Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

7599895984

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.

DC (LK/CGW) 161583/3 **R**

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[Turn over

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 .....

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2 .....

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3 .....

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[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]

[Turn over

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.

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.....[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

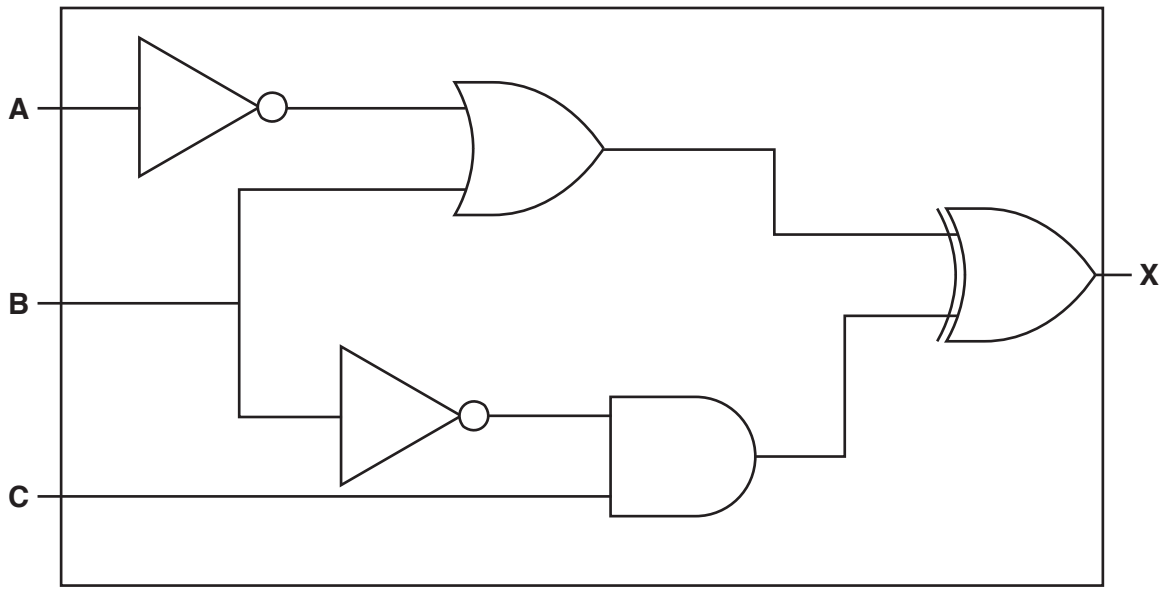
Example .....

Use .....

.....

[6]

7 **(a)** For this logic circuit:



Complete the truth table.

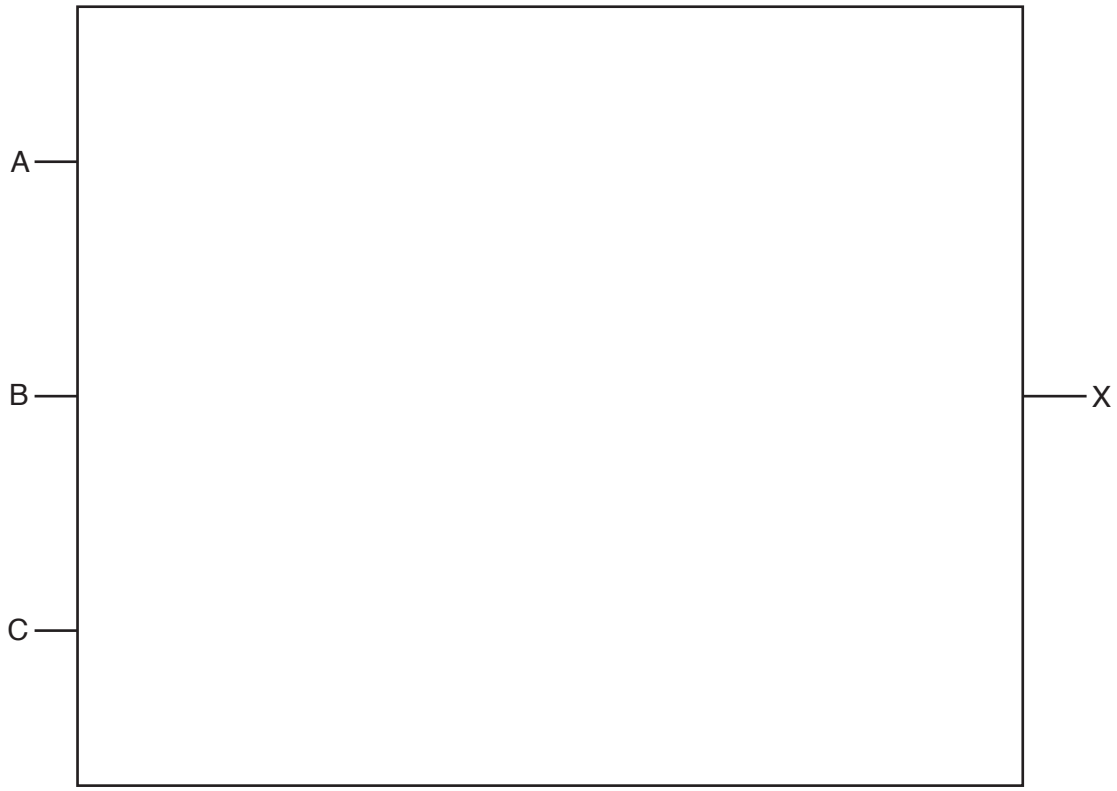
A	B	C	Working space	X
0	0	0		
0	0	1		
0	1	0		
0	1	1		
1	0	0		
1	0	1		
1	1	0		
1	1	1		

[4]

(b) For this logic statement:

X = 1 if (B is 1 OR C is NOT 1) AND ((A is NOT 1) AND (B is 1 OR C 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]

[Turn over

(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.

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.....[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 .....

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.....

.....

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 .....

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Function 2 .....

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Function 3 .....

.....

Function 4 .....

.....

[4]