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)

2 March 2018 (X-Paper)
09:00–11:00

This question paper consists of 9 pages.

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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. 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 This is a base 16 number system.

A Binary
B Decimal
C Octal
D Hexadecimal

1.2 A/An … can be used to inform the user that that the application is still executing some background task.

A input box
B message box
C hourglass
D tab control

1.3 To explicitly terminate the For…. Loop statement from continuing executing, we use …

A End Loop.
B Exit For.
C Next.
D End For.

1.4 Positioning the mouse pointer over a button or some screen object generates this event.

A Click
B Mouse-hover
C Keypress
D Key-debugging

1.5 25 > 10 AND 25 < 10

A True
B 60
C Or
D 40

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1.6 This is an error caused by trying to process a number that is too big:

A Underflow
B Overflow
C Index-out-of-range
D Syntax

1.7 Primary storage is also known as …_____

A RISC.
B CISC.
C RAM.
D ROM.

1.8 This internally represents characters inside a computer.

A Bits
B Pointers
C Strings
D Floating point numbers

1.9 A … is a relationship in which a row in a table on the left side of the relationship is linked with many rows on the right side of the relationship.

A many-to-many
B one-to-many
C one-to-one
D many-to-one

1.10 This refers to how many bits of data the computer handles at a time.

A Checksum
B Validation
C Word size
D Bit mapping

(10 × 1) **[10]**

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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 A Do … Loop is an example of a selection structure.

2.2 Run-time errors are problems in your code that are caused by spelling mistakes.

2.3 Induced errors are caused by too big and too small numbers.

2.4 A foreign key needs to have the same data type as the primary key in which it is referring.

2.5 Masks are widely used to guide the user to enter data in a valid format.

2.6 The division sign is an example of a logical operator.

2.7 Passing variables by reference gives its address and value to the calling module.

2.8 The output value of an XOR gate is 0 unless both inputs are 1.

2.9 A pointer does not contain data.

2.10 Another symbol for AND operator is ∩.

(10 × 1) **[10]**

QUESTION 3

Give ONE word or term for each of the following descriptions. Write only the word or term next to the question number (3.1–3.5) in the ANSWER BOOK.

3.1 This forms part of a computer's CPU high-speed memory.

3.2 These types of multivibrators are also known as clocks, oscillators or pulse generators.

3.3 This data type can be used to store values True/False.

3.4 The IF statement falls under this programming structure.

3.5 People with this type of human behaviour do things without thinking.

(5 × 1) **[5]**

TOTAL SECTION A: 25

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SECTION B

QUESTION 4

4.1 You are developing an application that will determine if a student is eligible (True) or not eligible (False) to enrol for an IT class. As you interview the college principal, you decide to use Boolean algebra to plan a program that will evaluate several conditions.

Analyse each of the statements below and write a Boolean expression that represents each statement by the principal.

Use A, B, C or D as your variables and Q as output.

4.1.1 In this college, we only take students that have either passed Grade 9 or show great programming skill. (2)

4.1.2 Students must not be lazy and they must be experienced or hard-working. (3)

4.2 Draw a circuit diagram corresponding to the following Boolean expression:

Q = (A + B) EN (B + C) (3)

4.3 Convert 27_{10} to binary. Show ALL the steps. (3)

[11]

QUESTION 5

5.1 Explain the concept of *rapid application development*. (2)

5.2 What is the difference between *passing a parameter by value* and *passing a parameter by reference*? (2)

5.3 Explain the concept of *event-driven programming*. (1)

5.4 Distinguish between an *index* and an *element of an array*. (2)

5.5 What is the difference between a *variable* and an *array*? (2)

5.6 Explicitly declare an array that holds the following numbers: 5, 10, 6, 4. (2)

[11]

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QUESTION 6

6.1 You are given the following numbers: 47, 70, 20, 63, 27

Explain, in simple sentences, how Selection Sort will arrange the numbers from the lowest to the highest (**Don't code**). (4)

6.2 You are given the following numbers: 40, 10, 20, 43, 33

Explain, in simple sentences, how Bubble Sort will arrange the numbers from the highest to the lowest (**Don't code**). (4)

6.3 Between a *database* and an *array*, which data structure will you use for recording payments of school fees in your application?

Explain why you are not using the other one. (3)
[11]

QUESTION 7

7.1 Which programming structure will be used for an application that tests whether a person can vote or not? (1)

7.2 Develop an IPO chart for the following problem:

Calculate the total wages a student earns working a part-time job, given the wages and hours worked. (5)

NOTE: Total Wages = Hours Worked × Hourly Wage

7.3 Write a pseudocode to calculate the area of a rectangle.

NOTE: Area = Length × breadth (4)
[10]

QUESTION 8

8.1 Explain the following database keys: primary key, alternate key and foreign key. (3)

8.2 List THREE types of relationships that can be used when joining tables. (3)

8.3 Why do you think enforcing referential integrity when creating table relationships is important? (2)

8.4 As a database designer for a company, what are the THREE details you will include in your working plan? (3)
[11]

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QUESTION 9

9.1 What do you understand by the term *error handling*? (2)

9.2 Distinguish between *run-time error*, *logical error* and *syntax error*. (3)

9.3 Study the snippet below and then answer the questions (9.3.1–9.3.3) in the ANSWER BOOK.

Snippet A

```
1. Public Class Form1
2. Dim intStudentMarks() As Integer = {52, 23, 74, 86, 96,
   38, 56, 63, 85}
3. 'List the marks on a listbox
4. Private Sub btnCompute_Click(sender As System.Object, e
   As System.EventArgs) Handles btnCompute.Click
5. For i As Integer = 0 To 10
6. ListBox1.Items.Add(intStudentMarks(i))
7. Next
8. End Sub
9. End Class
```

Snippet B

```
1. Public Class Form2
2. Dim intStudentMarks As Integer
3. Private Sub btnCompute_Click(sender As System.Object, e
   As System.EventArgs) Handles btnCompute.Click
4. intStudentMarks = 2000
5. End Sub
6. End Class
```

Snippet C

```
1. Public Class Form3
2. Dim a As Integer
3. Private Sub btnCompute_Click(sender As System.Object,
   e As System.EventArgs) Handles btnCompute.Click
4. If a > 10 Then
5. Message.show("Number is less than 10")
6. Else
7. Message.show("Number is greater than 10")
8. End Sub
9. End Class
```

9.3.1 What type of error will be generated by a combination of line 5 and line 6 of snippet A?

9.3.2 What type of error will be generated by line 4 of snippet B?

9.3.3 What type of error will be generated by line 5 and line 7 of snippet C?

(3 × 2) (6)

[11]

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QUESTION 10

10.1 Explain what is meant by *user-centred design*. (2)

10.2 Explain how you will prevent the user from entering a wrong ID number in a textbox as part of defensive programming. (2)

10.3 List the activities to include when applying validation. (3)

10.4 What THREE activities are important during user-centred design? (3)
[10]

TOTAL SECTION B: 75
GRAND TOTAL: 100

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