Cambridge International AS & A Level

Cambridge International Examinations
Cambridge International Advanced Subsidiary and Advanced Level

CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER			

8931165436

COMPUTER SCIENCE **9608/11**

Paper 1 Theory Fundamentals **October/November 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 **15** printed pages and **1** blank page.

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CAMBRIDGE International Examinations

1 A student is creating a short video and needs to record music to play in the background.

(a) The student uses a microphone to capture the music.

Explain how the microphone captures the music.

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.....[3]

(b) An analogue-to-digital converter uses sampling to encode the sound.

Explain how different sampling resolutions affect the sound file and the sound it represents.

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.....[3]

(c) The student needs to edit the sound file.

Describe **two** features of sound editing software that can be used to edit the sound file.

Feature 1 .....

.....

.....

.....

Feature 2 .....

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.....

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[4]

(d) The video is recorded with a frame rate of 60 frames per second (fps) and uses progressive encoding.

(i) Describe what is meant by **a frame rate of 60 fps**.

.....

.....[1]

(ii) Describe what is meant by **progressive encoding** in video recording.

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.....

.....[2]

(e) MP4 multimedia container format is used to save the video.

State what is meant by **multimedia container format**.

.....

.....[1]

2 Computer **A** needs to access a web page.

(a) State how Computer **A** could access the web page without using a Domain Name Service (DNS).

.....

.....[1]

(b) **(i)** The following table shows four IPv6 addresses.

State if each address is valid or invalid.

IP address	Valid or invalid
21E5:69AA:FFFF:1:E100:B691:1285:F56E	
::255.255.255.255	
59FB::1005:CC57:6571	
56FE::2159:5BBC::6594	

[4]

(ii) The following table shows four statements about either public or private IP addresses.

Tick (✓) **one** box in each row to indicate whether each statement refers to a public or a private IP address.

Statement	Public	Private
192.168.2.1 is an example of this type of address		
Assigned by the Internet Service Provider (ISP)		
IP address cannot be duplicated in different networks		
Network Address Translation (NAT) is necessary to access the Internet directly		

[4]

(c) One type of transmission media is copper cable.

Give **two** additional types of transmission media.

1 .....

2 .....

[2]

3 Hugo has produced a program (app) for mobile phones. He needs to decide whether to use an Open Source licence or to distribute the app as shareware.

(a) Describe what is meant by **Open Source licence** and **shareware**.

Open Source .....

.....

.....

.....

Shareware .....

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.....

[4]

(b) Tick (✓) **one** box to indicate the licence Hugo should use. Justify your choice.

Open Source	
Shareware	

Justification .....

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.....

.....[2]

4 The table shows assembly language instructions for a processor which has one general purpose register, the Accumulator (ACC) and an index register (IX).

Instruction		Explanation
Op code	**Operand**	
LDD	<address>	Direct addressing. Load the contents of the location at the given 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.
STO	<address>	Store contents of ACC at the given address.
ADD	<address>	Add the contents of the given address to ACC.
INC	<register>	Add 1 to the contents of the register (ACC or IX).
DEC	<register>	Subtract 1 from the contents of the register (ACC or IX).
CMP	<address>	Compare contents of ACC with contents of <address>.
JPE	<address>	Following a compare instruction, jump to <address> if the compare was True.
JPN	<address>	Following a compare instruction, jump to <address> if the compare was False.
JMP	<address>	Jump to the given address.
OUT		Output to the screen the character whose ASCII value is stored in ACC.
END		Return control to the operating system.

(a) (i) State what is meant by **direct addressing** and **indirect addressing**.

Direct addressing .....

.....

Indirect addressing .....

.....

[2]

(ii) Explain how the instruction `ADD 20` can be interpreted as either direct or indirect addressing.

Direct addressing .....

.....

Indirect addressing .....

.....

[2]

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(b) The assembly language instructions in the following table use either symbolic addressing or absolute addressing.

Tick (✓) **one** box in each row to indicate whether the instruction uses symbolic or absolute addressing.

Instruction	Symbolic	Absolute
`ADD 90`		
`CMP found`		
`STO 20`		

[2]

(c) The current contents of a general purpose register (X) are:

X	1	0	1	1	1	0	1	0

(i) The contents of X represent an unsigned binary integer.

Convert the value in X into denary.

.....[1]

(ii) The contents of X represent an unsigned binary integer.

Convert the value in X into hexadecimal.

.....[1]

(iii) The contents of X represent a two's complement binary integer.

Convert the value in X into denary.

.....[1]

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(d) The current contents of the main memory, Index Register (IX) and selected values from the ASCII character set are provided with a copy of the instruction set.

Address	Instruction
70	LDX 200
71	OUT
72	STO 203
73	LDD 204
74	INC ACC
75	STO 204
76	INC IX
77	LDX 200
78	CMP 203
79	JPN 81
80	OUT
81	LDD 204
82	CMP 205
83	JPN 74
84	END
…	
200	130
201	133
202	130
203	0
204	0
205	2

IX	0

ASCII code table (selected codes only)

ASCII code	Character
127	?
128	!
129	“
130	*
131	$
132	&
133	%
134	/

Instruction set

Instruction		Explanation
Op code	Operand	
LDD	<address>	Direct addressing. Load the contents of the location at the given 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.
STO	<address>	Store contents of ACC at the given address.
ADD	<address>	Add the contents of the given address to ACC.
INC	<register>	Add 1 to the contents of the register (ACC or IX).
DEC	<register>	Subtract 1 from the contents of the register (ACC or IX).
CMP	<address>	Compare contents of ACC with contents of <address>.
JPE	<address>	Following a compare instruction, jump to <address> if the compare was True.
JPN	<address>	Following a compare instruction, jump to <address> if the compare was False.
JMP	<address>	Jump to the given address.
OUT		Output to the screen the character whose ASCII value is stored in ACC.
END		Return control to the operating system.

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9

Complete the trace table for the given assembly language program.

Instruction address	ACC	Memory address						IX	OUTPUT
		200	201	202	203	204	205		
70	130	130	133	130	0	0	2	0	

[8]

5 For each of the following scenarios, tick (✓) **one** box for each scenario to indicate whether you think the person's behaviour is ethical or unethical. Justify your choice.

(a) Kevin is a software engineer who has recently started a job with a new company. He is using program code from his previous employer in his new employer's programs.

Ethical	
Unethical	

Justification .....

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.....

.....[2]

(b) Nadya is a software developer. She has accepted a new job. She has never worked with the programming languages used by this new company. Nadya is planning to increase her knowledge of these programming languages before she starts her new job.

Ethical	
Unethical	

Justification .....

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.....[2]

(c) Maria finds that one of her team members has produced some inventive code. She presents this to her manager, stating that it was produced by the team. She does not mention the individual's name.

Ethical	
Unethical	

Justification .....

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.....[2]

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

```
01 <?php
02     if(isset($_GET['age'])) {
03         echo "Result: ", allowed($_GET['age']);
04     } else {
05 ?>
06
07 <form action="#" method="get">
08     Enter Age: <input type="text" name="age" /><br/>
09     <input type="submit" value="Calculate" />
10 </form>
11
12 <?php
13       }
14       function allowed($age) {
15           if($age <= 16) $message = "You need permission";
16           else if($age > 30) $message = "You are too old";
17           else $message = "Allowed";
18           return $message;
19       }
20 ?>
```

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

1 .....

2 .....
[2]

(b) Write the value assigned to `$message` if the user types `30` in the text box.

.....[1]

(c) Explain the purpose of the code in line `18`.

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.....[2]

(d) The PHP code in a web page uses server-side scripting.

List the sequence of events that take place when a user requests a web page containing PHP code.

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.....[4]

Question 7 begins on the next page.

7 A movie theatre has a relational database that stores the movie schedule, and information about the movies. The theatre has several screens that play movies at the same time.

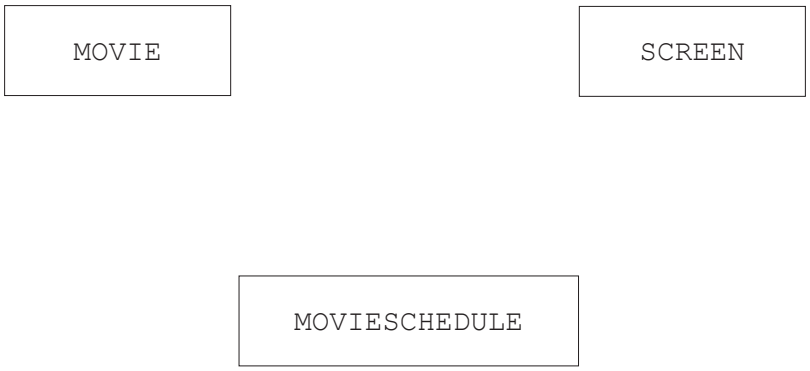
The database has three tables to store information about the movies, the screens and the movie schedule.

MOVIE(MovieID, Title, Length, Rating)

SCREEN(ScreenNumber, NumberSeats)

MOVIESCHEDULE(ScheduleID, MovieID, ScreenNumber, Time)

(a) Complete the entity-relationship (E-R) diagram to show the relationships between these tables.



[2]

(b) Explain how primary and foreign keys are used to link the tables in the movie theatre database.

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.....[4]

(c) The database needs to store the name of the company that produced each movie, for example, `Rocking Movies`.

Write an SQL script to add the attribute `ProductionCompany` to the `MOVIE` table.

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.....[2]

(d) Write an SQL script to display the title and rating of all movies scheduled to play on screen number 3.

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.....[4]

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