Cambridge Assessment International Education

CS BY AQIB KHAN

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CANDIDATE NAME

CENTRE NUMBER | | | | | |

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2152459291

COMPUTER SCIENCE **0478/13**

Paper 1 Theory **October/November 2022**

1 hour 45 minutes

You must answer on the question paper.

No additional materials are needed.

INSTRUCTIONS

- Answer **all** questions.
- Use a black or dark blue pen. You may use an HB pencil for any diagrams or graphs.
- Write your name, centre number and candidate number in the boxes at the top of the page.
- Write your answer to each question in the space provided.
- Do **not** use an erasable pen or correction fluid.
- Do **not** write on any bar codes.
- Calculators must **not** be used in this paper.

INFORMATION

- The total mark for this paper is 75.
- The number of marks for each question or part question is shown in brackets [ ].
- No marks will be awarded for using brand names of software packages or hardware.

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This document has **12** pages.

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[Turn over

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1 **Five** components are shown.

Tick (✓) to show whether each component is an example of input, output or storage.

Component	Input (✓)	Output (✓)	Storage (✓)
actuator			
register			
sensor			
mouse			
Digital Versatile Disc (DVD)			

[5]

2 **(a)** Denary values are converted to binary values to be processed by a computer.

Draw **one** line from each denary value to the correctly converted 8-bit binary value.

Denary	8-bit binary
72	11110101
245	01110010
15	11100101
	00010101
	00001111
	01001000

Working space

.....

.....

.....

.....

[3]

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(b) Binary values can be converted to hexadecimal values.

Give the hexadecimal value for the 16-bit binary value 0000100110101110

.....

Working space

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[3]

3 Jessica wants to store a large number of small thumbnail images on a USB flash memory drive. Each thumbnail image is 16-bit colour and is 100 pixels wide and 100 pixels high.

She has 5 MB of storage space available on her USB flash memory drive.

Calculate how many images she can store in the 5 MB of storage space. Show all your working.

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.....

.....

Number of images .....

[4]

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4 A company wants to manufacture a mobile phone.

(a) The company needs to decide which touch screen technology to use.

State **one** type of touch screen technology that you recommend the company use.

Justify your choice.

Touch screen type .....

Justification .....

.....

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..... [4]

(b) The mobile phone uses Random Access Memory (RAM) and Read Only Memory (ROM).

RAM and ROM are both examples of the same type of storage.

Identify this type of storage and justify your answer.

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..... [2]

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(c) The mobile phone has a USB port to allow a USB connection to a computer.

(i) Describe how data is transmitted using a USB connection.

.....

.....

.....

..... [2]

(ii) One benefit of a USB connection is that the cable can only be inserted into the port one way, so an incorrect connection cannot be made.

Give **three** other benefits of using a USB connection to connect a mobile phone to a computer.

Benefit 1 .....

.....

Benefit 2 .....

.....

Benefit 3 .....

..... [3]

(d) When a user is reading a text on the mobile phone, they may also get a telephone call on the mobile phone. An interrupt signal is generated that results in an output to inform the user that a person is calling them.

Describe how the interrupt signal is processed to inform the user that a person is calling them.

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..... [4]

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5 Consider the logic statement:

X = ((((**B** AND **C**) OR NOT **C**) NOR **B**) XOR NOT **A**)

(a) Draw a logic circuit to represent the given logic statement.

Do **not** attempt to simplify the logic statement. All logic gates must have a maximum of **two** inputs.



[6]

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(b) Complete the truth table for the given logic statement.

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]

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6 A museum has Quick Response (QR) codes that allow visitors to view videos for extra information about items in the museum.

The visitor is given a portable device with a display screen, that they can use to read each QR code.

(a) Describe how the QR code is read and processed to display the video for the visitor.

.....

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..... [4]

(b) Tick (✓) to show whether the videos are MP3 files, MP4 files or MIDI files.

	Tick (✓)
MP3 files	☐
MP4 files	☐
MIDI files	☐

[1]

(c) The video files are compressed using lossy compression.

Give **two** benefits of using lossy compression to compress the video files.

Benefit 1 .....

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Benefit 2 .....

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[2]

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(d) The portable device has a Light-Emitting Diode (LED) display screen to allow the visitor to watch a video.

Describe how the LED screen operates to display the video.

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..... [4]

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7 The paragraph explains how an instruction is processed by the Central Processing Unit (CPU).

Complete the paragraph using the list of terms. **Not** all terms in the list need to be used.

- address bus
- Arithmetic Logic Unit (ALU)
- calculations
- data bus
- decoded
- execute
- fetched
- interrupt
- Memory Address Register (MAR)
- Memory Data Register (MDR)
- Program Counter (PC)
- protocol
- ROM
- stored

An instruction is ..... from RAM into the CPU, where it is temporarily stored in the ..... . The instruction is then sent along the ..... to the Control Unit (CU) to be ..... . The ..... will then perform any ..... and logic operations that are required to ..... the instruction.

[7]

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8 A computer can have both a Media Access Control (MAC) address and an Internet Protocol (IP) address.

(a) Give **two** similarities between a MAC address and an IP address.

Similarity 1 .....

.....

Similarity 2 .....

.....

[2]

(b) Give **two** differences between a MAC address and an IP address.

Difference 1 .....

.....

Difference 2 .....

.....

[2]

9 A system uses parity checks and Automatic Repeat reQuests (ARQ) to detect and correct errors in the transmission of data.

Describe how parity checks and ARQ operate together to detect and correct errors.

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[6]

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10 Mario has a website that he uses to sell his artwork.

(a) The website uses HTTPS to transmit data.

(i) Describe what is meant by HTTPS.

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..... [3]

(ii) One way a user can check a website uses HTTPS is to check whether the Uniform Resource Locator (URL) begins with HTTPS.

Give **one** other way a user can check if a website uses HTTPS.

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..... [1]

(b) There is a risk that people that use the Internet to access websites can have their stored data maliciously damaged.

State **three** ways that stored data can be maliciously damaged.

1 .....

2 .....

3 .....

[3]

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