Cambridge International AS & A Level

Cambridge International Examinations
Cambridge International Advanced Subsidiary and Advanced Level

CANDIDATE NAME

CENTRE NUMBER | | | | | |

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4861110320

COMPUTER SCIENCE **9608/12**

Paper 1 Theory Fundamentals **May/June 2018**

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 An operating system (OS) is usually pre-installed on a new computer.

(a) The OS performs a number of different tasks such as file management and peripheral management.

(i) State **three** file management tasks the OS performs.

1 .....

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2 .....

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3 .....

.....

[3]

(ii) State **three** printer management tasks the OS performs.

1 .....

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2 .....

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3 .....

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[3]

(b) Utility software is usually pre-installed on a new computer.

(i) The following table lists four programs. Put **one** tick (✓) in each row to indicate whether or not the program is utility software.

Program	True	False
Database		
Virus checker		
Web browser		
Backup software		

[4]

(ii) Name **two** other utility programs.

Program 1 .....

Program 2 .....

[2]

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Question 2 begins on the next page.

2 **(a)** A greenhouse control system has four input parameters (H, D, T, W) and two outputs (X, Y).

Parameter	Description of parameter	Binary value	Condition
H	Humidity	0	Too low
		1	Acceptable
D	Day	0	Night
		1	Day
T	Temperature	0	Too high
		1	Acceptable
W	Windows	0	Closed
		1	Open

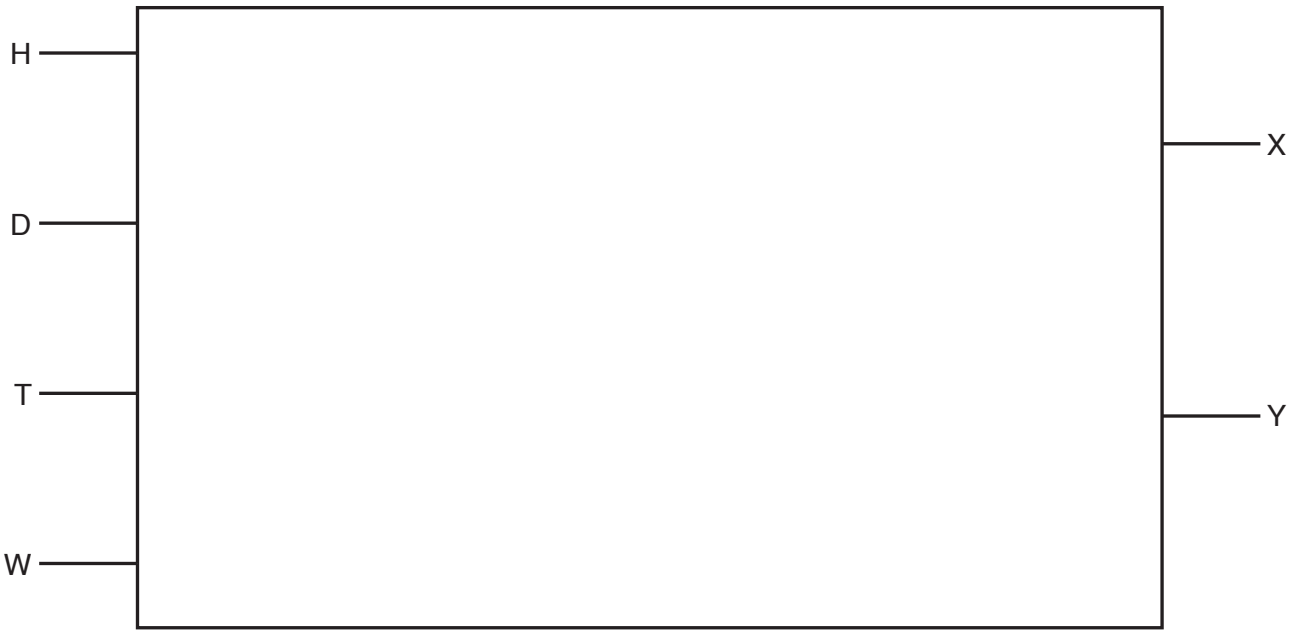
The watering system turns on (X = 1) if:

either it is daytime **and** the temperature is too high

or the humidity is too low.

The fan turns on (Y = 1) if the temperature is too high **and** the windows are closed.

Draw a logic circuit to represent the greenhouse control system.



[6]

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(b) Complete the truth table for the logic expression: **X** = NOT **A** AND (**B** NAND **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 Parity bits can be used to verify data.

(a) The following binary number is transmitted using **odd** parity.

Add the missing parity bit.

Parity bit							
	0	1	0	0	0	0	0

[1]

(b) In the following data transmitted, the first column contains the parity bits, and the last row contains the parity byte. A device transmits the data using **even** parity.

Circle the error in the data transmitted.

	Parity bit	**Data**						
	1	0	1	0	1	1	1	1
	0	1	1	0	0	1	1	0
	1	1	0	0	0	0	0	0
	0	1	0	0	0	0	0	0
Parity byte	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**1**

[1]

(c) The following table shows five error detection measures.

Put **one** tick (✓) in each row to indicate whether the measure is validation or verification.

Measure	**Validation**	**Verification**
Checksum		
Format check		
Range check		
Double entry		
Check digit		

[5]

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4 **(a)** The Accumulator is a register. The current contents of the Accumulator are:

1	1	0	1	1	0	1	1

The current contents of the Accumulator represent an unsigned binary integer.

(i) Convert the value in the Accumulator into denary.

.....[1]

(ii) Convert the value in the Accumulator into hexadecimal.

.....[1]

(iii) The current contents of the Accumulator represent a two's complement binary integer.

Convert the value in the Accumulator into denary.

.....[1]

(b) The binary integer represents a character from the computer's character set.

(i) Define the term **character set**.

.....

.....[1]

(ii) Explain the differences between the **ASCII** and **Unicode** character sets.

.....

.....

.....

.....[2]

(iii) The ASCII code for 'A' is 41 in hexadecimal.

Calculate the ASCII code in hexadecimal for 'Z'. Show your working.

Working .....

.....

.....

ASCII code in hexadecimal for 'Z' .....
[2]

5 A student has recorded a sound track for a short film.

(a) Explain how an analogue sound wave is sampled to convert it into digital format.

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.....[3]

(b) Explain the effects of increasing the sampling resolution on the sound file.

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.....[2]

(c) The original sound was sampled at 44.1 kHz. The sample rate is changed to 22.05 kHz.

Explain the effects of this change on the sound file.

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.....[3]

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(d) The student uses sound editing software to edit the sound file.

Name **two** features of sound editing software the student can use to edit the sound file.

Describe the purpose of each feature.

Feature 1 .....

Purpose .....

.....

.....

Feature 2 .....

Purpose .....

.....

.....

[4]

Question 6 begins on the next page.

6 A web page includes the following HTML and JavaScript code.

```
01   <html>
02   <body>
03
04   <p>Enter your mark</p>
05   <input id="Mark" value="0">
06   <button onclick="calcGrade()">Enter</button>
07
08   <script>
09        function calcGrade() {
10             var mark, grade;
11             mark = document.getElementById("Mark").value;
12             if (mark >= 90) {
13                  grade = "A"
14             } else if (mark >= 80) {
15                  grade = "B"
16             } else if (mark >= 70) {
17                  grade = "C"
18             } else if (mark >= 60) {
19                  grade = "D"
20             } else if (mark >= 50) {
21                  grade = "E"
22             } else {
23                  grade = "U"
24             }
25             alert("Your grade is " + grade)
26        }
27   </script>
28
29   </body>
30   </html>
```

(a) Give the identifier of **two** variables used in the JavaScript code.

1 .....

2 .....
[2]

(b) Give the line number where the JavaScript code produces an output.

.....[1]

(c) Describe the purpose of the statement on line `11`.

.....

.....[2]

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(d) (i) State whether this JavaScript code will be run client-side or server-side.

.....[1]

(ii) Explain the difference between **client-side** scripting and **server-side** scripting.

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.....[3]

7 A social media website has a relational database, WEBDATA, that stores the site's information.

The database has three tables to store users' details, and details of the images and text that they post.

USER(UserName, FirstName, SecondName, DateOfBirth)

PHOTO(PhotoID, UserName, Comment, UploadDate)

TEXTPOST(PostID, UserName, DateOfPost, TheText)

(a) (i) Explain how the relationship between the tables USER and PHOTO has been implemented.

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.....[2]

(ii) Draw the entity-relationship (E-R) diagram to show the relationships between the three tables.

[2]

(b) A database administrator decides to enforce referential integrity.

Use an example from the database WEBDATA to explain what is meant by **referential integrity**.

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.....[3]

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(c) The database has been normalised to Third Normal Form (3NF).

Define the three stages of database normalisation.

1NF .....

.....

2NF .....

.....

3NF .....

.....

[3]

(d) The following shows sample data from the USER table.

UserName	FirstName	SecondName	DateOfBirth
gem123	John	Smith	01/01/1995
purpleSky	Muhammed	Ali	23/02/1956
OpenWindow	Sunny	Amir	03/03/1997
bluebird127	Raziya	Bello	04/03/1982

(i) Write an SQL script to create the USER table.

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.....[5]

(ii) The database administrator needs to alter the USER table. A new field, `Country`, needs to be added.

Write an SQL script to add the field `Country` to the USER table.

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.....[2]

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