



# The University of Fiji

## School of Science and Technology

### Department of Computer Science/ Information Technology

ITC216

System Design and Implementation

Semester II, 2013

## FINAL EXAMINATION PAPER

Time Allowed: 3 Hours [10 Minutes Extra Allowed For Reading the Paper]

Weighting: 50%

Total Marks: 100 marks.

### Section A:

30 multiple choice questions

30 marks

### Section B:

06 Short Answer Questions

70 marks

**Total**

**100 mark**

### Instructions

- Show your answers clearly in each question to gain maximum marks.
- You may ask for extra sheets from the supervisors if the need arises.
- Do not forget to write your name and ID number on all the extra sheet(s) attached.
- Programmable calculators are not allowed.

## Section A: Multiple Choice

30 Marks

1. An algorithm is defined as:  
(A) a mathematical formula that solves a problem.  
(B) a tempo for classical music played in a coda.  
(C) a logical sequence of steps that solve a problem.  
(D) a tool that designs computer programs and draws the user interface.
2. Visual Basic access keys are created by using which symbol in a button's Text property?  
(A) @  
(B) &  
(C) %  
(D) #
3. What effect will the following statement have?  
*lblOne.Visible = False*  
(A) Enable lblOne  
(B) Delete lblOne  
(C) Make lblOne invisible  
(D) It is not a valid Visual Basic statement.
4. When the user clicks a button, \_\_\_\_\_ is raised.  
(A) an event  
(B) a method  
(C) a setting  
(D) a property
5. What of the following is a correct statement for specifying the words to appear in the title bar of Form1?  
(A) Form1.Text = "My Text"  
(B) Form1.TitleBar = "My Text"  
(C) Me.Text = "My Text"  
(D) Me.Caption = "My Text"
6. When will the following event procedure be executed?  
*Private Sub txtBox\_TextChanged(...) Handles txtBox.TextChanged*  
(A) when text is added to the text box  
(B) when text is deleted from the text box  
(C) when text is modified inside the text box  
(D) All of the above
7. Which of the following statements specifies that the color of the text in txtBox be red?  
(A) txtBox.Text = Color.Red  
(B) txtBox.ForeColor = Color.Red  
(C) txtBox.ForeColor = Red  
(D) txtBox = Color.Red
8. The statement  
*btnButton.Focus()*  
(A) has no effect.

- (B) moves the focus to the button btnButton.
  - (C) has the same effect as clicking on the button btnButton.
  - (D) is invalid in Visual Basic.
9. Which of the following statements sets the words on a button to "Push Me"?
- (A) btnButton.Name = "Push Me"
  - (B) btnButton.Text = Push Me
  - (C) btnButton.Text = "Push Me"
  - (D) btnButton = "Push Me"
10. Which of the following is a valid statement in Visual Basic?
- (A) Form1.Text = "Revenue"
  - (B) Form1.Caption = "Revenue"
  - (C) btnButton.Text = Push Me
  - (D) Me.Text = "Revenue"
- 
11. Which of the following statements will place "Greetings" in the title bar of a form?
- (A) Me.Title = "Greetings"
  - (B) Me.Text = "Greetings"
  - (C) Me.Name = "Greetings"
  - (D) Me.Heading = "Greetings"
12. What is the correct statement when declaring and assigning the value of 100 to an Integer variable called numPeople?
- (A) Dim numPeople = 100
  - (B) Dim numPeople = Int(100)
  - (C) numPeople = 100
  - (D) Dim numPeople As Integer = 100
13. What is the value of Int(8.9)?
- (A) 8
  - (B) 8.9
  - (C) 9
  - (D) 1
14. Which of the following statements removes all text from lstBox?
- (A) lstBox.Clear()
  - (B) lstBox.Items.Clear()
  - (C) lstBox.Text.Clear()
  - (D) lstBox.Items.Add("")
15. What will be the contents of the variable x after the following statement is executed?
- $$x = \text{Math.Sqrt}(((9 + 7) / (4 * 2)) + 2)$$
- (A) 1
  - (B) 2
  - (C) 3
  - (D) 4

16. Consider the following two sets of code.

(a) If (a = 1) And (b = 1) Then  
    txtBox.Text = "Hi"  
End If

(b) If a = 1 Then  
    If b = 1 Then  
        txtBox.Text = "Hi"  
    End If  
End If

Which one of the following statements is true?

- (A) (a) and (b) will produce different outputs.
- (B) (b) is not a valid set of Visual Basic instructions.
- (C) The two sets of code are equivalent, but (a) is preferred to (b) because (a) is clearer.
- (D) The condition statement in (a) is not valid.

17. What will be displayed by the following program when the button is clicked?

```
Private Sub btnDisplay_Click(...) Handles btnDisplay.Click
    Dim a, b, c, x As Double
    a = 5
    b = 3
    c = 6
    If a > c Then
        x = 1
    Else
        If b > c Then
            x = 2
        Else
            x = 3
        End If
    End If
    txtBox.Text = CStr(x)
End Sub
```

- (A) 1
- (B) 2
- (C) 3
- (D) None of the above

18. What will be the output of the following program when the button is clicked?

```
Private Sub btnDisplay_Click(...) Handles btnDisplay.Click
    Dim x, y, z As Double
    x = 3
    y = 3
    If x > y Then
        z = x + y
    Else
        z = y - x
    End If
    txtBox.Text = CStr(z)
End Sub
```

- (A) 6
- (B) 3
- (C) 0

(D) No output

19. What will be the output of the following program when the button is clicked?

```
Private Sub btnDisplay_Click(...) Handles btnDisplay.Click
    Dim word1, word2, newWord As String
    word1 = "shower"
    word2 = "about"
    newWord = word1.Substring(0, 4) & word2.Substring(0, 3)
    If newWord.IndexOf("how") = -1 Then
        txtBox.Text = "The new word was not found."
    Else
        txtBox.Text = "Found it."
    End If
End Sub
```

(A) The new word was not found.

(B) Found it.

(C) Syntax error

(D) No output

20. What will be the output of the following lines of code?

```
Dim phrase As String = "A penny saved is worth nothing."
If phrase.IndexOf("pen") <> -1 Then
    txtBox.Text = CStr(phrase.IndexOf("pen"))
Else
    txtBox.Text = CStr(-1)
End If
```

(A) pen

(B) 2

(C) 0

(D) A penny saved is worth nothing.

21. What will be displayed when the button is clicked?

```
Private Sub btnDisplay_Click(...) Handles btnDisplay.Click
    Dim num As Double = 9
    Dim sqrRoot As Double
    If num < 0 Then
        MessageBox.Show("Cannot find square root. Result set to zero.",
            "Error")
        sqrRoot = 0
    Else
        sqrRoot = Math.Sqrt(Num)
    End If
    txtBox.Text = CStr(sqrRoot)
End Sub
```

(A) 0

(B) 3

(C) 6

(D) An error will occur.

22. What word(s) will appear in the list box when the button is clicked?

```
Private Sub btnDisplay_Click(...) Handles btnDisplay.Click
```

```

Dim num As Integer = 5
If num = 2 Then
    lstBox.Items.Add("Two")
ElseIf num > 3 Then
    lstBox.Items.Add("Great")
ElseIf num = 5 Then
    lstBox.Items.Add("Equal")
End If
End Sub

```

- (A) Two, Great, and Equal
- (B) Great and Equal
- (C) Great
- (D) Equal

23. Why is the following Select Case block invalid in Visual Basic?

```

Select Case myName.Substring(0, 1)
Case myName < "D"
    txtBox.Text = "Your name starts with A, B, or C."
End Select

```

- (A) There should not be a standard conditional expression in a value list.
- (B) There are not enough Case statements.
- (C) There is no selector.
- (D) myName.Substring(0, 1) is not valid where it is.

24. Suppose that the selector in a Select Case block is the string variable myVar. Which of the following is NOT a valid Case clause?

- (A) Case "Adams"
- (B) Case "739"
- (C) Case myVar.Substring(0, 1)
- (D) Case myVar.Length

25. What will be the output of the following program when the button is clicked?

```

Private Sub btnDisplay_Click(...) Handles btnDisplay.Click
    Dim name As String = "Washington"
    Select Case name
        Case "George"
            txtBox.Text = "George"
        Case "Wash"
            txtBox.Text = "Wash"
        Case "WASHINGTON"
            txtBox.Text = "WASHINGTON"
        Case Else
            txtBox.Text = "Washington"
    End Select
End Sub

```

- (A) WashWashington
- (B) Washington
- (C) WASHINGTONWashington
- (D) No output

26. What is the problem (if any) with the following Select Case block which is intended to determine the price of a movie depending on the patron's age?

```
Private Sub btnDisplay_Click(...) Handles btnDisplay.Click
    Dim age As Integer, price As Double
    age = CInt(InputBox("Enter your age:"))
    Select Case age
        Case Is >= 65 'Senior citizen
            price = 4.50
        Case Is >= 5 'Regular price
            price = 6.00
        Case Is >= 0 'Child (no charge with parents)
            price = 0
        Case Else
            txtBox.Text = "Entry error"
    End Select
End Sub
```

- (A) Everyone will get in free at the child rate.
- (B) The output will always be "Entry error."
- (C) The Case Is statements have bad syntax.
- (D) There is nothing wrong.

27. What will be the output of the following program when the button is clicked?

```
Private Sub btnDisplay_Click(...) Handles btnDisplay.Click
    Dim a, b, c, acronym As String
    a = "federal"
    b = "aviation"
    c = "administration"
    acronym = a.Substring(0, 1) & b.Substring(0, 1) & c.Substring(0, 1)
    Select Case acronym
        Case "FAA"
            txtBox.Text = "Federal Aviation Administration"
        Case "DEA"
            txtBox.Text = "Drug Enforcement Agency"
        Case Else
            txtBox.Text = "Unknown acronym. Sorry."
    End Select
End Sub
```

- (A) Federal Aviation Administration
- (B) Drug Enforcement Agency
- (C) Syntax error
- (D) Unknown acronym. Sorry.

28. Which exception will the following code generate?

```
Dim num1 As Integer, num2 As Integer = 1000000
num1 = num2 * num2
```

- (A) NullReferenceException
- (B) ArgumentOutOfRangeException
- (C) OverflowException
- (D) InvalidCastException

29. Consider the following code. The Catch block of code will not be executed if the user enters which of the following when prompted?

```
Private Sub btnCalc_Click(...) Handles btnCalc.Click
    Dim newNum, finalNum As Integer
    Dim message, message1 As String
    Try
        newNum = CInt(InputBox("How old are you?"))
    Catch
        message = "That answer is not an Integer value."
        MessageBox.Show(message)
        newNum = 0
    Finally
        finalNum = newNum + 1
        message1 = "Your age next year will be " & finalNum & "."
        MessageBox.Show(message1)
    End Try
End Sub
```

- (A) one
- (B) 0
- (C) 3000000000
- (D) \*

30. A program contains two forms with the names Form1 and Form2. Form1 contains a button called btnDisplay, and the following code is placed inside btnDisplay's Click event procedure.

```
Form2.ShowDialog()
MessageBox.Show("Hello")
```

Which of the following statements is true after the user clicks on btnDisplay at run time?

- (A) Form2 appears behind Form1 and the user will be able to set the focus to either form.
- (B) Form2 appears in front of Form1 and the user will only be able to set the focus to Form2.
- (C) A message box displaying the text "Hello" appears in front of Form2 and Form1.
- (D) A message box displaying the text "Hello" appears behind Form2 and Form1.

## **Section B: Short Answer Questions**

**70 Marks**

### **Question 01 (10)**

- a. Examine the following application, both the code and the form, and answer the questions in i through vi. (4.5)

```
Public Class Form1
    Inherits System.Windows.Forms.Form
```

```
#Region "Windows Form Designer generated code"
```

```
Private Sub Button1_Click(ByVal sender As System.Object, ByVal e As
    System.EventArgs) Handles btnEnter.Click
```

```

        Dim inString As String
        inString = txtInput.Text
        MsgBox(inString)
        lblInput.Text = "Close the window"
    End Sub
End Class

```

---

- i. Describe the items on the form.
  - ii. If the user inputs the string "Good Day", what is printed in the window?
  - iii. What is printed in the message box?
  - iv. Explain where and how to name the controls on the form.
- 
- v. Explain why the executable code is placed where it is.
  - vi. What is the button's name?

b. Use the following program and form for exercises i through iii.

(1.5)

```

Public Class Form1
    Inherits System.Windows.Forms.Form

    #Region "Windows Form Designer generated code"

        Private Sub Button1_Click(ByVal sender As System.Object, ByVal e As
System.EventArgs) Handles btnEnter.Click
            Dim inString As String
            Dim number As Double
            inString = txtInput.Text
            ' TO BE INSERTED : Question iii
            MsgBox(number)
        End Sub
    End Class

```

---

- i. How will you change the text of the button to read "Done".
- ii. How will you change the name of the button to "btnDone".
- iii. Insert the statement that converts a string to a value of type Double. After inputting the string value "999.99" during run-time, what is displayed where?

ANS:

- c. Examine the following code segments and determine the result of the requested expression.

(2)

```

s1 = "Hello"
s2 = "hello"
_____

s1 = "Hello"
s2 = "hello"
s1.ToUpper().Equals(s2.ToUpper)
s1 = "Hello"
s2 = "hello"
_____

```

```
s1 = s3
```

```
s1 = "Good by"
```

```
s2 = "Goodby"
```

```
s1.compareTo(s2)
```

```
s2.compareTo(s1)
```

```
s1.compareTo("Good by")
```

- d. Write the *if* statements for the following statements below: (2)

| <i>Temperature</i> | <i>Message</i>             |
|--------------------|----------------------------|
| >90                | "Visit a neighbour"        |
| <=90, >80          | "Turn on air conditioner." |
| <=80, >70          | "Do Nothing"               |
| <=70, >66          | "Turn on Heat"             |
| <=66               | "Visit a Neighbour"        |

### Question 02

- a. Explain the differences between a Windows-Based application and a Web-Based application. (1)
- b. Explain the difference between a form's Text property and its Name property. (1)
- c. What property determines whether the value stored in the form's Text property appears on the Windows taskbar when the application is running? (0.5)
- d. What property determines whether an icon is displayed in the forms title bar? (0.5)
- e. Write an assignment statement that adds the contents of the sales1 variable to the contents of the sales2 variable and then assigns the sum to an existing variable named totalSales. All of the variable have the Decimal data type. (0.5)
- f. A form contains two buttons named salaryButton and bonusButton. Both buttons Click event procedures need to use the same variable: a String variable named employeeName. Write the statement to declare the employeeName variable. Also specify where you will need to enter the statement and whether the variable is a procedure level or module-level variable. (1)
- g. Draw the flowchart that corresponds to the following pseudocode: (3.5)
- ```
if hours are greater than 40
    display "Overtime pay"
else
    display "Regular pay"
end if
```
- h. An instruction is missing from the following code. What are the missing instructions and where does it belong in the code? (2)
- ```
i. Dim number As integer = 1
Do While number
    MessageBox.Show(number.ToString)
```

```

Loop
ii. Dim number As Integer = 10
Do
    MessageBox.Show(number.ToString)
Loop until

```

**20**

**Question 03 (10 Marks)**

- i. Describe salient features of VB.Net. Describe VB.Net Integrated Development Environment with the help of a diagram. Also discuss few of the common properties, events and methods. (1)
- ii. Write down a program to find out the factorial of a number, the user enters the number in the text box and presses the button, the result is then displayed in a message box. (5)
- iii. What do you understand by variables? Describe Data types, Scope, Lifetime and Visibility of the variable. (1)
- iv. Write down a subroutine that accepts Name of the User and displays a greeting message for that user in a message box. (4)
- v. Describe the following properties of the Form Control: (1.5)
  - i. Accept and Cancel Button
  - ii. BorderStyle
  - iii. MinimizeBox and MaximizeBox
- i. Describe the purpose of the following controls in VB.Net: (1.5)
  - i. TextBox
  - ii. ListBox
  - iii. Combo Box
- ii. What are Common Dialogue Controls? Describe any two by giving appropriate examples. (1)
- iii. Describe the following Object oriented Programming Concepts in context of VB.Net: (1.5)
  - i. Class
  - ii. Inheritance
  - iii. Polymorphism
- iv. What do you understand by Collection? How can you sort Data items Stored in collections? (1)
- v. Write down the code for the reversing of the string by the user in a Text Box. (1.5)

**Question 04 (10)**

- i. How can you add and program the following Controls in VB.Net: (1.5)
- Print
  - PageSetup
  - PrintPreview

- ii. What items display in the list box after the following code executes: (1.5)

```
Dim numbers(2), x As Integer
Dim sr As IO.StreamReader = IO.File.OpenText("DATA.TXT")
Do While sr.Peek <> -1
    x = CInt(sr.ReadLine)
    numbers(x) = numbers(x) + 1
    lstBox.Items.Add (CStr(numbers(2)))
Loop
sr.Close()
```

Assume the six lines of the file DATA.TXT contain the following entries: 1, 2, 0, 1, 2, 1

|            |  |
|------------|--|
| First Row  |  |
| Second Row |  |
| Third Row  |  |
| Fourth Row |  |
| Fifth Row  |  |
| Sixth Row  |  |

- iii. Fill in the empty rectangles to illustrate the progressing status of examGrades() after the execution of each segment: (1.5)

Dim examGrades(4) As Double

examGrades() 

|  |  |  |  |  |
|--|--|--|--|--|
|  |  |  |  |  |
|--|--|--|--|--|

examGrades(0) = 92.4

examGrades(1) = examGrades(0) + 2

examGrades() 

|  |  |  |  |  |
|--|--|--|--|--|
|  |  |  |  |  |
|--|--|--|--|--|

For i As Integer = 2 to 4

examGrades(i) = examGrades(i-1) + 2

Next

examGrades() 

|  |  |  |  |  |
|--|--|--|--|--|
|  |  |  |  |  |
|--|--|--|--|--|

- iv. Describe the key features and differences of the Do While, the Do Loop Until, and the For Next loop constructs. (1)
- v. Show two examples in pseudocode or VB code where you repeatedly request a password from a user until the user supplies the correct password. In one example use a Do While loop, and in the other example use a Do Loop Until. Assume the password is "SHAZAM". (2)
- vi. Show pseudo code or VB code that reads student records from a file and stores the data in a set of arrays. Each line of the file contains one field of a record. A complete record occupies three lines. The three fields are student name, number of credits taken, and class status (e.g., freshman, sophomore, etc). You should use three arrays,

and the data should be placed in the arrays such that a complete record for a student can be retrieved by accessing the same index in each array. Assume the file you are reading from resides in the \bin\debug folder. (2.5)

**Question 06 (20 marks)**

Draw the sequence diagrams for the following user stories of ATM example.

- i. **System Startup Use Case:** The system is started up when the operator turns the operator switch to the "on" position. The operator will be asked to enter the amount of money currently in the cash dispenser, and a connection to the bank will be established. Then the servicing of customers can begin. (5)
- ii. **Withdrawal Transaction Use Case:** A withdrawal transaction asks the customer to choose a type of account to withdraw from (e.g. checking) from a menu of possible accounts, and to choose a dollar amount from a menu of possible amounts. The system verifies that it has sufficient money on hand to satisfy the request before sending the transaction to the bank. (If not, the customer is informed and asked to enter a different amount.) If the transaction is approved by the bank, the appropriate amount of cash is dispensed by the machine before it issues a receipt. (The dispensing of cash is also recorded in the ATM's log.) A withdrawal transaction can be cancelled by the customer pressing the Cancel key any time prior to choosing the dollar amount. (9)
- iii. **An invalid PIN extension:** An invalid PIN extension is started from within a transaction when the bank reports that the customer's transaction is disapproved due to an invalid PIN. The customer is required to re-enter the PIN and the original request is sent to the bank again. If the bank now approves the transaction, or disapproves it for some other reason, the original use case is continued; otherwise the process of re-entering the PIN is repeated. Once the PIN is successfully re-entered, it is used for both the current transaction and all subsequent transactions in the session. If the customer fails three times to enter the correct PIN, the card is permanently retained, a screen is displayed informing the customer of this and suggesting he/she contact the bank, and the entire customer session is aborted. If the customer presses Cancel instead of re-entering a PIN, the original transaction is cancelled. (6)

