Cambridge Assessment International Education

CS BY AQIB KHAN

Cambridge International AS & A Level

CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

0800421055

COMPUTER SCIENCE **9618/12**

Paper 1 Theory Fundamentals **October/November 2025**

1 hour 30 minutes

You must answer on the question paper.

No additional materials are needed.

INSTRUCTIONS

- Answer **all** questions.
- Use a black or dark blue pen.
- 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.
- You may use an HB pencil for any diagrams, graphs or rough working.
- 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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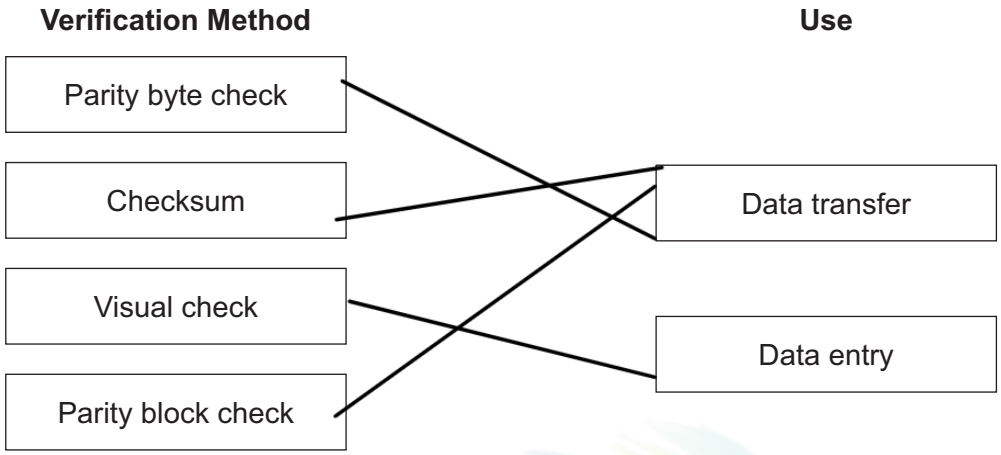
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1 Draw **one** line from each verification method to indicate whether it is used during data transfer or data entry.



[2]

2 **(a)** Complete the table by describing each term.

Term	Description
Copyright	Formal or legal recognitation of ownership.
Open Source (Initiative)	The software is a public view in this people can edit the source
Shareware	In this the software can't be edited and it is a free trial software
Software Licence	A legal agreement that defines the rights and terms usage of software.

[4]

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(b) Describe the purpose of a code of conduct.

The ensure that employees understand the expectations and consequences of their actions. To maintain public trust.

[2]

3 **(a)** **(i)** State what is meant by relative addressing.

addressing mode used in assembly language, where the operand specifies a memory address relative to the current address stored in the accumulator

[1]

(ii) Registers such as the Accumulator (ACC) and the Index Register (IX) are used in the CPU.

Identify **two** special purpose registers used in the CPU. Do **not** include the ACC or IX in your answers.

1 Memory Data Register (MDR)

2 Program Counter (PC)

[2]

3. Memory Address Register (MAR)
4. Current Instruction Register (CIR)
5. Status Register

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(b) The following table shows part of the instruction set for a processor. The processor has two registers: the ACC and an IX.

Instruction		Explanation
Opcode	**Operand**	
LDM	#n	Immediate addressing. Load the number n to ACC
LDD	<address>	Direct addressing. Load the contents of the location at the given address to ACC
LDI	<address>	Indirect addressing. The address to be used is at the given address. Load the contents of this second address to ACC
LDX	<address>	Indexed addressing. Form the address from <address> + the contents of the index register. Copy the contents of this calculated address to ACC
LDR	#n	Immediate addressing. Load the number n to IX
<address> can be an absolute or symbolic address # denotes a denary number, e.g. #127		

The current contents of the main memory and the index register are shown.

Address	Instruction
98	8
99	16
100	3
101	98
102	32
IX	2

Write the contents of the ACC after each instruction is executed.

Instruction	Value in ACC
LDM #98	98
LDI 101	8
LDX 100	32

[3]

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(c) A student buys a new computer. The table shows the specifications of the old computer and the new computer.

Old computer	New computer
1.8 GHz dual core processor	2.3 GHz dual core processor
16 MB cache	32 MB cache

Explain why increasing the clock speed **and** increasing the cache memory will improve the performance of the computer.

Clock speed The processor can perform more Fetch Execute cycle per second so that data can be processed per second.

Cache memory Can store more of the most frequently used instructions which reduces the need to access slower RAM.

[4]

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4 A relational database, SHIPPING, stores data about the ships in a company and the containers that are carried on the ships.

The database has the following tables:

CONTAINER(ContainerID, Type, Weight, OwnerName, ShipID)

SHIP(ShipID, Type, Capacity, ShipName)

(a) Describe the relationship between the two tables. Refer to the primary and foreign keys in your answer.

The relationship between Ship and container is one to many. The primary key is Ship ID in container table which become foriegn key in Ship table [2]

(b) The table CONTAINER needs an additional field to store the data for the last inspection date.

Write a Structured Query Language (SQL) script to add **one** field to the table CONTAINER to store the date of last inspection of the container, for example 08/07/2019.

```
ALTER TABLE CONTAINER
Add Inspection Date, Time
```

[2]

(c) Write an SQL script to return the number of containers stored in the database for the ship with the name Caledonia.

```
SELECT COUNT (Container ID)
FROM CONTAINER, SHIP
WHERE CONTAINER.ShipID = SHIP.ShipID
ADD ShipName = "Caledonia"
```

[4]

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(d) Describe the purpose of a developer interface in a Database Management System (DBMS).

To allow user to modify the table. Allow them to form or create the data input.

[2]

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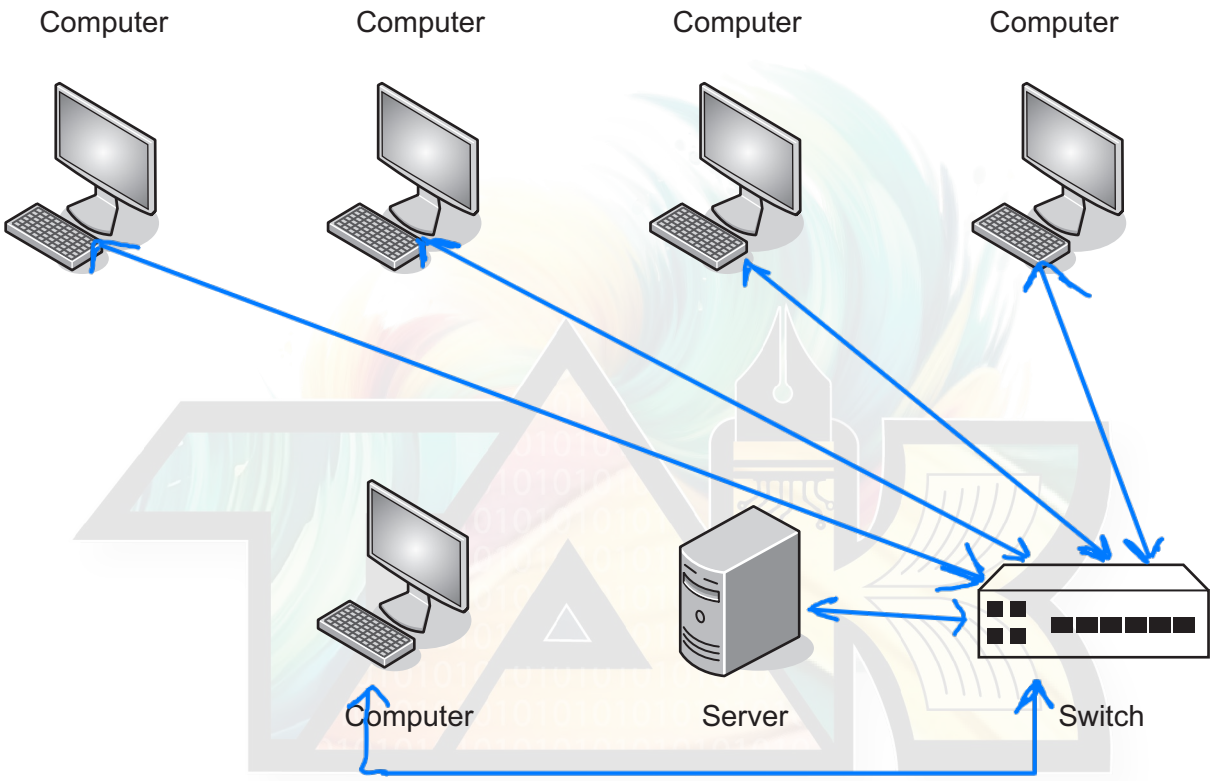
5 A local area network (LAN) has five computers, one switch and one server.

(a) Describe the characteristics of a LAN.

Covers a small geographical area. It use wired or wireless communication.

[2]

(b) Complete the following diagram to show how these devices are connected in a star topology.



[2]

(c) Describe how packets are transmitted between two hosts using a star topology.

The sending device sends the packet to the switch, the switch checks the destination address on each packet and sends them only to intended devices.

[3]

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(d) Another type of network is a bus network.

Ethernet is used to transmit and receive data between the devices on the bus network.

Describe how collisions are detected and managed on this network.

The workstation listen to communication channel and sends the data only when there is no data being transmitted. The random time increased if they are multiple collisions.

[3]

(e) Complete the table by identifying **one** threat to computer and data security posed by networks and the internet.

Describe the threat and give a method of prevention.

Threat	Description	Prevention
Hacking	Gaining an unauthorised access to a computer device	Firewall

[3]

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6 **(a)** A sound file is compressed by reducing the sampling rate.

State whether this is lossless or lossy compression. Justify your choice.

Type of compression ... Lossy ...

Justification ... There will be fewer sample per second so that data will permanently lost. ...

...

...

[1]

(b) The following table shows some words and corresponding denary values.

Word	Denary value
Computing	55
Science	56
Computers	57
are	58
Brilliant!	59
is	60
Fun!	61
Amazing!	62

32
+16
48
+8
56

The following table shows three bytes of data that have been received.

Use the table to find the corresponding words from the binary values received.

Binary value	00111000	00111100	00111110
Word	Science	is	Amazing

Working ...

...

...

...

[1]

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(c) A computer system uses even parity. The least significant (rightmost) bit of each byte is the parity bit.

(i) Complete the byte by writing the missing parity bit:

parity bit ↓

0	1	0	1	1	1	0	0

[1]

(ii) The computer also uses parity block check. The parity block check uses even parity. Computer A transmits four bytes of data to computer B, followed by a parity byte. Computer B receives the following sequence of bytes.

							parity bit ↓
	1	0	1	1	0	1	1	1
	0	1	1	1	0	0	0	0
	0	0	0	1	1	0	1	1
	0	1	1	1	0	1	0	0
parity byte →	1	0	1	0	0	0	0	0

Following transmission, one of the four bytes of data has an error in one of the bits.

Circle the bit that has been altered during the data transfer. [1]

(d) A bitmap image has a resolution of 1000 pixels wide by 2000 pixels high. The colour depth is 16 bits. → 16 bytes → 2 bytes

Calculate an estimate of the file size in megabytes.

Show your working.

File Size = Pixels wide x Pixels high x colour depth

= 1000 x 2000 x 2

= 4000000

To convert in megabytes → 4000000 / 1000000

= 4 MB

File size ..... 4 ..... megabytes

[2]

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7 **(a)** The following binary addition is performed using 8-bit registers.

Complete the calculation using binary addition.

```
  1 1 1 1 1 1
  1 0 0 0 0 1 1 1
+ 0 0 1 1 1 1 0 0 1
-----------------
  1 1 0 0 0 0 0 0 0
```

[1]

(b) A computer uses the Unicode character set.

State the number of bits used to store **one** character from the Unicode character set.

8 ..... [1]

(c) ASCII is another character set. The ASCII value for the character 'h' has the denary value 104.

(i) Write the Binary Coded Decimal (BCD) value for the ASCII character 'h'.

0001 0000 0100 ..... [1]

(ii) Write the hexadecimal value for the ASCII character 'h'.

68 ..... [1]

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8 A restaurant accesses software and stores data using cloud computing.

(a) (i) Give **two** benefits of storing data using cloud computing.

1 Easier to share data

2 No need to have personal storage devices.

[2]

(ii) Give **two** drawbacks of using cloud computing.

1 Limited storage capacity without paying extra.

2 Security issues.

[2]

(b) The restaurant uses touchscreens as input devices to allow staff to select items from a menu.

(i) Explain how a touchscreen converts the point of touch to a selection from the menu.

Two layers of material make contact and complete the circuit. Contact with the screen creates a change in charge. The beams are broken by pointing the device. A shadow is created when surface is touched. The point of touch is used to determine x and y coordinate. When corresponding coordinates are recognised the menu item will be added in order. [4]

(ii) The image files that are displayed on the touchscreen have been corrupted.

Identify **two** examples of utility software that could be used to recover the images.

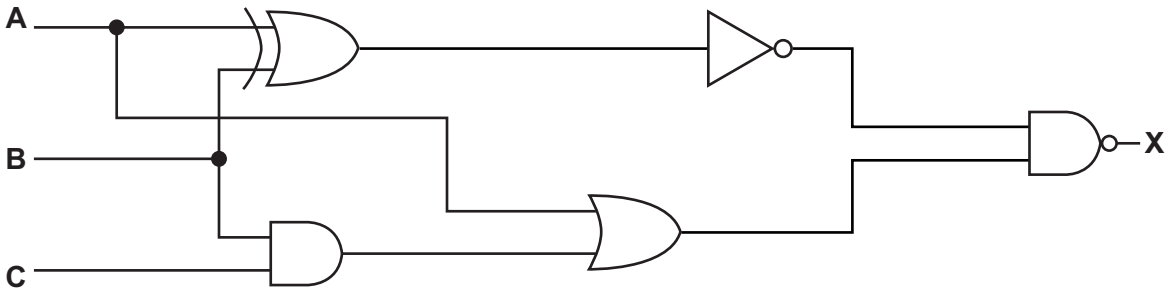
1 Backup software

2 Disk repair

[2]

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9 **(a)** Consider the following logic circuit:



Write the logic expression for the logic circuit. Do **not** simplify the expression.

X = NOT(A XOR B) NAND((BANDC OR A)) [2]

(b) Consider the following logic expression:

X = NOT ((**A** NAND **B**) XOR (NOT **A** OR NOT **C**))

A truth table for the logic expression is given:

Row number	A	B	C	X
1	0	0	0	1
2	0	0	1	0
3	0	1	0	1
4	0	1	1	0
5	1	0	0	1
6	1	0	1	0
7	1	1	0	1
8	1	1	1	1

There are **three** errors in the truth table.

Identify the **three** errors in the truth table by writing the row numbers with an incorrect output.

Error 1 Row number ..... 2 .....

Error 2 Row number ..... 4 .....

Error 3 Row number ..... 7 .....

[2]

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10 A programmer is developing a computer program.

(a) Explain how the programmer can first use an interpreter **and** then a compiler to develop the computer program.

Interpreter Use the interpreter to test the completed program because errors can be corrected. Errors are identified one at a time.

Compiler Use the compiler after the program is complete to make an executable file so source code not seen.

[4]

(b) The programmer releases the program as Free Software.

Describe what is meant by Free Software.

The software is free of instructions. The source code can be edited by the user. It can be shared with others.

[2]

(c) A user downloads the computer program from the internet.

State what should be included as part of the download to make sure the program is authentic.

Digital Signature [1]

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11 An automated system opens doors when a person is detected within 2 metres. The system closes the doors when there is no longer a person within 2 metres.

Identify whether the automated system is an example of a monitoring system or a control system.

Justify your choice.

Monitoring or Control ... Control System ...

Justification ... The opening doors allow people to move which changes the input to the sensor The system uses actuator to open or close the doors. The system acts accordingly to the feedback given to sensor. ...

... [3]

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