Cambridge Assessment International Education

Cambridge International AS & A Level

CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

3355746943

COMPUTER SCIENCE **9618/12**

Paper 1 Theory Fundamentals **May/June 2023**

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.

This document has **16** pages. Any blank pages are indicated.

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1 A company has a LAN (local area network).

(a) Give **two** benefits of connecting computers to a LAN.

1 .....

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2 .....

.....

[2]

(b) Give **two** characteristics of a LAN.

1 .....

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2 .....

.....

[2]

(c) One of the company's offices has one server and four computers connected in a star topology.

Draw a diagram to show the layout of the office's star topology.

[2]

(d) Computers can be connected using Ethernet.

Describe what is meant by **Ethernet**.

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..... [3]

(e) The network runs as a thick-client model.

Describe what is meant by a **thick-client** model.

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..... [2]

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2 A horse riding school uses a database, `Lessons`, to store data about lesson bookings.

This database is created and managed using a Database Management System (DBMS).

(a) The table contains names and descriptions of DBMS features and tools.

Complete the table by writing down the missing names and descriptions.

Name	Description
Data dictionary	....
Query processor	....
....	A model of a database that is not specific to one DBMS.
....	A software tool that allows the user to create items such as tables, forms and reports.

[4]

(b) Explain the reasons why referential integrity is important in a database.

.....

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..... [3]

(c) The database `Lessons` has the following tables:

`HORSE(HorseID, Name, Height, Age, HorseLevel)`

`STUDENT(StudentID, FirstName, LastName, RiderLevel, PreferredHorseID)`

`LESSON(LessonID, Date, Time, StudentID, HorseID, LessonContent)`

Dates in this database are stored in the format `#DD/MM/YYYY#`.

The fields `RiderLevel` and `HorseLevel` can only have the values: `Beginner`, `Intermediate` or `Advanced`.

(i) Describe **two** methods of validating the field `RiderLevel`.

1 .....

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2 .....

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.....

[2]

(ii) Write a Structured Query Language (SQL) script to return the names of all the horses that have the horse level intermediate or beginner.

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..... [4]

(iii) The following SQL script should return the number of riders that have the rider level beginner and have a lesson booked on 09/09/2023.

```
SELECT SUM(STUDENT.RiderLevel) AS NumberOfRiders

FROM STUDENT, LESSON

WHERE StudentID = StudentID

OR Date = #09/09/2023#

AND STUDENT.RiderLevel = Beginner;
```

There are **four** errors in the script.

Identify **and** correct each error.

1 .....

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2 .....

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3 .....

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4 .....

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[4]

3 A program is written in assembly language.

(a) The program is converted into machine code by a two-pass assembler.

Draw **one or more** lines to identify the pass or passes in which each action takes place.

Action	Pass
generates object code	first
reads the source code one line at a time	second
removes white space	
adds labels to the symbol table	

[3]

(b) Assembly language statements can use different modes of addressing.

Complete the following description of addressing modes.

..... addressing is when the operand holds the memory address of the data.

..... addressing is when the operand holds a memory address that stores the memory address of the data.

..... addressing is when the operand is the data.

[3]

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4 Data in a computer is stored in binary form.

(a) State the number of unique binary values that can be represented in 16 bits.

..... [1]

(b) Give the 8-bit one's complement representation of the denary number −120.

Show your working.

Working .....

.....

.....

.....

Answer .....
[2]

(c) Convert the hexadecimal number A04 into denary.

Show your working.

Working .....

.....

.....

.....

Answer .....
[2]

(d) Show the result of a 2-place left logical shift on the binary number:

01001111

..... [1]

5 A student has purchased a new laptop.

(a) The laptop is designed using the Von Neumann model for a computer system.

Identify **two** types of signal that a control bus can transfer.

1 .....

2 .....

[2]

(b) Describe **two** ways the hardware of a laptop can be upgraded to improve the performance **and** explain how each upgrade improves the performance.

1 .....

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2 .....

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[4]

(c) Peripherals are connected to the laptop using ports.

(i) A printer is connected to a Universal Serial Bus (USB) port.

Describe how data is transmitted through a USB port.

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.....

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..... [1]

(ii) A monitor is connected to the laptop using a different type of port.

Identify **one** other type of port that can be used to connect the monitor.

..... [1]

(d) The laptop has systems software.

(i) Describe how the Operating System (OS) manages processes in the computer.

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..... [5]

(ii) Describe the purpose of utility software in a computer.

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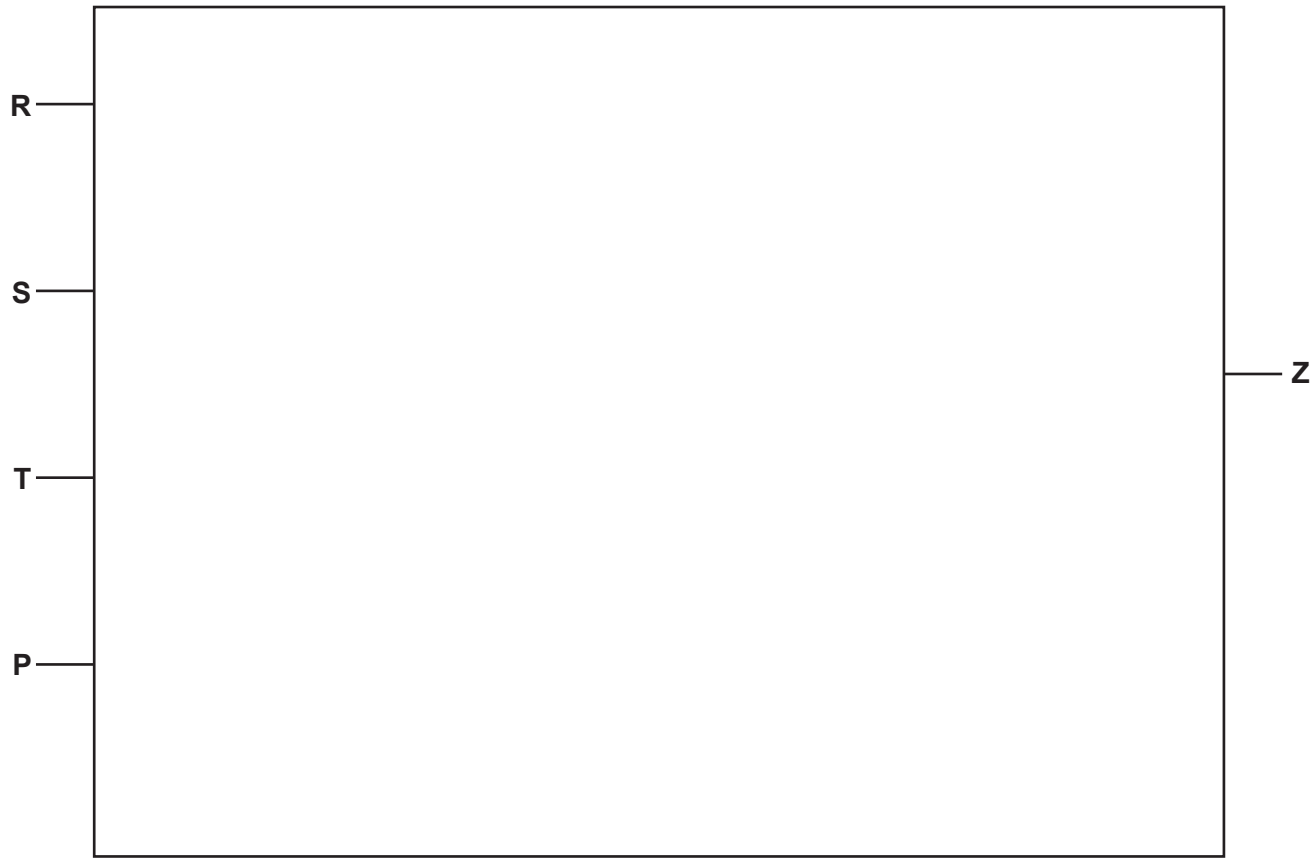
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..... [2]

6 **(a)** Draw the logic circuit for this logic expression:

Z = (**R** XOR **S**) AND (NOT **T** NOR **P**)



[2]

(b) Complete the truth table for this logic expression:

Z = (NOT **P** OR **Q**) XOR (**R** NOR **Q**)

P	Q	R	Working space	Z
0	0	0		
0	0	1		
0	1	0		
0	1	1		
1	0	0		
1	0	1		
1	1	0		
1	1	1		

[2]

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7 A software developer is working in a team writing a program for a client.

(a) The developer is writing a new program library to be used by the other team members.

(i) Define the term **program library**.

.....

.....

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..... [2]

(ii) Explain **two** benefits to the developer of choosing to create a Dynamic Link Library (DLL).

1 .....

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.....

.....

2 .....

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.....

[4]

(b) The development team needs to use a translator whilst writing the program for the client.

Identify whether an interpreter or a compiler would be more appropriate at this stage of the program development.

Justify your choice.

Translator .....

Justification .....

.....

.....

.....

.....

..... [3]

(c) The development team uses an Integrated Development Environment (IDE).

Complete the table by describing the typical features found in an IDE.

Feature	Description
Breakpoints	....
Dynamic syntax checks	....
Context-sensitive prompts	....
Single stepping	....

[4]

(d) One section of the program being developed will convert user's speech into commands.

Explain how Artificial Intelligence (AI) can be used in this program.

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..... [3]

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