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)

3 March 2020 (X-paper)
09:00–11:00

This question paper consists of 9 pages.

235Q1S2003

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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. Start each section on a new page.
5. Use only a blue or black pen.
6. Write neatly and legibly.

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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 If you convert 100_{10} (decimal) to hexadecimal the answer will be …

A AB_{16}
B 19_{16} ⌘
C 37_{16}
D 64_{16}

1.2 A conversion error is a type of …

A syntax error.
B direct declaration.
C logical error.
D run-time error.

1.3 This is an example of a logical operator:

A Flag ⌘
B /
C OR
D x

1.4 This is an example of a double precision number:

A 25,9
B 7.2×10^{78} ⌘
C -7
D -29.9

1.5 In VB.NET the declaration,

```
Dim FirstName(10) as string
```

can hold … elements.

A 9 ⌘
B 11
C 10
D 0

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1.6 Study the following VB.NET code snippet.

```
1.    Dim iDbl As Double
2.    Dim iInt As Integer
3.    iDbl = 9.123
4.    MsgBox("The value of iDbl is " & iDbl)
5.    iInt = iDbl
6.    MsgBox("The value of iInt is " & iInt)
```

Which one of the lines of code (1 to 6) would result in an implicit conversion?

A 3
B 4
C 5
D 6

1.7 Which of the following clauses stop the loop when the value in the `intPopulation` variable is less than the number 5000?

A `Do While intPopulation >= 5000`
B `Do Until intPopulation < 5000`
C `Loop While intPopulation >= 5000`
D `Do Until intPopulation >= 5000`

1.8 Microsoft Access is an example of …

A SQL.
B a spreadsheet.
C a DBMS.
D a text file.

1.9 A bistable multivibrator has … stable states.

A zero
B one
C two
D four

1.10 A … search is an example of a linear algorithm.

A sequential
B binary
C bubble
D database

(10 × 1) **[10]**

QUESTION 2

Indicate whether the following statements are TRUE or FALSE by writing only 'True' or 'False' next to the question number (2.1–2.10) in the ANSWER BOOK.

2.1 The following two statements would be valid in VB.NET if Option Strict is On

```
Dim charVar As Char
charVar = "Z"
```

2.2 Monostable multivibrators always return to one particular state during operation.

2.3 An array is an abstract data type.

2.4 Using a java method in VB.Net is a logical error.

2.5 A primary key in one table becomes a composite key in another table.

2.6 You can identify logical expressions by means of parameters.

2.7 1000_{10} added to 100_{10} equals to $1100_{2.}$

2.8 A query is a question to a database.

2.9 The other name for a database table is an entity.

2.10 An iteration structure allows you to decide which code to execute in your program.

(10 × 1) **[10]**

QUESTION 3

Complete the following sentences by writing only the missing word or words next to the question number (3.1–3.5) in the ANSWER BOOK.

3.1 A/An … error is when the computer tries to process a number and cannot do so because the number is too big.

3.2 A … is a placeholder in the memory for a value that cannot be changed.

3.3 The … statement is used to retrieve data from a table in SQL

3.4 … is a technique to represent a negative binary number.

3.5 Another name for a loop structure is …

(5 × 1) **[5]**

TOTAL SECTION A: 25

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SECTION B

QUESTION 4

4.1 Draw a truth table for the function F(Q,R,S) where:

F = Q AND (R OR NOT S)

Use the following headings as part of your truth table:

Q	R	S	NOT S	R OR NOT S	F

(5)

4.2 Convert 137_{10} to a binary number. Show all the steps. (3)

4.3 Define the term *Shift Register*. (2)

4.4 Draw a diagram which represents a J-K flip-flop. (3)

[13]

QUESTION 5

5.1 Evaluate the following expression:

M > 7 AND D < (S * 2) OR P

where

M = 7, D = 8, S = 5, P = FALSE

Show all the steps. (4)

5.2 Define each of the following data storage concepts:

5.2.1 Signed number

5.2.2 Integer

5.2.3 Floating-point number

5.2.4 Character

5.2.5 Array

(5 × 1) (5)

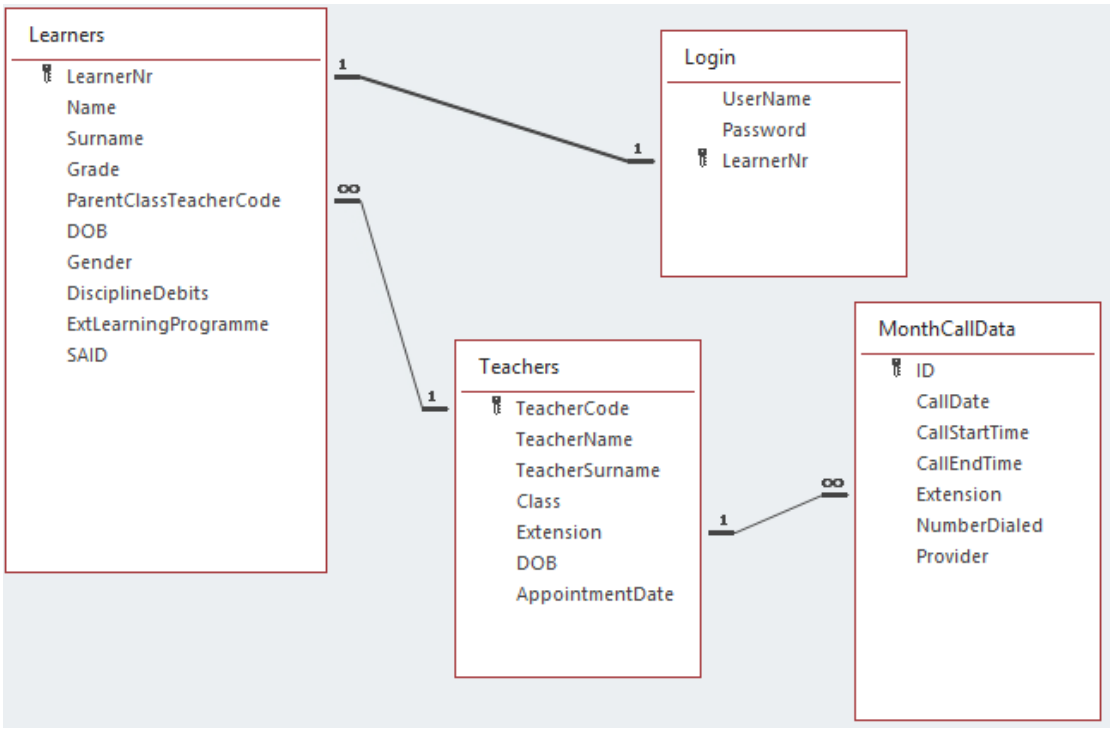
[9]

QUESTION 6

6.1 State FOUR benefits of using a database. (4)

6.2 Differentiate between a *foreign key* and an *alternate key*. (2 × 2) (4)

6.3 Study the following relationship diagram which represents the data structure of the lazy learner high school database and answer the questions.



6.3.1 Identify the relationship type between the Learners and the Teachers tables. (1)

6.3.2 Identify the type of relationship between the Learners and the Login tables. (1)

6.3.3 Identify the name of the foreign key field in the Learners table. (1)

6.3.4 The Learners and the Teachers tables contain a field named DOB.

State what the acronym DOB stands for when used in the context of a database table. (1)

[12]

QUESTION 7

7.1 A bubble sort is a good sorting algorithm, but there are situations where it is not the most suitable algorithm to implement as part of a solution.

Name ONE instance where a bubble sort may not be the best choice. (1)

7.2 Explain the steps that bubble sort will follow to sort the following items in ascending order. Use the array diagram below to substantiate your answer.

33	50	12	96	27	63	69	7	21	4

(5)

7.3 Consider the following declarations and incomplete VB.NET code snippet:

```
' Declaration of variables
        Dim a As Integer
        Dim b As Integer
        Dim t As Integer
' Assigning the values of variables
        a = 5
        b = 9
```

Write the VB.NET code that will swop the value of the variable a with that of b.

(3)

7.4 Complete the sentence:

In order to use the binary search method, the applicable array must first be … (1)

[10]

QUESTION 8

8.1 Explain what causes underflow errors. (2)

8.2 Explain why a developer would use a masked textbox control as part of a GUI. (2)

8.3 Study the following statements and indicate which error will occur:

8.3.1 The array is meant to hold six elements, but the user attempts to enter seven elements.

8.3.2 Using the wrong variable type to store data

8.3.2 Incorrect record formats in data files (3 × 1) (3)

8.4 Discuss the concept: *parity bit.* (3)

[10]

QUESTION 9

9.1 Study the following scenario and answer the question.

As a programmer you are requested by your college to design a program that will help students to solve the following physical science formula:

Force = mass × acceleration ⌘

Analyse the program by developing an IPO chart. (4)

9.2 Use a trace table to determine the values and outputs during the execution of the following code snippet. Use the headings i, j and lstDisplay for the trace table:

```
For i As Integer = 1 To 3
    For j as Integer = 1 To i
       lstDisplay.Items.Add(i * j)
    Next
Next
```

⌘

(7)
[11]

QUESTION 10

10.1 Name THREE validation techniques. ⌘ (3)

10.2 State FOUR guidelines when designing a user interface (such as a VB.NET form). (4)

10.3 Define the term *human-computer interaction (HCI)*. (1)

10.4 Explain the principle behind user-centred design (UCD). ⌘ (2)
[10]

TOTAL SECTION B: 75
GRAND TOTAL: 100

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