Level 3 Technical Level
IT: PROGRAMMING

Unit 2 Computer programming

Monday 21 January 2019   Morning   Time allowed: 2 hours

Materials
For this paper you must have:
- a ruler
- a scientific calculator (non-programmable)
- stencils or other drawing equipment (eg flowchart stencils).

Instructions
- Use black ink or black ball-point pen.
- Fill in the boxes at the top of this page.
- Answer **all** questions.
- You must answer each question in the space provided. Do not write outside the box around each page or on blank pages.
- Do all rough work in this book. Cross through any work you do not want to be marked.
- If you need more space use the additional pages at the back of this booklet.

Information
- The marks for questions are shown in brackets.
- The maximum mark for this paper is 80.
- There are 50 marks in **Section A** and 30 marks in **Section B**. Both sections should be attempted.

Advice
- In all calculations, show clearly how you work out your answer.
- Use diagrams, where appropriate, to clarify your answers.
- You are expected to use a calculator where appropriate.
- You are reminded of the need for good English and clear presentation in your answers.

For Examiner's Use	
Question	Mark
1−5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	
16	
17	
TOTAL	

Section A

Answer **all** questions in this section.

| 0 | 1 | Which of the following describes a string?

Tick (✓) **one** box.

[1 mark]

an array of characters ☐

an empty array ☐

an infinite sequence of symbols ☐

a sequence of numbers ☐

| 0 | 2 | Which of the following describes a programming paradigm?

Tick (✓) **one** box.

[1 mark]

a method of restricting features in a programming language ☐

a pattern of logic used to plan and design a program ☐

a system for proving how an algorithm works ☐

a way to classify programming languages based on features ☐

| 0 | 3 |

In an event-driven paradigm, which of the following is a trigger?

Tick (✓) **one** box.

[1 mark]

an event handler ☐

an infinite loop ☐

a recursive function ☐

a timer expiring ☐

| 0 | 4 |

Which of the following describes the Common Vulnerabilities and Exposures (CVE) system?

Tick (✓) **one** box.

[1 mark]

catalogues vulnerabilities in software or firmware ☐

prevents network exposure to vulnerabilities ☐

removes vulnerabilities on a computer system ☐

tests software and firmware vulnerabilities before release ☐

Turn over for the next question

Turn over ▶

| 0 | 5 |

Which of the following describes Unified Modelling Language (UML)?

Tick (✓) **one** box.

[1 mark]

UML is about behaviour but not structure

UML is easy to maintain if design specifications change

UML is a modelling language from the 1970s

UML is a standard way to visualise the design of a system

5

0 6   **Figure 1** and **Figure 2** show two programs that make use of functions.

The **var** statement declares a variable.

Figure 1

```
01   var x1=5;
02   var y1=3;
03
04   alert (calcArea (10,2));
05
06   function calcArea (x1, y1) {
07         return x1 * y1;
08   }
```

Figure 2

```
01   var x1y1 = 0;
02
03   calcArea (5,9);
04
05   alert (x1y1);
06
07   function calcArea (x1, y1) {
08       x1y1 = x1 * y1;
09   }
```

0 6 . 1   What is output on line 04 of the code in **Figure 1**?

[1 mark]

_____

0 6 . 2   What is output on line 05 of the code in **Figure 2**?

[1 mark]

_____

Question 6 continues on the next page

Turn over ▶

0 6 . 3 Explain what will happen if variable x1y1 is declared a second time inside the function, as shown on line 08 in **Figure 3**?

[2 marks]

Figure 3

```
01   var x1y1 = 0;
02
03   calcArea (5,9);
04
05   alert (x1y1);
06
07   function calcArea (x1, y1) {
08       var x1y1 = x1 * y1;
09   }
```

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4

0 7 . 1 The keyword **char** is used to declare a variable.

How many characters can be stored in a char variable?

[1 mark]

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0 7 . 2 How many bytes are needed to store a char variable?

[1 mark]

2

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0 8 'Programmers do not need to make code efficient because modern compilers automatically make code more efficient.'

Discuss reasons why programmers should either follow or ignore this advice.

[6 marks]

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Turn over for the next question

Turn over ▶

0 9 Algorithms can be represented using pseudocode rather than a programming language.

Explain the purpose of pseudocode.

[3 marks]

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1 0 In the software release lifecycle there are different conventions for releasing versions of software.

Name **three** types of versioning.

[3 marks]

1 _____

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3 _____

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1 1   Explain the **open/closed principle** in object-oriented programming.

[3 marks]

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Turn over for the next question

Turn over ▶

1 2 When designing a user interface for a website, one important factor is the screen resolution.

Name **three** other important factors when designing a user interface for a website.

Explain why each factor is important.

[6 marks]

Factor 1 _____

_____

Explanation _____

_____

Factor 2 _____

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Explanation _____

_____

Factor 3 _____

_____

Explanation _____

_____

6

1 3 . 1 Explain the principles of modular application development.

[4 marks]

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1 3 . 2 Give **two** advantages to a developer of using the modular development approach.

[2 marks]

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2 _____

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Turn over for the next question

Turn over ▶

1 4 Developers use different techniques to debug software.

1 4 . 1 Describe what a **breakpoint** is used for.

[2 marks]

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1 4 . 2 Describe **two** other techniques for debugging software.

[4 marks]

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1 5   Software is often developed to work on different devices and platforms, eg games such as Fortnite and FIFA 19, or office applications like Microsoft Word.

Discuss the challenges of cross-platform development.

[6 marks]

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END OF SECTION A

6

Turn over ▶

Section B

Answer **all** questions in this section.

| 1 | 6 | | ENTZARUS is a theatre and concert ticket-booking company that operates through a booking website. To use the system you must first register your details, giving your name, email address and a password. Once registered, you can log in and book tickets. |

You have been asked to create a registration and login process for ENTZARUS.

| 1 | 6 | . | 1 | Give a different validation method that could be used for each input listed.

[3 marks]

Name _____

_____

_____

Email address _____

_____

_____

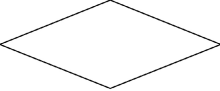Password _____

_____

_____
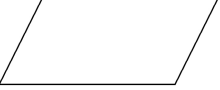
1	6	.	2

Draw a flowchart on pages 16–17 to show the registration and login process for ENTZARUS.

- Include validation in your flowchart.

- Use the flowchart symbols in **Table 1**.

[12 marks]

Table 1

Flowchart symbol	Name
(rounded rectangle)	Start/end
(parallelogram)	Input/output
(rectangle)	Process
(diamond)	Decision

Question 16 continues on the next page

Turn over ▶

Turn over for the next question

Turn over ▶

15
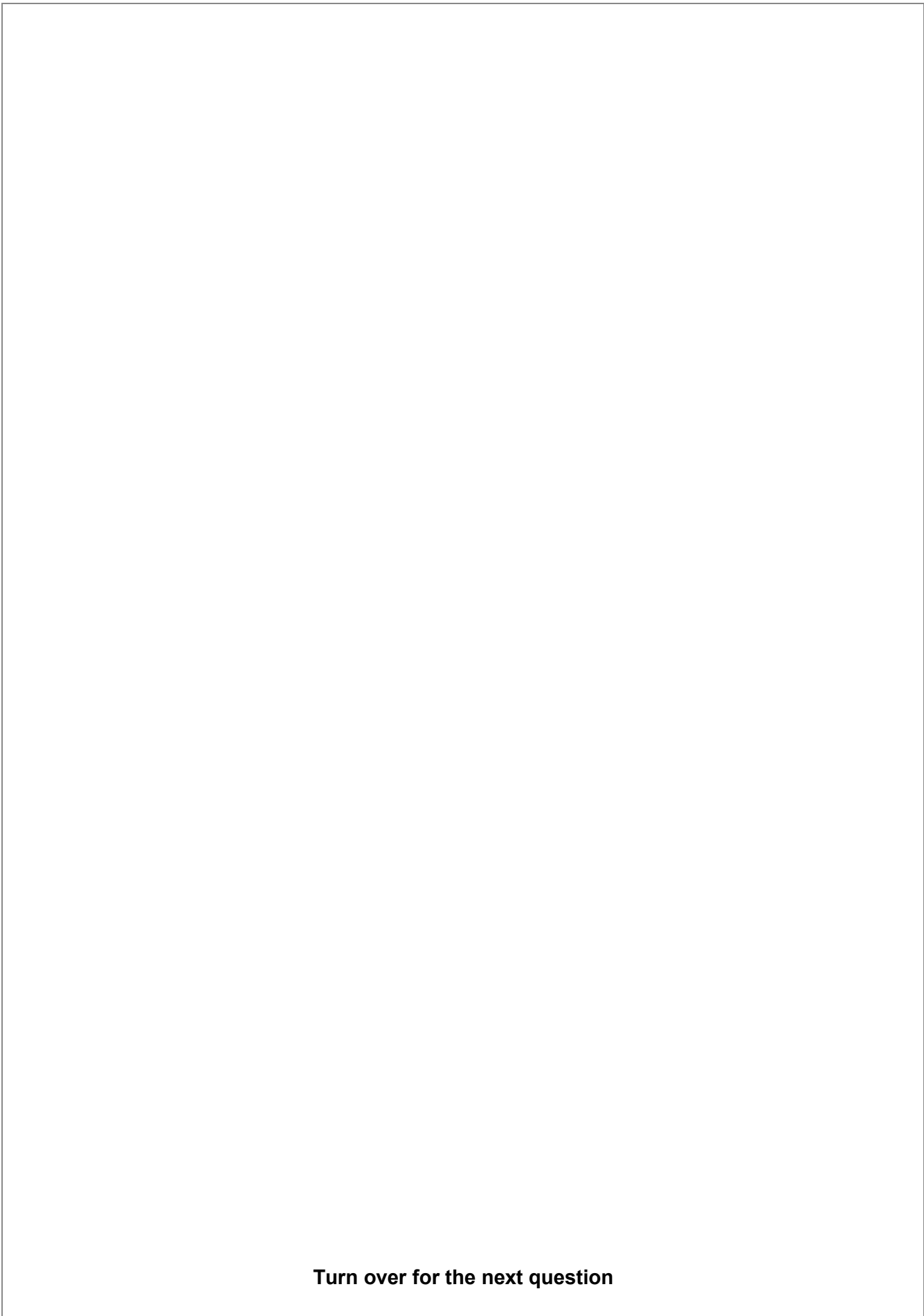
1 7 The code in **Figure 4** is written to count the numbers of games won, drawn and lost. Won, drawn and lost is represented in the results list as 'W', 'D' and 'L'.

Figure 4

```
01   # results for 10 games
02   results = ['W','B','W','D','D','D','D','W','D','L']
03   win = 0
04   draw = 0
05   lose = 0
06
07   print(results.count('W'), results.count('D'), results.count('L'))
08
09   # x loop through all results
10   for x in results:
11   # counts wins, draws and losses
12       if x=='W':
13           win+=1
14       elif x=='D'
15           draw+=1
16       else:
17           lose+=1
18
19   print(win, draw, lose)
```

This example of Python uses a `count()` method. The `count()` method returns the number of occurrences of an element in a list. This is shown in `line 07`.

The programmer has created a loop in `lines 10 to 17` to perform the same task as the `count()` method in `line 07`.

1 7 . 1 The trace table in **Table 2** shows `lines 03 to 07` and the first two iterations of the x loop on `lines 10 to 17`.

- Choose appropriate headings for each column (shown by the dotted lines).

- Complete the trace table.

[12 marks]

Table 2

Line	win	draw	lose					Output
03								
04								
05								
07								
10								
12								
13								
14								
15								
16								
17								
10								
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16								
17								

The top row spanning columns contains: Trace table for code in **Figure 4**

Question 17 continues on the next page

Turn over ▶

1 7 . 2 The outputs on line 07 and line 19 are different when the program in **Figure 4** is run through all iterations.

Complete the following extract from the trace table.

[1 mark]

Line	win	draw	lose	Output
19				

1 7 . 3 Explain why the output on line 07 from Question **17.1** is different from the output on line 19 from Question **17.2**.

[2 marks]

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15

END OF QUESTIONS

If needed, use the following pages to continue your answers. Write the question number beside your answer.

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