



**Cambridge International Examinations**  
Cambridge International General Certificate of Secondary Education

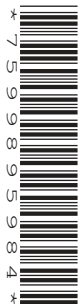
CANDIDATE  
NAME

CENTRE  
NUMBER

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**COMPUTER SCIENCE**

**0478/12**

Paper 1 Theory

**February/March 2018**

**1 hour 45 minutes**

Candidates answer on the Question Paper.

No Additional Materials are required.

No calculators allowed.

**READ THESE INSTRUCTIONS FIRST**

Write your Centre number, candidate number and name in the spaces at the top of this page.

Write in dark blue or black pen.

You may use an HB pencil for any diagrams, graphs or rough working.

Do not use staples, paper clips, glue or correction fluid.

**DO NOT WRITE IN ANY BARCODES.**

Answer **all** questions.

No marks will be awarded for using brand names of software packages or hardware.

At the end of the examination, fasten all your work securely together.

The number of marks is given in brackets [ ] at the end of each question or part question.

The maximum number of marks is 75.

This syllabus is approved for use in England, Wales and Northern Ireland as a Cambridge International Level 1/Level 2 Certificate.

This document consists of **12** printed pages.

1 Some types of software can be described as free software or freeware.

Draw lines to link each description to a correct type of software. A description can be linked to more than one type of software.

| Description                            | Type of software |
|--|------------------|
| Free to download                       | Free software    |
| Code can be modified and redistributed | Freeware         |
| Subject to copyright legislation       |                  |

[2]

2 David has installed anti-virus software on his computer.

(a) State **three** tasks carried out by anti-virus software.

Task 1 .....

.....

Task 2 .....

.....

Task 3 .....

.....

[3]

(b) David is still concerned that his computer might get infected by a computer virus.

State **three** other ways in which David can reduce the risk of his computer getting a computer virus.

- 1 .....
- 2 .....
- 3 .....

[3]

3 Parity checks can be used to check for errors during data transmission.

**One** of the bytes has been transmitted incorrectly.

| Byte 1   | Byte 2   | Byte 3   | Byte 4   |
|----------|----------|----------|----------|
| 10110011 | 10101000 | 10110100 | 10110101 |

(a) State which byte was incorrectly transmitted.

..... [1]

(b) Explain how you identified the incorrectly transmitted byte.

.....  
.....  
.....  
.....  
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..... [3]

4 An air conditioning system is used to control the temperature in a hospital.

The air conditioning system uses temperature sensors and a microprocessor.

The temperature must remain between 21 °C and 24 °C.

Describe how the sensors and the microprocessor are used to control the temperature of the hospital.

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[6]

5 The IP address of a computer is stored as a set of four 8-bit binary numbers.

The network administrator converts each binary number into hexadecimal.

(a) Complete the table to show the hexadecimal equivalent of the binary IP address.  
The first number has already been converted.

Binary IP address

|          |          |          |          |
|----------|----------|----------|----------|
| 11000100 | 00010000 | 11111110 | 00001001 |
|----------|----------|----------|----------|

Hexadecimal

|    |  |  |  |
|----|--|--|--|
| C4 |  |  |  |
|----|--|--|--|

[3]

(b) Explain why the network administrator uses hexadecimal.

.....  
.....  
.....  
.....  
.....

[2]

6 Primary, secondary and off-line are types of storage.

Give an example of each type of storage.

For each example state how it is used.

**Primary storage**

Example .....

Use .....

.....

**Secondary storage**

Example .....

Use .....

.....

**Off-line storage**

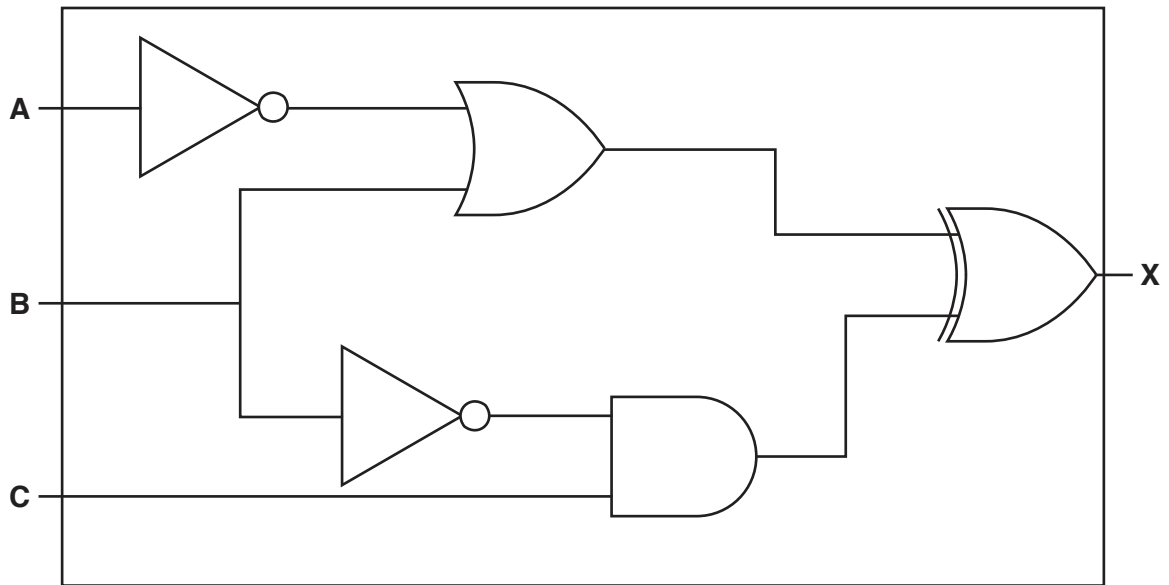
Example .....

Use .....

.....

[6]

7 (a) For this logic circuit:



Complete the truth table.

| A | B | C | Working space | X |
|---|---|---|---------------|---|
| 0 | 0 | 0 |               |   |
| 0 | 0 | 1 |               |   |
| 0 | 1 | 0 |               |   |
| 0 | 1 | 1 |               |   |
| 1 | 0 | 0 |               |   |
| 1 | 0 | 1 |               |   |
| 1 | 1 | 0 |               |   |
| 1 | 1 | 1 |               |   |

[4]

(b) For this logic statement:

$$X = 1 \text{ if } (B \text{ is } 1 \text{ OR } C \text{ is NOT } 1) \text{ AND } ((A \text{ is NOT } 1) \text{ AND } (B \text{ is } 1 \text{ OR } C \text{ is } 1))$$

Draw a logic circuit.



[6]

(c) Complete the truth table for the logic statement given in **part (b)**.

| A | B | C | Working space | X |
|---|---|---|---------------|---|
| 0 | 0 | 0 |               |   |
| 0 | 0 | 1 |               |   |
| 0 | 1 | 0 |               |   |
| 0 | 1 | 1 |               |   |
| 1 | 0 | 0 |               |   |
| 1 | 0 | 1 |               |   |
| 1 | 1 | 0 |               |   |
| 1 | 1 | 1 |               |   |

[4]

8 (a) **Three** descriptions and **two** methods of data transmission are given.

Tick (✓) the correct box to show the **Method** of data transmission for each description.

| Description  | Method |          |
|--|--------|----------|
|  | Serial | Parallel |
| Multiple bits are sent and received at the same time.                                      |        |          |
| Bits are sent one at a time in a single direction.   |        |          |
| Bits are sent using a single wire. Data can be sent or received, but not at the same time. |        |          |

[3]

(b) **Three** descriptions and **three** types of data transmission are given.

Tick (✓) the correct box to show the **Type** of data transmission for each description.

| Description  | Type    |             |        |
|--|---------|-------------|--------|
|  | Simplex | Half-duplex | Duplex |
| Multiple bits are sent and received at the same time.                                      |         |             |        |
| Bits are sent one at a time in a single direction.   |         |             |        |
| Bits are sent using a single wire. Data can be sent or received, but not at the same time. |         |             |        |

[3]



- 9 A 32-second sound clip will be recorded. The sound will be sampled 16000 times a second. Each sample will be stored using 8 bits.

Calculate the file size in kilobytes. **You must show all of your working.**

File Size ..... kB

[3]

- 10 The table shows a segment of primary memory from a Von Neumann model computer.

| Address | Contents |
|---------|----------|
| 10001   | 11001101 |
| 10010   | 11110001 |
| 10011   | 10101111 |
| 10100   | 10000110 |
| 10101   | 00011001 |
| 10110   | 10101100 |

The program counter contains the data 10010.

- (a) (i) State the data that will be placed in the memory address register (MAR).

.....[1]

- (ii) State the data that will be placed in the memory data register (MDR).

.....[1]

(b) Describe the stored program concept when applied to the Von Neumann model.

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..... [4]

11 Miriam needs to use a large high-resolution photo as a thumbnail image on a website.

She will use lossy compression to reduce the file size of the photo to create the thumbnail image.

(a) State why a smaller file size is appropriate for this situation.

.....  
..... [1]

(b) Explain how lossy compression reduces the file size.

.....  
.....  
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..... [4]

12 A hospital stores the results of medical tests on a computer system. Each patient is given a wristband containing a unique barcode. The barcode is used every time the patient has a medical test.

(a) Explain **two** benefits of using barcodes in this situation.

Benefit 1 .....

.....

.....

.....

Benefit 2 .....

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.....

[4]

(b) Describe how the barcode is read.

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[4]

**13** State **four** functions of an operating system.

Function 1 .....

.....

Function 2 .....

.....

Function 3 .....

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Function 4 .....

.....

[4]

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