get Quotation	16
Button	btnClear	&Clear	Default
Button	btnExit	&Exit	Default

(4)

1.9 Change the text in the title of the form to your EXAMINATION NUMBER. (1)

1.10 Make a PRINTOUT of the form. (1)

[27]

QUESTION 2

The following questions refer to the VB.NET solution called *CarRentals* (*…\ISD L2 P2 SUPPLEMENTARY 2018\CarRentals*) that has been saved on your computer.

A company called *Local Car Rentals* hires you and your software development team to develop a program which will help them determine the cost of a car rental. The user will first select the *class* of the car (Class A, B or C). The costs associated with these classes are as follows:

- Class A: R250.00 per day.
- Class B: R500.00 per day.
- Class C: R1020.00 per day.

The user then enters the *deposit* which was paid, the total *number of days* the car was used, and the total *number of kilometers* used. *Local Car Rentals* charges R1.50 per kilometer used.

A VAT charge of 14% is also added to the cost of the rental.

Finally, a late charge is payable if the car is returned after the agreed return date.
The *late charge* is calculated as follows:

- 1 day late: 10% of total cost.
- 2 days late: 15% of total cost.
- 3 days late: 20% of total cost.

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The program must calculate and display the final cost the client has to pay (see IPO chart below).

Use the IPO chart below to help you with the program:

INPUT	**PROCESSING**	**OUTPUT**
Deposit Number of days Number of kilometers Select Class Select days late	**Car Class Costs:** Class A: R250 Per Day Class B: R500 Per Day Class C: R1020 Per Day **LatePercentage:** 1 Day: 10% 2 Days 15% 3 Days: 20% **VATPercentage** = 14% **CarCost** = ClassCost * NumberOfDays **KilometerCost**= NumberOfKilometers * R1.50 **Subtotal** = CarCost + KilometerCost - Deposit **Vat** = Subtotal * VATPercentage **SubTotalWithVat** = Subtotal + VAT **LateCharge** = SubTotalWithVat * LatePercentage **FinalCost** = SubTotalWithVat + LateCharge	FinalCost

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FIGURE 2 below is a print screen of what the user interface looks like. The completed interface has been saved on your computer. Open the solution *CarRentals* and follow the instructions to complete the program:

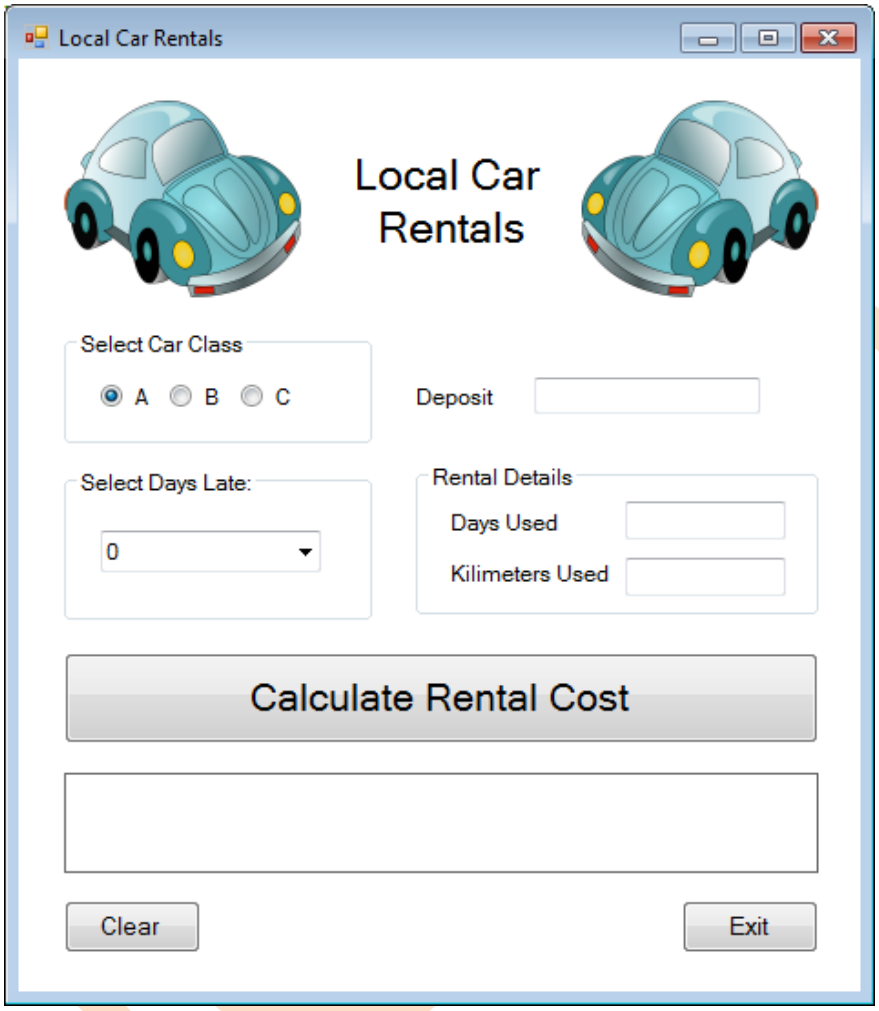
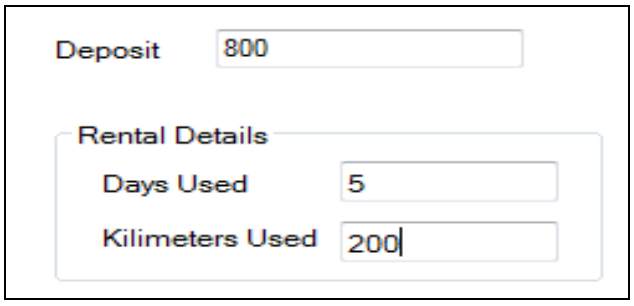


FIGURE 2

The following steps explain how to use the program in order to calculate the cost of a car rental.

STEP 1 RUN the program and enter the *Deposit*, *Days Used* and *Kilometers Used:*



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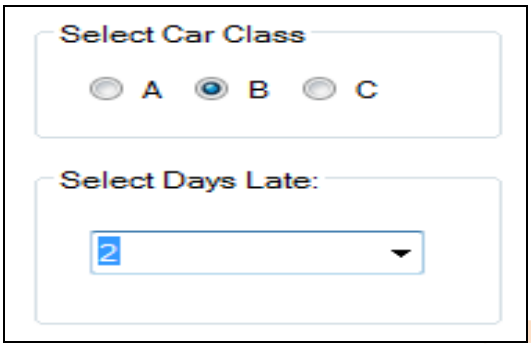
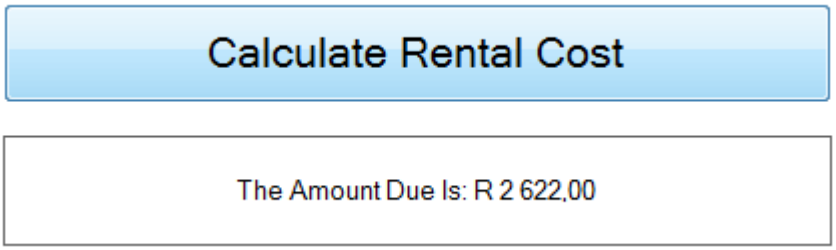
STEP 2 Select the *Car Class* and the *Days Late*:



STEP 3 Click the *Calculate b*utton to calculate and display the *Final Cost* as follows:



2.1 A programmer must always adhere to good program documentation principles. To ensure that your program code is user-friendly and easy to interpret, incorporate the following into your program code:

Add your EXAMINATION NUMBER as a comment and any suitable comments to the program code in your source code. (1)

2.2 Add the following code to the Form Load event:

2.2.1 Add the following FOUR items to the *Days Late* combo box:

0, 1, 2, 3 (2)

2.2.2 Select the first item in the combo box. (1)

2.3 Add the following program code to the click event of the *Calculate* button:

2.3.1 Declare the VAT as a constant. (1)

2.3.2 Declare ALL the required variables. (4)

2.3.3 Convert and assign the values for the *Deposit*, *Total Number of Days* and *Total Kilometers* text boxes to the appropriate variables. (3)

2.3.4 Determine the *Class Cost* based on the selection in the *Radio* buttons, by making use of (an) <if> statement(s). (4)

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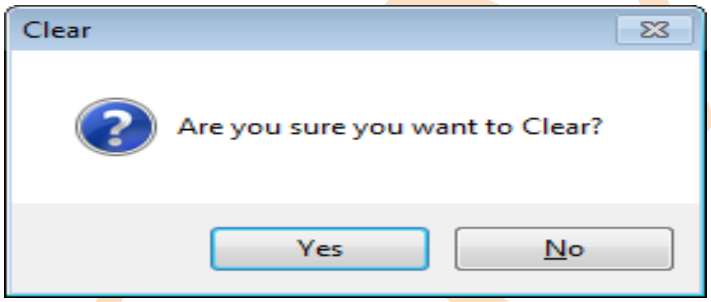
2.3.5 Determine the *Late Percentage* based on the selection in the combo box, using a <select…case> statement. (3)

2.3.6 Calculate ALL of the following:

(a) CarCost (2)
(b) KilometerCost (2)
(c) Subtotal (3)
(d) VAT (2)
(e) SubtotalWithVat (3)
(f) LateCharge (2)
(g) FinalCost (3)

2.3.7 Display the calculated *FinalCost* in the *Display* label as shown in Step 3 above. (3)

2.4 Clicking the *Clear* button should display the following message:



Clicking the *Yes* button should clear all the controls on the form, as well as select the first item in the combo box. Clicking the *No* button should leave the controls uncleared. (7)

2.5 The *Exit* button should close the program. (1)

2.6 Change the text in the title bar of the form to your EXAMINATION NUMBER.

Run the program, enter the following test data, and calculate the final cost:

Deposit: R750
Car class: B
Days used: 3
Kilometers used: 1120

Make a PRINTOUT of the source code. (3)
[50]

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QUESTION 3

The following questions refer to the VB.NET solution called *YearMarkCalculator* (*…\ISD L2 SUPPLEMENTARY 2018\YearMarkCalculator)* that has been saved on your computer.

Your local TVET college asked you and your software development team to design an application that will help their students calculate their year marks.

The students have to start by entering ALL of the following marks:

- Formal Test 1 (counts 10% towards year mark)
- Formal Test 2 (counts 10% towards year mark)
- Practical 1 (counts 25% towards year mark)
- Practical 2 (counts 25% towards year mark)
- Internal Examination (counts 30% towards year mark)

When the user clicks the *Calculate* button, the program calculates and displays the *Average* for the two formal tests, as well as the *Average* of the two practical assessments.

The program then finally calculates and displays the *Year Mark* achieved by the student, and also displays whether the student has passed or failed.

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FIGURE 3 below is a print screen of what the user interface looks like:

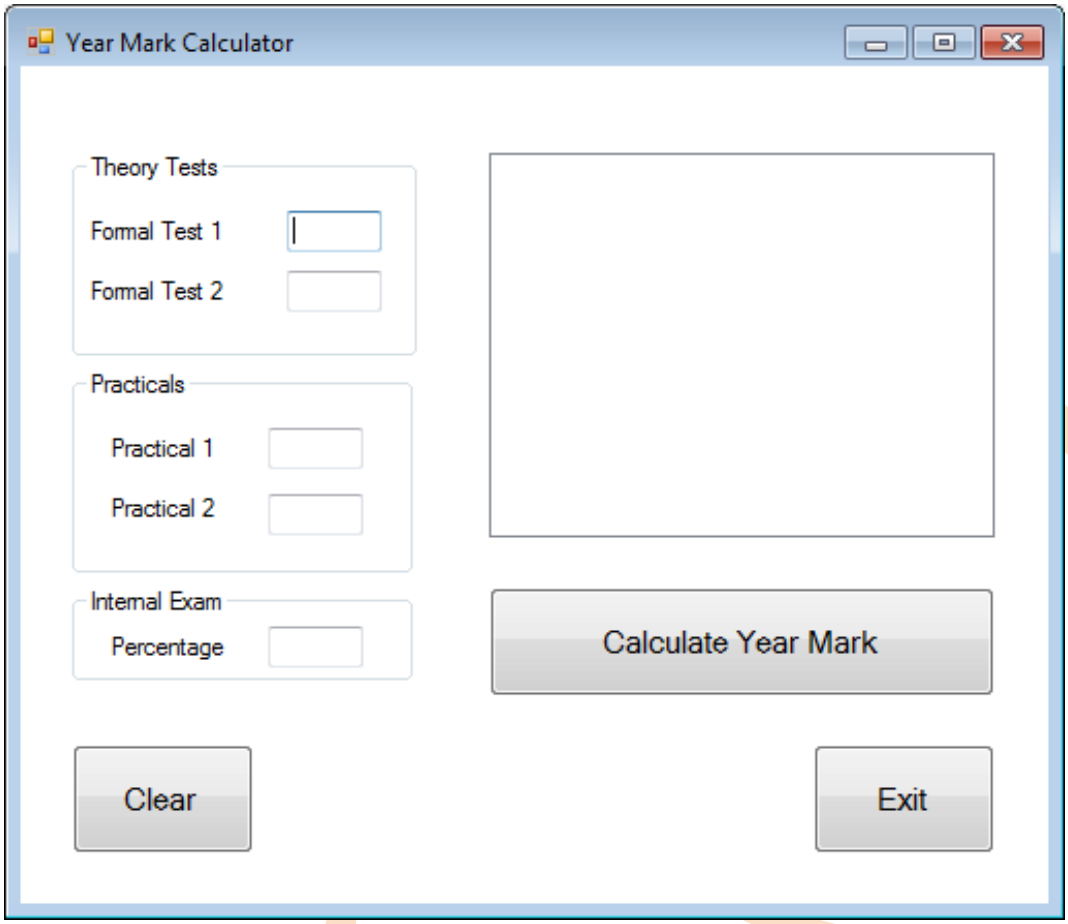
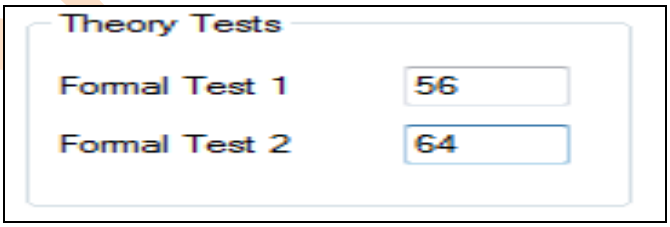


FIGURE 3

The following steps explain how to use the program:

STEP 1 RUN the program and enter marks for *Formal Test 1* and *Formal Test 2.*



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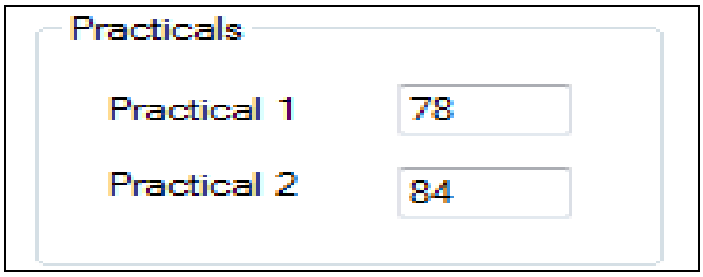
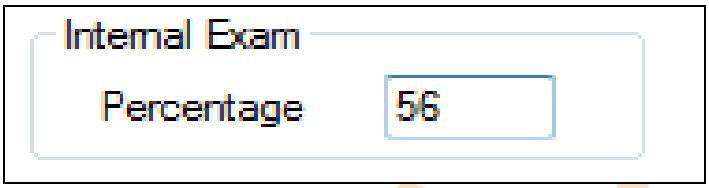
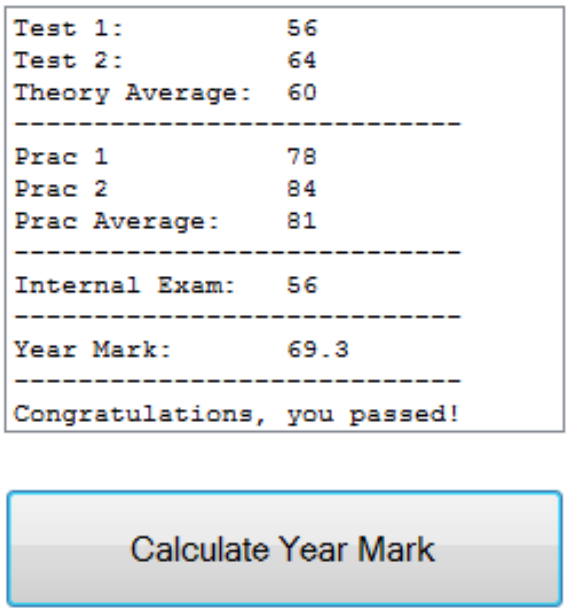
STEP 2 Enter marks for *Practical 1* and *Practical 2.*



STEP 3 Enter a mark for the *Internal Examination*:



STEP 4 Click on the *Calculate Year Mark* button to display the output of the program in the *List box:*



STEP 5 The *Clear* button resets and clears all the text boxes on the form, as well as the list box, and moves the focus to the *Formal Test 1* text box:

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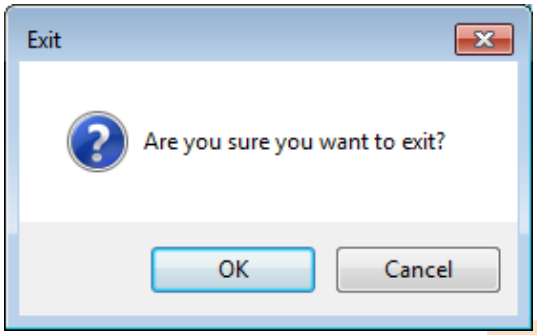
STEP 6 When the *Exit* button is clicked, the following message is displayed:



Clicking the *OK* button closes the application, while clicking the *Cancel* button leaves the program running.

The application has already been designed and coded by one of the other programmers on your team. The application contains numerous syntax and logical errors, and you have been tasked with debugging the source code.

Below is a PRINTOUT of the program code with all the syntax and logical errors still present:

```
…

Public Class Form1

    Private Sub btnCalculate_Click(ByVal sender As System.Object,
ByVal e As System.EventArgs) Handles btnCalculate.Click
        'Declare variables
        Dim decFT1 As Decimal = ""
        Dim decFT2 As Decimal = 0
         decPA1 As Decimal = 0
        Dim decPA2 As Decimal = 0
        Dim decISAT As Decimal = 0
        Dim decIntExam As Decimal = 0
        Dim decTheoryAverage As Integer = 0
        Dim decPracAverage As Decimal = 0
        Dim decYearMark As Decimal = 0

        'Convert textbox values
        decFT1 = CDec(txtFT1)
        decFT2 = CDec(txtFT2.Text)
        decPA1 = CDec(txtPrac1.Text)
        decPA2 = CDec(txtPrac2.Text)
        decIntExam = CDec(txtIntExam.Text)

        'Check that allowable marks were entered for theory tests
If (decFT1 < 0 Or decFT1 > 100) Or (decFT2 < 0 And decFT2 > 100) Then
            MessageBox.Show("Please check theory test values")
            txtFT1.Focus()
            Exit Sub

        End If
```

```
        'Check that allowable marks were entered for practicals
If (decPA1 < 0 Or decPA1 > 100) Or (decPA2 < 0 Or decPA2 < 100) Then
            MessageBox.Show("Please check practical values")
            txtFT1.Focus()
            Exit Sub
        End If

        'Calculate averages
        decTheoryAverage = decFT1 + decFT2 / 2
        decPracAverage = (decPA1 + decPA2) / 2

        'Calculate Year Mark
        decYearMark = (decTheoryAverage * 0.2) + (decPracAverage *
0.5) + (decIntExam * 0.3)

        'Display
        lstDisplay.Add.Items("Test 1:".PadRight(17)  decFT1)
        lstDisplay.Items.Add("Test 2:".PadRight(17) & decFT2)
        lstDisplay.Items.Add("Theory Average:".PadRight(17) &
decTheoryAverage)
        lstDisplay.Items.Add("----------------------------")
        lstDisplay.Items.Add("Prac 1".PadRight(17) & decPA1)
        lstDisplay.Items.Add("Prac 2".PadRight(17) & decPA2)
        lstDisplay.Items.Add("Prac Average:".PadRight(17) &
decPracAverage)
        lstDisplay.Items.Add("----------------------------")
        lstDisplay.Items.Add("Internal Exam:".PadRight(17) &
decIntExam)
        lstDisplay.Items.Add("----------------------------")
        lstDisplay.Items.Add("Year Mark:".PadRight(17) & decYearMark)
        lstDisplay.Items.Add("----------------------------")

        'Check if student passed or failed
        If decYearMark < 50 Then
            lstDisplay.Items.Add("Congratulations, you passed!")
        Else
            lstDisplay.Items.Add("Sorry, you are not yet competent")

    End Sub

Private Sub btnClear_Click(ByVal sender As System.Object, ByVal e As
System.EventArgs) Handles btnClear.Click
        'Clear form controls
        txtFT1.Clear()
        txtFT2.Clear()
        txtPrac1.Clear()
        txtPrac2.Clear()
        txtIntExam.Clear()
        lstDisplay.Clear()

        Move focus to formal test 1 textbox
        txtFT1.Focus()
    End Sub
```

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```
    Private Sub btnExit_Click(ByVal sender As System.Object, ByVal e
As System.EventArgs) Handles btnExit.Click
        Dim intResult As Integer

        intResult = MessageBox.Show("Are you sure you want to exit?",
"Exit", MessageBoxButtons.OKCancel, MessageBoxIcon.Question)
        If intResult = vbOK Then
            'exit application
            Close.Me()
        End If
    End Sub
End Class
```

The completed program has been saved on your computer. Open the solution *YearMarkCalculator* and follow the instructions to complete the program:

3.1 Debug the program as follows:

3.1.1 Fix all the syntax errors. (9)

3.1.2 Fix all the logical errors. (11)

3.2 Add your EXAMINATION NUMBER to the title bar of the form.

Run the program, enter the following test data, and calculate the year mark of a student with the following marks:

	Record 1	Record 2
FT1:	55%	75%
FT2:	42%	60%
PA1:	78%	95%
PA2:	67%	80%
Internal Examination:	58%	78%

Make a PRINTOUT of the form showing the correct result. (3)
[23]

TOTAL: 100

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