Cambridge Assessment International Education

Cambridge International AS & A Level

CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

0644556792

COMPUTER SCIENCE **9608/11**

Paper 1 Theory Fundamentals **May/June 2020**

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. Blank pages are indicated.

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[Turn over

1 A computer program makes use of data validation routines and verification of data input.

(a) Complete these **two** sentences about data validation and verification.

1. ..... checks that the data entered is reasonable. One example is ..... .

2. ..... checks that the data entered is the same as the original. One example is ..... .

[4]

(b) The program is installed on a computer system that has security measures in place to protect its data.

Complete the following table.

Security measure	Description
....	Data are written on two or more disks simultaneously.
Encryption	....
....	A copy of the data is taken and stored in another location.

[3]

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2 Kal teaches Computer Science and uses different devices when teaching his students.

(a) Tick (✓) **one or more** boxes on each row to indicate whether each device is an input device, an output device, or both.

Device	Input	Output
LCD monitor		
Microphone		
Keyboard		
Touchscreen		

[2]

(b) Kal has built a 3D printer to show students how it works.

(i) The steps 1 to 9 describe the basic internal operation of a 3D printer.

The following five statements are used to complete the sequence of steps.

A	A stepper motor moves the nozzle into position
B	A fan cools the layer
C	The software splits the object into slices
D	The nozzle extrudes the molten plastic
E	The data about the slices is sent to the printer

Write one of the letters **A**, **B**, **C**, **D** or **E** in the appropriate step to complete the sequence.

1. The object is designed using Computer Aided Design (CAD) software
2. .....
3. .....
4. The solid plastic is melted and transferred to the nozzle
5. .....
6. .....
7. The steps 5 to 6 are repeated until the layer is complete
8. .....
9. The steps 4 to 8 are repeated for each subsequent layer

[4]

(ii) The 3D printer has both RAM and ROM.

Describe the purpose of RAM and ROM in a **3D printer**.

RAM .....

.....

.....

.....

ROM .....

.....

.....

.....

[4]

3 Lana creates a website. The web pages of the website contain JavaScript and PHP code.

(a) Describe the purpose of the following JavaScript statement.

```
document.getElementById("text 2").innerHTML = 10 + 2;
```

.....

.....

.....

..... [2]

(b) Describe the purpose of the following JavaScript code.

```
function calculateValue(value1, value2){}
```

.....

.....

.....

..... [2]

(c) Describe the purpose of the following PHP code.

```
$number1 = 2;
echo $number1 ** 3;
```

.....

.....

.....

..... [2]

4 A digital camera takes a bitmap image. The image is 2000 pixels wide by 1000 pixels high with a colour depth of 24-bits.

(a) Calculate an estimate of the file size for the image. Give your answer in megabytes. Show your working.

Working .....

.....

.....

.....

.....

Answer ..... MB

[3]

(b) A second image is taken, this time in black and white. It has the same number of pixels, but the file size is smaller.

Explain why the file size is smaller.

.....

.....

.....

..... [2]

(c) The digital camera allows a user to add text to an image. The text is encoded as ASCII values.

The table shows the ASCII denary values for five characters.

Character	ASCII denary value
a	97
b	98
c	99
d	100
e	101

(i) Give the 8-bit binary value for the ASCII character 'b'.

.....

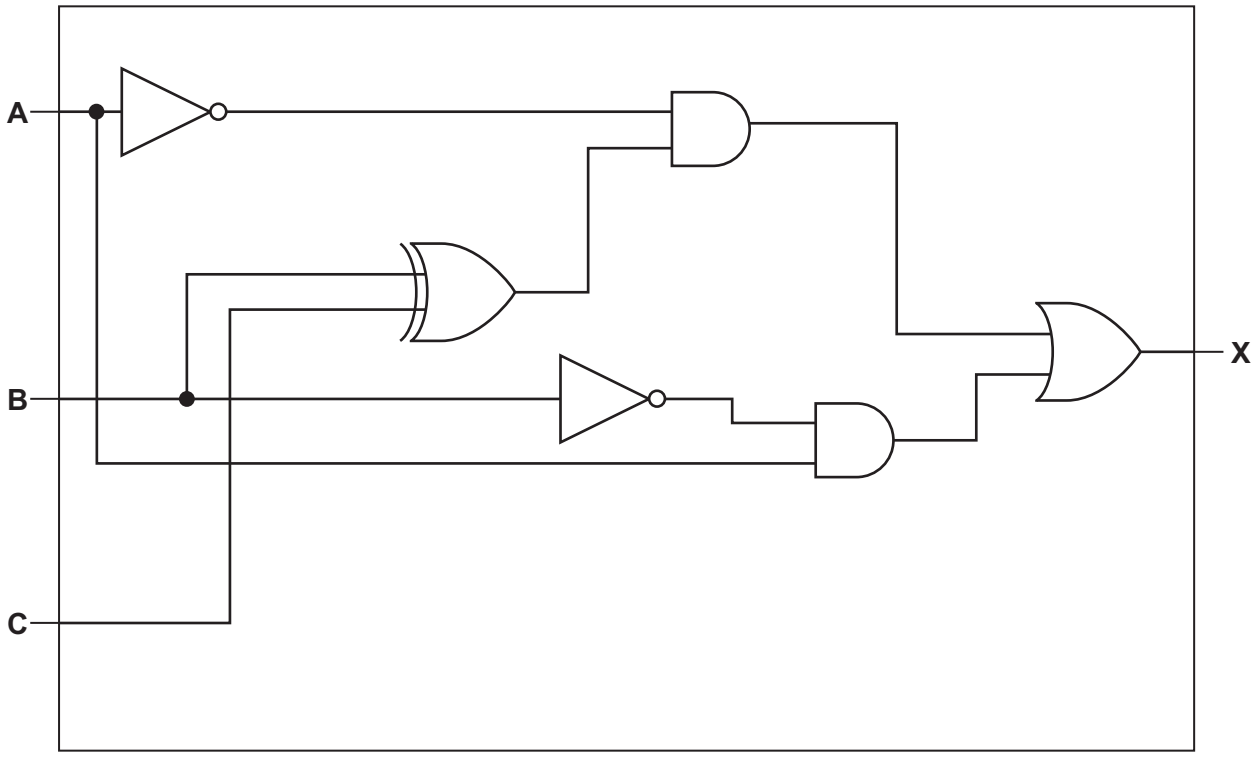
..... [1]

(ii) Complete the table by writing the ASCII denary value for the character 't' **and** its hexadecimal equivalent.

Character	**t**
ASCII denary value	
Hexadecimal value	

[2]

5 **(a)** A logic circuit is given:



Complete the following truth table for the logic circuit.

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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(b) Identify **one** logic gate not used in the logic circuit in **part (a)**.

Draw the symbol for this logic gate **and** complete its truth table.

Logic gate: .....

Symbol:

Truth table:

Input		**Output**
A	**B**	
0	0	
0	1	
1	0	
1	1	

[3]

6 A processor has one general purpose register, the Accumulator (ACC), and an Index Register (IX).

(a) The table gives **three** assembly language instructions for loading data into the ACC. It also identifies the addressing mode used for each instruction.

	Instruction	Addressing mode
A	`LDM #193`	Immediate
B	`LDD 193`	Direct
C	`LDX 193`	Indexed

(i) State the contents of the Accumulator after each of the instructions **A**, **B** and **C** are run.

A .....

.....

B .....

.....

C .....

.....

[3]

(ii) Name **two** other addressing modes.

1 .....

2 .....

[2]

(b) The ACC is a general purpose register. The IX is a special purpose register.

Identify **two** other special purpose registers used in the fetch-execute cycle **and** describe their role in the cycle.

Register 1 .....

Role .....

.....

.....

Register 2 .....

Role .....

.....

.....

[4]

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7 A driving school teaches people how to drive cars. The school has a relational database, DRIVING_SCHOOL, to store information about instructors, students, lessons and the cars used by instructors.

INSTRUCTOR(InstructorID, FirstName, LastName, DateOfBirth, Level)

CAR(Registration, Make, Model, EngineSize)

INSTRUCTOR_CAR(InstructorID, Registration)

STUDENT(StudentID, FirstName, LastName, DateOfBirth, Address1)

LESSON(LessonID, StudentID, InstructorID, LessonDate, LessonTime)

(a) Give **two** benefits to the **driving school** of using a relational database instead of a flat file.

1.....

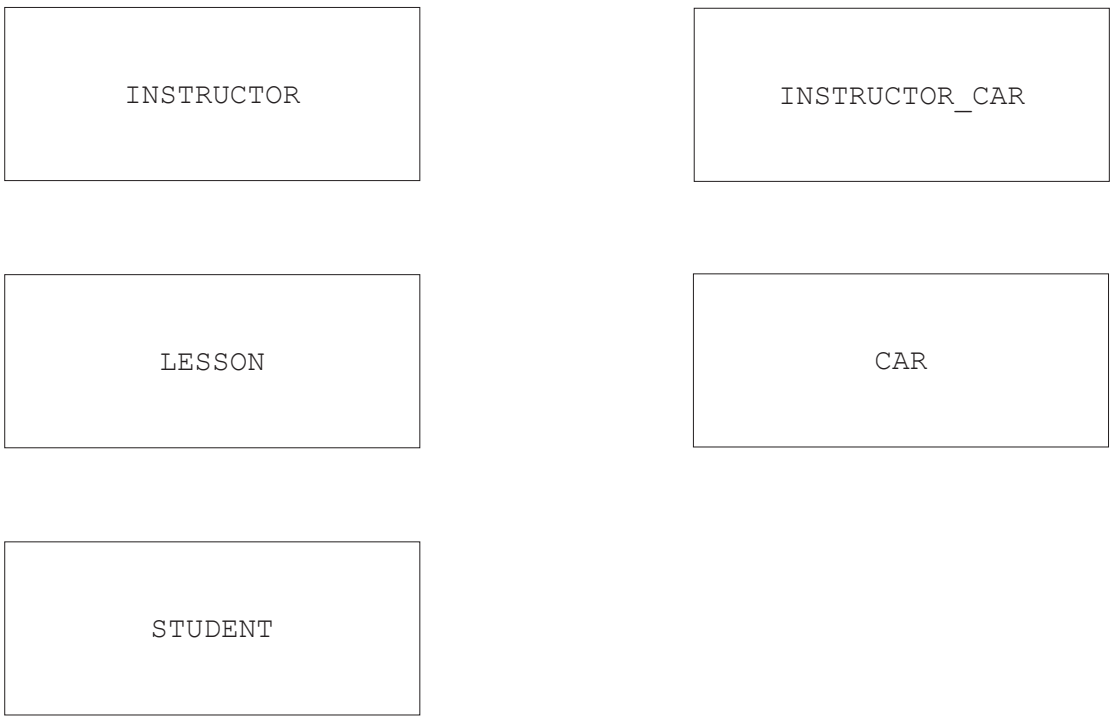
.....

2.....

.....

[2]

(b) Complete the entity-relationship diagram for the database DRIVING_SCHOOL.



[4]

(c) The table shows some sample data for the table `INSTRUCTOR`.

InstructorID	FirstName	LastName	DateOfBirth	Level
Ins01	Jayden	Han	05/06/1974	1
Ins02	Freda	Choi	06/02/1978	2
Ins03	Kelly	Kim	01/12/1966	1
Ins04	Santana	Thompson	09/09/1985	3

Complete the Data Definition Language (DDL) statement to create the table `INSTRUCTOR`.

```
..... TABLE INSTRUCTOR(
    InstructorID VARCHAR(5),
    FirstName VARCHAR(15),
    LastName VARCHAR(15),
    DateOfBirth DATE,
    Level ..... ,
    ..... (InstructorID)
);
```

[3]

(d) The table `STUDENT` needs an additional field to store the student's telephone number, for example 012-3456.

Write a Data Definition Language (DDL) statement to add the new field to the table `STUDENT`.

.....

.....

.....

..... [2]

(e) Write a Data Manipulation Language (DML) statement to return the date and time of all future lessons booked with the instructor whose `InstructorID` is Ins01.

.....

.....

.....

.....

.....

.....

..... [4]

8 Bart plays computer games on his stand-alone games console.

The games console has an operating system.

(a) Describe the tasks performed by the operating system to manage the **main memory** in the games console.

.....

.....

.....

.....

.....

.....

.....

..... [4]

(b) The computer games are written in a high-level language. Bart does not need a compiler or an interpreter to run the games he buys for his console.

Explain why the games run without the need for a compiler or an interpreter.

.....

.....

.....

..... [2]

(c) When Bart is at work, he connects his work laptop to his employer's Local Area Network (LAN). The LAN has both a router and a gateway.

Give **two** similarities and **one** difference between a router and a gateway.

Similarity 1 .....

.....

Similarity 2 .....

.....

Difference .....

.....

.....

[3]

9 Utility programs are examples of system software.

(a) Complete the table by writing the name of the utility program for each description.

Description	Utility program
Reorganises files on a disk to improve efficiency	
Scans a hard disk to identify bad sectors	
Prepares a hard disk for first use	

[3]

(b) File compression is one example of a utility program.

Tick (✓) **one** box on each row to indicate whether the action is an example of lossy compression or lossless compression.

Action	Lossy	Lossless
Reducing the resolution of an image		
Using run-length encoding on a text file		
Reducing the sampling rate of a sound file		

[1]

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