



**Undergraduate Programme**  
**Department of Computer Science and Mathematics**  
**Semester 2 Year 2018**

**FINAL EXAMINATION PAPER**

**ITC216 SOFTWARE DESIGN & PROGRAMMING**

**Important Instructions to Students:**

1. Read the questions, instructions carefully and answer the questions.
2. You are allowed an **extra 10 minutes reading time** (during this time, you are not allowed to write with pen) and **180 minutes (3 Hours) to complete this paper**.
3. Silent, non-programmable calculators are allowed, but not supplied.
4. Write all your answers in the answer booklet provided. If you need extra sheets, please ask from the supervisor. Write your name, course code and student identification number in the answer booklet and in the attendance sheet.
5. **This Final Course Examination Paper is worth 100 marks contributes 50% of the total course assessments.**
6. This paper contains one (1) section, A. All questions are compulsory to answer.
7. Write all your answers legibly. The marker has the right to award zero for answers that are not legible.
8. This is a **Closed Book Examination**. The University views plagiarism, cheating and dishonest practice as serious offences and if found, offenders are penalized.

**Examination Paper Content (Format):**

| <b><u>Section</u></b> | <b><u>Question</u></b> | <b><u>Content</u></b>  | <b><u>Marks</u></b> | <b><u>Suggested Time</u></b> |
|-----------------------|------------------------|------------------------|---------------------|------------------------------|
| A                     | 1-12                   | Short Answer Questions | 100                 | 180 minutes                  |
|                       |                        |                        |                     |                              |
|                       |                        |                        |                     |                              |
|                       |                        |                        |                     |                              |
|                       |                        | TOTAL                  | 100                 | 180 Minutes                  |

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**SECTION A: SHORT ANSWER QUESTIONS****[100 Marks]**

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**Question 1: An introduction to Visual Basic 2015 & Designing Applications****[8 Marks]**

- A. Which property controls the text displayed in a form's title bar?  
[1 Mark]
- B. Which property determines the initial position of a form when the application is started?  
[1 Mark]
- C. Explain the difference between a form's Text property and its Name property.  
[1 Mark]
- D. Explain the difference between a form file and a form.  
[2 Marks]
- E. What does the dot member access operator indicate in the text System.Windows.Forms.Label?  
[1 Mark]
- F. Explain how to delete a control that contains code.  
[2 Marks]

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**Question 2: Designing Applications****[10 Marks]**

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- A. Listed below are the four steps you should follow when planning an OO application. Put the steps in the proper order by placing a number (1 through 4) on the line to the left of the step.
- |       |                                                                                  |
|-------|----------------------------------------------------------------------------------|
| _____ | Identify the objects to which you will assign the tasks.                         |
| _____ | Draw a sketch of the user interface.                                             |
| _____ | Identify the tasks the application needs to perform.                             |
| _____ | Identify the events required to trigger an object to perform its assigned tasks. |
- [2 Marks]
- B. Listed below are the six steps you should follow when creating an OO application. Put the steps in the proper order by placing a number (1 through 6) on the line to the left of the step.
- |       |                                 |
|-------|---------------------------------|
| _____ | Test and debug the application. |
| _____ | Build the user interface.       |
| _____ | Code the application.           |
| _____ | Assemble the documentation.     |
| _____ | Plan the application.           |
| _____ | Meet with the client.           |
- [3 Marks]
- C. Explain the method for providing keyboard access to a text box.  
[2 Marks]
- D. What value is assigned to the lblNum control when the lblNum.Text = 99 \ 25 instruction is processed by the computer?  
[1 Mark]

E. What value is assigned to the lblNum control when the lblNum.Text = 99 Mod 25 instruction is processed by the computer?

[1 Mark]

F. Correct the syntax error in the following statement:

lblTotal.Text = Val(txtQuantity.Text + 3)

[1 Mark]

---

Question 3: Using Variables and Constants

[8 Marks]

A. A procedure needs to store a salesperson's name and bonus amount (which may have decimal places). Write the appropriate Dim statements to declare the necessary procedure-level variables.

[1 Mark]

B. A procedure needs to store a person's height and weight. The height may have a decimal place; the weight will always be a whole number. Write the appropriate Dim statements to declare the necessary procedure-level variables.

[2 Marks]

C. A procedure needs to store the name of a business, location of the business, the number of its employees at the beginning of the current year, the number of new employees hired during the current year, the number of employees who left the business during the current year, and the number of its employees at the end of the current year. Write the appropriate Dim statements to declare the necessary procedure-level variables.

[3 Marks]

D. Write an assignment statement that assigns the name Carol Jones to a String variable named strEmployee. Also write assignment statements that assign the numbers 34 and 15.99 to variables named intAge and dblPayRate, respectively.

[2 Marks]

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Question 4: The Selection Structure

[10 Marks]

A. The six logical operators are listed below. Indicate their order of precedence by placing a number (1, 2, and so on) on the line to the left of the operator. If two or more operators have the same precedence, assign the same number to each.

|       |         |
|-------|---------|
| _____ | Xor     |
| _____ | And     |
| _____ | Not     |
| _____ | Or      |
| _____ | AndAlso |
| _____ | OrElse  |

[2 Marks]

B. Write an If...Then...Else statement that assigns the number 35 to the intCommission variable when the decSales variable contains a number that is less than or equal to \$250; otherwise, assign the number 50.

[2 Marks]

- C. Write an If...Then...Else statement that displays the value 25 in the lblShipping control when the strState variable contains the string "Alaska" (in any case); otherwise, display the value 15. [2 Marks]
- D. Write an If...Then...Else statement that displays the string "Cat" in the lblAnimal control when the strAnimal variable contains the letter "C" (in any case); otherwise, display the string "Dog". Also draw the flowchart. [2 Marks]
- E. Write an If...Then...Else statement that displays the string "Time to reorder" in the lblMsg control when the intInStockvariable contains a number that is less than 250; otherwise, display the string "We have enough in stock". [2 Marks]

### Question 5: More on the Selection Structure

[7 Marks]

- A. Use the code shown in Figure 1 to answer Questions i through iv.

```

If dblSales <= 0 Then
    dblRate = 0
ElseIf dblSales < 460 Then
    dblRate = 0.05
ElseIf dblSales < 1000 Then
    dblRate = 0.1
Else
    dblRate = 0.15
End If

```

*Figure 1: Code for questions i-iv*

- i. What will the code in Figure 1 assign to the dblRate variable when the dblSales variable contains the number 459.99?
- ii. What will the code in Figure 1 assign to the dblRate variable when the dblSales variable contains the number 0?
- iii. What will the code in Figure 1 assign to the dblRate variable when the dblSales variable contains the number 999.75?
- iv. What will the code in Figure 1 assign to the dblRate variable when the dblSales variable contains the number 1000?

[2 Marks]

- B. Explain the meaning of the term desk-checking.

[1 Mark]

- C. Write the Visual Basic code that displays the message "Use the Kanton room" when the number of seminar participants is at least 75. When the number is 40 through 74, display the message "Use the Harris room". When the number is 10 through 39, display the message "Use the small conference room". When the number is less than 10, display the message "Cancel the seminar". The number of participants is stored in the intParticipants variable. Display the appropriate message in the lblMsg control. Code the multiple-alternative selection structure using the If...Then...Else statement.

[3 Marks]

- D. Write the Visual Basic code that generates a random integer from 1 to 25, inclusive? Store the random number in an integer variable called intNum. [1 Mark]

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Question 6: The Repetition Structure [7 Marks]

- A. Write a Visual Basic Do clause that processes the loop instructions as long as the value in the intNum variable is less than or equal to the number 100. Use the While keyword. Then rewrite the Do clause using the Until keyword. [1 Mark]
- B. Write a Visual Basic Do clause that stops the loop when the value in the intOrdered variable is greater than the value in the intOnHand variable. Use the Until keyword. Then rewrite the Do clause using the While keyword. [2 Marks]
- C. What will the following code display in message boxes?  
Dim intX As Integer = 1  
Do While intX < 5  
    MessageBox.Show(intX.ToString)  
    intX += 1  
Loop [1 Mark]
- D. What will the following code display in message boxes?  
Dim intX As Integer = 1  
Do  
    MessageBox.Show(intX.ToString)  
    intX = intX + 1  
Loop Until intX > 5 [1 Mark]
- E. Write a Visual Basic Do clause that processes the loop instructions as long as the value in the strName variable is not "Done" (in any case). Use the While keyword. Then rewrite the Do clause using the Until keyword. [2 Marks]

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Question 7: Sub and Function Procedures [8 Marks]

- A. Explain the difference between a Sub procedure and a Function procedure. [1 Mark]
- B. Explain the difference between passing a variable by value and passing it by reference. [2 Marks]
- C. Explain the difference between invoking a Sub procedure and invoking a function. [1 Mark]

D. Write the code for a function named `GetState`. The function should prompt the user to enter the name of a U.S. state and then return the user's response. Then write a statement to invoke the `GetState` function. Display the function's return value in a message box.

[2 Marks]

E. Write the code for a Sub procedure that receives three Integer variables: the first two by value and the last one by reference. The procedure should multiply the first variable by the second variable and then store the result in the third variable. Name the procedure `CalcProduct`.

[2 Marks]

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#### Question 8: String Manipulation

[10 Marks]

A. Write a Visual Basic statement that removes the leading and trailing spaces from the `txtAddress` control.

[1 Mark]

B. Write a Visual Basic statement that uses the `Insert` method to change the contents of the `strState` variable from "IL" to "Illinois".

[1 Mark]

C. Using the `Insert` and `Remove` methods, write the Visual Basic statements to change the contents of the `strWord` variable from "late" to "crate".

[2 Marks]

D. The `strItem` variable contains the string "YMBLueX". Write a Visual Basic statement that assigns the string "Blue" from the `strItem` variable to the `strColor` variable.

[1 Mark]

E. The `strAmount` variable contains the string "3,123,560". Write the Visual Basic statements to change the contents of the variable to "3123560"; use the `Remove` method.

[2 Marks]

F. Write the Visual Basic statement that uses the `Contains` method to determine whether the `strAddress` variable contains the string "Jefferson Street" (entered in uppercase, lowercase, or a combination of uppercase and lowercase). Assign the method's return value to a Boolean variable named `blnIsContained`.

[1 Mark]

G. The `strAmount` variable contains the string "3123560". Write the Visual Basic statements to change the variable's contents to "\$3,123,560".

[2 Marks]

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#### Question 9: Arrays

[8 Marks]

A. Write the statement to declare a procedure-level one-dimensional array named `intOrders`. The array should be able to store 20 integers. Then write the statement to store the number 25 in the third element.

[2 Marks]

- B. Write the statement to declare a class-level one-dimensional array named `strStates`. The array should be able to store 50 strings. Then write the statement to store the string "North Dakota" in the first element. [2 Marks]
- C. Write the statement to declare and initialize a procedure-level one-dimensional array named `dblTaxRates`. Use the following numbers to initialize the array: 5.5, 7.25, and 3.4. [1 Mark]
- D. The `intNumbers` array is a one-dimensional array. Write the statement to multiply the number stored in the first array element by 3, storing the result in the `intResult` variable. [1 Mark]
- E. The `intNumbers` array is a one-dimensional array. Write the statement to add together the numbers stored in the first and second array elements, displaying the sum in the `lblSum` control. [2 Marks]

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#### Question 10: Structures and Sequential Access File

[8 Marks]

- A. Write a Structure statement that defines a structure named `Book`. The structure contains three-member variables named `strTitle`, `strAuthor`, and `decPrice`. Then write a `Dim` statement that declares a `Book` variable named `fiction`. [3 Marks]
- B. Write a Structure statement that defines a structure named `SongInfo`. The structure contains three-member variables named `strName`, `strArtist`, and `strSongLength`. Then write a `Private` statement that declares a `SongInfo` variable named `mySongs`. [3 Marks]
- C. An application contains the Structure statement shown here. Write a `Dim` statement that declares a `Computer` variable named `homeUse`. Then write an assignment statement that assigns the string "KRZ45" to the `strModel` member. Finally, write an assignment statement that assigns the number 149.99 to the `dblCost` member.
- ```

Structure Computer
Public strModel As String
Public dblCost As Double
End Structure

```

[2 Marks]

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#### Question 11: Classes and Objects

[10 Marks]

- A. Explain how the computer determines the appropriate constructor to use when instantiating an object using a class that contains more than one constructor. [2 Marks]

##### Instantiating an Object from a Class

##### Syntax – Version 1

```

[Dim | Private] variableName As className
variableName = New className

```

*Figure 2: Syntax and examples of instantiating an object*

B. Write a Class statement that defines a class named Book. The class contains three Public variables: Title, Author, and Price. The Title and Author variables are String variables. The Price variable is a Decimal variable. Then use the syntax shown in Version 1 in Figure 1 to declare a variable that can store a Book object; name the variable fiction. Also write a statement that instantiates the Book object and assigns it to the fiction variable.

[3 Marks]

C. Rewrite the Class statement from question B so that it uses Private variables rather than Public variables. Be sure to include the Property procedures and default constructor.

[5 Marks]

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**Question 12: Working with Access Databases, LINQ & SQL**

[6 Marks]

A. The tblBooks table contains five fields. The BookNum, Price, and QuantityInStock fields are numeric; the Title and Author fields contain text. The dataset's name is BooksDataSet.

i. Write a LINQ statement that arranges the records in ascending order by the Author field.

[1 Mark]

ii. Write a LINQ statement that selects records having a price of at least \$12.75.

[1 Mark]

iii. Write a LINQ statement that selects records having more than 100 books in inventory.

[1 Mark]

iv. Write a LINQ statement that selects the books written by George Marten and arranges the books in descending order by the book's price.

[1 Mark]

B. The tblMagazine table contains three fields. The Cost field is numeric. The Code and MagName fields contain text.

i. Write a SQL SELECT statement that arranges the records in descending order by the Cost field.

[1 Mark]

ii. Write a SQL SELECT statement that selects only the MagName and Cost fields from records having a code of PG10.

[1 Mark]

**THE END**