higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE (VOCATIONAL)

PRINCIPLES OF COMPUTER PROGRAMMING

(First Paper)

NQF LEVEL 3

(10041023)

22 November 2018 (X-Paper)
09:00–11:00

This question paper consists of 12 pages.

NCV

TIME: 2 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.

NCV

SECTION A

QUESTION 1

Various options are given as possible answers to the following questions. Choose the answer and write only the letter (A–D) next to the question number (1.1–1.10) in the ANSWER BOOK.

1.1 Which property determines whether a control is displayed to the user?

A Hide
B Show
C Visible
D Enabled

1.2 The tick event is found in which ONE of the following objects:

A Form
B Button
C TextBox
D Timer

1.3 Which ONE of the following is NOT an integer data type:

A Single
B Byte
C Short
D Long

1.4 VB.Net identifiers …

A are case sensitive.
B can begin with an underscore.
C can begin with a number.
D Both A and B

1.5 The proper operator precedence from first to last:

A Logical, comparison and arithmetic
B Arithmetic, comparison and logical
C Arithmetic, logical and comparison
D Comparison, arithmetic and logical

1.6 With A = False and B = True, which statement evaluates to False?

A A OR A
B A OR B
C B OR A
D B OR B

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1.7 Which ONE of the following functions displays a pop-up window:

A MessageBox
B InputBox
C TextBox
D Both A and B

1.8 Which value of the combo box *DropDownStyle* property allows a user to type data in the combo box?

A DropDown
B DropDownSimple
C DropDownList
D DropDownAdd

1.9 When a condition in an IF statement tests true …

A the next <Else> statement is activated.
B the next <If> statement is activated.
C the next <Then> statement is activated.
D the <End If> statement is activated.

1.10 Which ONE of the following is an example of multiple branches from a single expression:

A If ... Then
B Select Case
C Do ... Loop
D For ... Next

(10 × 1) **[10]**

QUESTION 2

Indicate whether the following statements are TRUE or FALSE. Choose the answer and write only 'true' or 'false' next to the question number (2.1–2.10) in the ANSWER BOOK.

2.1 The NAND logic gate is the complement of the OR logic gate.

2.2 In the <For ... Next> iteration structure the default value for step is 0.

2.3 Dividing by zero will raise an exception.

2.4 The methodology where code is broken down into small, logical procedures is called event-driven programming.

2.5 When a parameter in a procedure is declared <ByVal>, a reference to the argument is sent to the procedure.

2.6 Any number of return statements is allowed in a function procedure.

2.7 In the statement, <Dim Days(7) As String>, the 7 refers to the number of elements that the array can store.

2.8 In a database table a single element of data is stored in a record.

2.9 In a SQL SELECT statement the WHERE clause is used to restrict the number of columns retrieved by the SELECT statement.

2.10 The database normalisation process is used to remove redundant data.

(10 × 1) **[10]**

QUESTION 3

Choose a key from COLUMN B that matches a description in COLUMN A. Write only the letter (A–H) next to the question number (3.1–3.5) in the ANSWER BOOK.

COLUMN A		COLUMN B	
3.1	Composed of two or more attributes	A	artificial key
3.2	No business meaning	B	indexed key
3.3	Preferred key that uniquely identifies an entity	C	natural key
		D	composite key
3.4	One or more attributes in an entity type that represents a key, either primary or secondary, in another entity type	E	foreign key
		F	alternate key
3.5	Also known as a secondary key and is another unique identifier of a row within a table	G	primary key
		H	referential key

(5 × 1) **[5]**

TOTAL SECTION A: 25

SECTION B

QUESTION 4

4.1 Convert the following binary number to a hexadecimal number:

1010100111_2 (3)

4.2 Use two's complement to illustrate the following subtraction:

34 – 52 = -18

Use 8 bits to represent the numbers. (6)

4.3 Determine if the following expression is true or false:

a + 7 > b – 3 * c

where a = 4, b = 12 and c = 5 (4)

4.4 Convert the following binary number to a decimal number:

00101110_2 (2)

NOTE: Show ALL steps. NO marks will be allocated for answers only. **[15]**

QUESTION 5

TheHandyman database has two tables, namely *Vendors* and *Products*. A one-to-many relationship exists between the *Vendors* and *Products* tables. A vendor may supply many different products, but a specific product is supplied by only one vendor.

Table: Vendors

Name	Ord	Data Type	Size	Primary Key
VendorID	0	String	6	True
Vendor	1	String	25	False
ContactNo	2	String	10	False
Province	3	String	25	False
OrderNo	4	String	6	False

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The records in the *Vendors* table:

VendorID	Vendor	ContactNo	Province	OrderNo
102	RJE Distributors	0123437667	Mpumalanga	509909
103	TLT Industrial Hardware	0219024429	Western Cape	509424
104	Gerbit Plumbing Suppliers	0316764329	Free State	510565
105	Augusta Tool Suppliers	0826492048	Kwazulu-Natal	510709
106	Mica Hardware suppliers	0834548981	Limpopo	511404
101	The Hardware Group	0118764329	Gauteng	509809

6 rows selected ...

Table: Products

Name	Ord	Data Type	Size	Primary Key
ProductID	0	String	10	True
Description	1	String	50	False
OnHand	2	Int32	4	False
ReorderLevel	3	Int32	4	False
UnitPrice	4	Decimal	8	False
VendorID	5	String	6	False

Some of the records in the *Products* table:

ProductID	Description	OnHand	ReorderLevel	UnitPrice	VendorID
142	Socket wrench set	65	60	426	103
128	Multi-purpose ratchet wrench set	78	80	499	103
140	Silent-db20 and HDPE	15	10	449.99	104
131	Pneumatic flush actuator	23	25	699.9	104
103	AP110 Stop and go flush	56	50	450	104
127	Monolith sanitary module for WC	5	2	890	104
118	Generator petrol Honda	1	2	6184.65	101
133	Reversible ratchet set	12	15	565	103
112	Combination wrench set	56	50	1011	103

9 rows selected ...

5.1 Identify and write down the primary key in the *Vendors* table. (1)

5.2 Identify and write down a secondary or alternate key in the *Vendors* table. (1)

5.3 Write a SQL statement that will retrieve all records from the *Vendors* table. (2)

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5.4 Write an SQL statement to retrieve the *OrderNo* and *Vendor* from the *Vendors* table. The SQL statement should also retrieve the *ProductID*, *Description* and *UnitPrice* from the *Products* table. Retrieve only records where the stock on hand is less than the reorder level and the unit price is less than 100.
Format the unit price to display as currency.

OrderNo	Vendor	ProductID	Description	UnitPrice
509909	RJE Distributors	129	Plant markers	R 12.99
509909	RJE Distributors	132	Pot handling frames & stackers	R 89.00
509424	TLT Industrial Hardware	101	8mm flexible socket wrench	R 59.00
510709	Augusta Tool Suppliers	124	Masonary drill	R 9.23
510709	Augusta Tool Suppliers	141	Socket eye auger	R 4.56
511404	Mica Hardware suppliers	121	Lamp holder brass BC	R 18.46
509809	The Hardware Group	106	Burner for patio braai Cadac	R 84.80

7 rows selected ... (9)

5.5 When designing a database, entities are mapped to database tables.

5.5.1 Where in a database table is a single instance of an entity stored?

5.5.2 Where in a database table are entity attributes stored?

(2 × 1) (2)
[15]

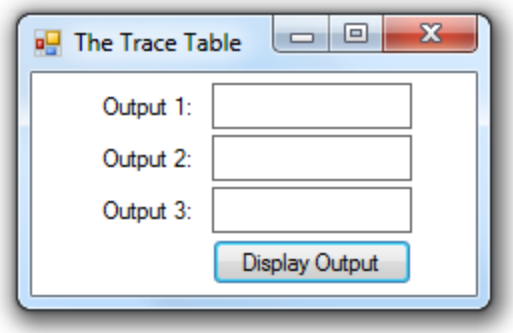
QUESTION 6

6.1 Describe the process of *error handling*. (3)

6.2 Use a trace table to determine the output of the following Visual Basic program. Indicate ALL changes in the values of the variables.

Use the headings below for the trace table:

										Output		
A	**B**	**C**	**X**	**Y**	**Z**	**F**	**G**	**H**	**C**	**1**	**2**	**3**



```
Public Class frmTraceTable
    Dim A As Integer = 7
    Dim B As Integer = 5
    Dim C As Integer = 3

    Private Sub CalcTotal(ByVal F As Integer, _
                          ByRef G As Integer, _
                          ByVal H As Integer)
        Dim C As Integer = 0

        C = F + G
        H = C + 2
        G = C
    End Sub

    Private Sub btnTrace_Click() Handles btnTrace.Click
        Dim X As Integer = 2
        Dim Y As Integer = 6
        Dim Z As Integer = 8

        X = A
        Call CalcTotal(X, Z, Y)

        lblOutput1.Text = Y.ToString
        lblOutput2.Text = Z.ToString
        lblOutput3.Text = C.ToString
    End Sub
End Class
```

(11)

6.3 Overflow errors occur when the computer tries to process a number.

What causes overflow errors? (1)

[15]

QUESTION 7

7.1 What is the purpose of program loops? (1)

7.2 Differentiate between a *pre-test* and a *post-test* loop? (2)

7.3 Name the kind of testing (pre-test or post-test) done with a <For> loop? (1)

7.4 Rewrite the following code snippet as a <Do While ... Loop>:

```
For i = 20 to 0 Step –1
    sum = sum + i
Next i
```

(4)

7.5 How much storage space (bytes) is required for the array in the following example:

```
Dim MyArray(10) As Double
```
(1)

7.6 Define a multidimensional array that will be used to store a table of values. The first dimension should be used to hold the number and the second dimension to hold the square of the number. The array should be large enough to hold 0 through 100 elements. (2)

7.7 A binary search is an effective search algorithm of an array.

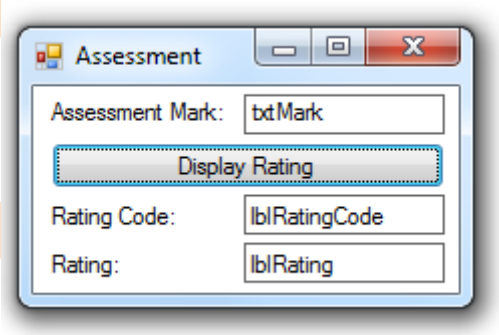
Name the major disadvantage of a binary search. (2)

7.8 Describe why the following statement produces a syntax error:

```
Dim Numbers(2) As Integer = {1, 2, 3}
```
(2)
[15]

QUESTION 8

Study the program code of the following Visual Basic program and answer the questions.




```
Option Explicit On
Option Strict On

Public Class frmAssessmentMark

    Private Function IsInteger(ByVal textBox As TextBox) As Boolean

        Try
            Convert.ToInt32(textBox.Text)
            Return True
        Catch ex As FormatException
            MessageBox.Show(textBox.Tag.ToString & " must be a whole number ...")
            textBox.Focus()
            textBox.SelectAll()
            Return False
        End Try

    End Function
```

```
Private Function IsInRange(ByVal textBox As TextBox) As Boolean

    Dim intRange As Integer = CInt(textBox.Text)

    If intRange >= 0 And intRange <= 100 Then
        Return True
    Else
        MessageBox.Show(textBox.Tag.ToString & " is not a valid ...")
        textBox.Focus()
        textBox.SelectAll()
        Return False
    End If

End Function

Private Function IsValidData() As Boolean

    If IsInteger(txtMark) AndAlso IsInRange(txtMark) Then
        Return True
    Else
        Return False
    End If

End Function

Private Sub btnRating_Click() Handles btnRating.Click

    If IsValidData() Then

        Dim intTestMark As Integer = CInt(txtMark.Text)
        Dim strRating As String = ""
        Dim intRatingCode As Integer = 0

        Select Case intTestMark
            Case 0 To 39
                strRating = "Not Achieved"
                intRatingCode = 1
            Case 40 To 49
                strRating = "Not Yet Competent"
                intRatingCode = 2
            Case 50 To 69
                strRating = "Competent"
                intRatingCode = 3
            Case 70 To 79
                strRating = "Highly Competent"
                intRatingCode = 4
            Case 80 To 100
                strRating = "Outstanding"
                intRatingCode = 5
        End Select
```

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```
        lblRating.Text = strRating
        lblRatingCode.Text = intRatingCode.ToString

    End If

End Sub

End Class
```

8.1 The technique of defensive programming has been employed in the given program.

Briefly describe defensive programming. (3)

8.2 Describe the purpose of the IsInteger() function procedure. (2)

8.3 8.3.1 Describe the purpose of the IsInRange() function procedure. (2)

8.3.2 Name the data validation technique employed in the IsInRange() function procedure. (1)

8.4 VB.Net provides a built-in *exception* class that deals with errors. The *exception* class has been implemented in the IsInteger() function procedure.

8.4.1 Describe what an *exception* is. (2)

8.4.2 Name and briefly describe the VB.Net coding structure used to implement the *exception* class. (4)

8.5 Briefly describe the purpose of using a progress bar control in an application. (1)

[15]

TOTAL SECTION B: 75
GRAND TOTAL: 100

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