Cambridge International AS & A Level

**Cambridge Assessment International Education**
Cambridge International Advanced Subsidiary and Advanced Level

CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

*5339709646*

**COMPUTER SCIENCE** **9608/12**

Paper 1 Theory Fundamentals **October/November 2019**

**1 hour 30 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 document consists of **14** printed pages and **2** blank pages.


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**1** **(a)** The diagram shows different types of software on the left, and descriptions on the right.

Draw a line from each type of software to its correct description.

| Type of software | Description |
| --- | --- |
| Operating system | Provides a ready-built routine that can be imported into a program |
| Utility program | Provides an interface between the user and the hardware |
| Library program | Converts source code into a low-level language |
| Compiler | Creates a new document for the user to edit |
| | An additional program that helps to maintain or configure the system |

[4]

**(b)** Describe the purpose of disk repair software.

.....

.....

.....

.....

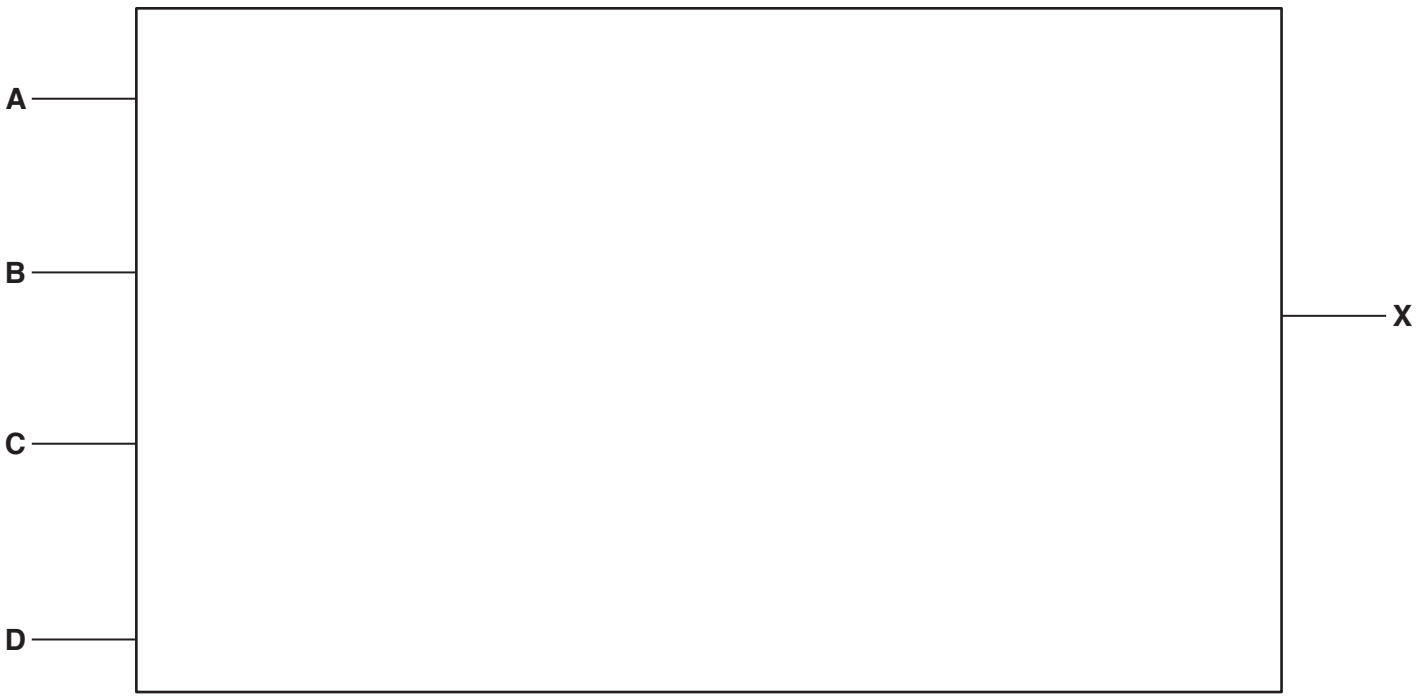
.....

..... [3]

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**2** **(a)** Draw a logic circuit to represent the following logic expression:

**X** = NOT (**A** AND **B**) AND (**C** XOR **D**)




[4]

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

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

| 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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**[Turn over**

**3** A web page includes the following JavaScript and HTML code.

```
01   <html>
02   <body>
03
04   <form>
05     <p><input type="text" id="textBox1"></p>
06     <button id = "button1" onclick="multiply()">First</button>
07     <button id = "button2" onclick="addition()">Second</button>
08   </form>
09
10   </body>
11   <script>
12     function multiply(){
13       value1 = document.getElementById("textBox1").value;
14       value1++;
15       alert(parseInt(value1)* parseInt(value1));
16     }
17
18     function addition(){
19       value1 = document.getElementById("textBox1").value;
20       alert(parseInt(value1) + parseInt(value1));
21     }
22   </script>
23   </html>
```

**(a)** Name **two** identifiers used in the JavaScript code.

1 .....

2 .....
[2]

**(b)** The number 9 is typed into `textBox1`.

Write the value that is output after `button1` is pressed.

..... [1]

**(c)** State the purpose of the code in line `14`.

.....

..... [1]

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**(d)** Line `20` is replaced with:

```
20  alert(value1 + value1);
```

Describe how this will affect the program.

.....

.....

.....

..... [2]

**4** Anushka needs to store information about bookings at a sports club.

**(a)** Anushka has a file-based storage system. She wants a relational database.

**(i)** Describe the features of a relational database that address the limitations of Anushka's file-based system.

.....

.....

.....

.....

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.....

.....

..... [4]

**(ii)** The relational database design needs to be normalised. The following statements describe the three stages of database normalisation.

Complete the statements by filling in the missing words.

For a database to be in First Normal Form (1NF) there must be no .....

groups of attributes.

For a database to be in Second Normal Form (2NF), it must be in 1NF, and contain no

..... key dependencies.

For a database to be in Third Normal Form (3NF), it must be in 2NF, and all attributes

must be fully dependent on the ..... ..... .

[4]

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**(b)** The **normalised** relational database, SPORTS_CLUB, has the following table design.

MEMBER(MemberID, FirstName, LastName, MembershipType)

SESSION(SessionID, Description, SessionDate, SessionTime, NumberMembers)

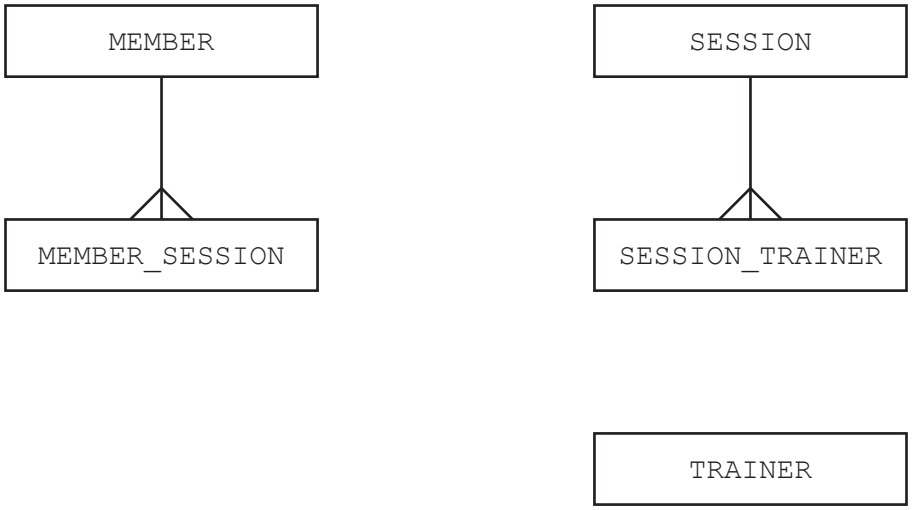
TRAINER(TrainerID, TrainerFirstName, TrainerLastName)

MEMBER_SESSION(MemberID, SessionID)

SESSION_TRAINER(SessionID, TrainerID)

**(i)** Anushka has designed an entity-relationship (E-R) diagram for SPORTS_CLUB.

Complete the entity-relationship (E-R) diagram.




[2]

**(ii)** Anushka first needs to create the database that she has designed.

Write a Data Definition Language (DDL) statement to create the SPORTS_CLUB database.

.....

..... [1]

**(iii)** The table shows some sample data for the table `SESSION`.

| SessionID | Description | SessionDate | SessionTime | NumberMembers |
|---|---|---|---|---|
| 21PL | Pilates junior | 04/04/2020 | 18:00 | 15 |
| 13AE | Aerobics senior | 04/04/2020 | 19:00 | 20 |
| 33WG | Weightlifting advanced | 04/04/2020 | 10:00 | 10 |

Write a DDL script to create the table `SESSION`.

.....

.....

.....

.....

.....

.....

.....

.....

.....

..... [5]

**(iv)** Write a Data Manipulation Language (DML) script to return the first name and last name of all members who have `Peak` membership type.

.....

.....

.....

.....

..... [3]

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**5** Mica has created some software and has copyrighted it. She wants to stop other people from copying and changing it illegally.

**(a)** Identify **two** ways Mica can prevent illegal copies of the software being installed.

1 .....

.....

2 .....

.....
[2]

**(b)** Identify **one** way Mica can distribute the software without the source code.

.....

..... [1]

**(c)** Mica is releasing the software under a commercial licence.

**(i)** Give **two** benefits to Mica of using a commercial licence.

1 .....

.....

2 .....

.....
[2]

**(ii)** Name **two** other types of software licence.

1 .....

.....

2 .....

.....
[2]

**6** Dominic uses a tablet computer to complete work. He records videos of his work to send to his colleagues to watch at a later date.

**(a)** The tablet computer has input and output devices.

**(i)** The table lists four devices built into the tablet.

Tick (✓) one or more boxes for each device to identify whether it is an input device, an output device or both.

| Device | Input | Output |
|---|---|---|
| Touchscreen | | |
| Webcam | | |
| Microphone | | |
| Fingerprint scanner | | |

[2]

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**(ii)** An external speaker is plugged into the tablet computer.

The sequence of steps 1 to 7 describes the internal operation of the speaker.

The statements **A**, **B**, **C**, **D** and **E** are used to complete the sequence.

| Letter | Statement |
|---|---|
| **A** | Changes in the audio signal cause the direction of the electrical current to change. This determines the polarity of the electromagnet. |
| **B** | The vibration creates sound waves. |
| **C** | An electric current is sent to the speaker. |
| **D** | The electromagnet is repelled by, or attracted to the permanent magnet. |
| **E** | The electric current passes through the coil. |

Write **one** of the letters **A** to **E** in each appropriate row to complete the sequence.

1 .....

2 .....

3 The current in the coil creates an electromagnetic field.

4 .....

5 .....

6 The movement of the coil causes the diaphragm to vibrate.

7 .....

[4]

**(b)** The tablet computer's secondary storage is solid state (flash) memory.

**(i)** Give **one** reason why the tablet computer needs secondary storage.

.....

..... [1]

**(ii)** Describe solid state memory.

.....

.....

.....

.....

.....

..... [3]

**(c)** The tablet computer has RAM and ROM memory.

State the purpose of RAM and ROM memory in the computer.

RAM .....

.....

ROM .....

.....

[2]

**(d)** Dominic's tablet captures a video of Dominic to send to other people. The video is made of a sequence of images and a sound file.

**(i)** Describe how the images and sound are encoded into a digital form.

Images .....

.....

.....

.....

Sound .....

.....

.....

.....

[4]

**(ii)** The sequence of images and the sound file create a video. This is sent over the Internet as a video stream. The video stream can use interlaced encoding or progressive encoding.

Describe the terms **interlaced encoding** and **progressive encoding**.

Interlaced encoding .....

.....

.....

.....

Progressive encoding .....

.....

.....

.....

[4]

**(e)** Dominic sends his videos to his colleagues over the Internet using bit streaming.

**(i)** Describe how the video is sent using bit streaming.

.....

.....

.....

.....

.....

.....

.....

..... [4]

**(ii)** Circle either Real-time or on-demand to identify whether the video will be sent using real-time or on-demand bit streaming. Justify your choice.

Real-time / on-demand

Justification .....

.....

.....

.....

[2]

**(iii)** Describe the following video terms.

Temporal redundancy .....

.....

.....

.....

Spatial redundancy .....

.....

.....

.....

[2]

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