Cambridge International AS & A Level

Cambridge International Examinations
Cambridge International Advanced Subsidiary and Advanced Level

CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER			

4204544686

COMPUTER SCIENCE **9608/12**

Paper 1 Theory Fundamentals **October/November 2016**

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 **12** printed pages.

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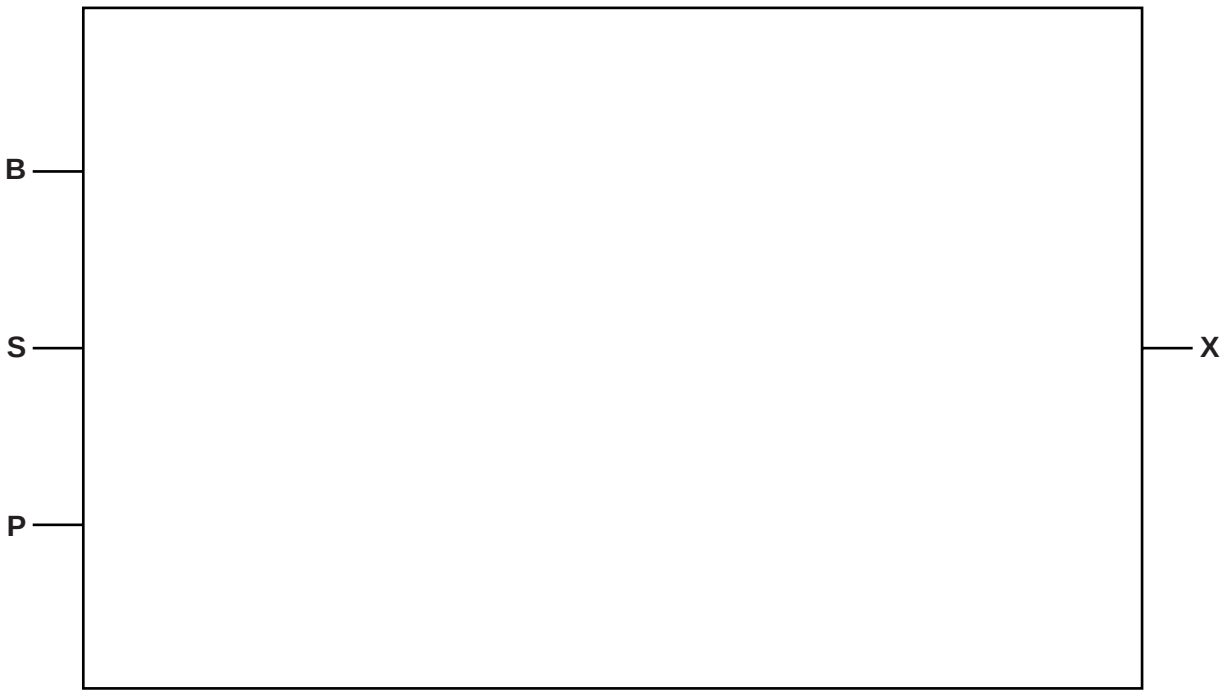
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1 **(a)** A student writes the following logic expression:

X is 1 IF (B is NOT 1 AND S is NOT 1) OR (P is NOT 1 AND S is 1)

Draw a logic circuit to represent this logic expression.

Do not attempt to simplify the logic expression.



[6]

(b) Complete the truth table for the logic expression given in **part (a)**.

B	S	P	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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2 **(a)** When recording a video, state what is meant by frame rate.

.....

.....[1]

(b) Video streaming can use either interlaced encoding or progressive encoding.

Describe what is meant by the following terms.

Interlaced encoding

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Progressive encoding

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.....[4]

(c) **(i)** Name the video terms described below:

Description	Term
Pixels in two video frames have the same value in the same location. There is duplication of data between frames.	.....
A sequence of pixels in a single video frame have the same value.	.....

[2]

(ii) Give **one** file technique that could be applied when either of the two features, described in **part (c)(i)**, are present.

.....

.....[1]

3 When an application program requests a file stored on a hard disk, the computer system reads the file. Use the statement labels A to H to complete the sequence of steps that describe how this happens.

Label	Statement
A	When the hard disk drive has read the file, it generates an interrupt.
B	While the file continues, the head reads successive clusters of sectors from the disk and writes data into the disk buffer.
C	The head reads the first cluster of sectors from disk and writes data into the disk buffer.
D	The head moves to the correct track.
E	The operating system transfers the contents of the disk buffer to the application program's data memory.
F	In the relevant directory file, the operating system looks up the track and sector where the file begins.
G	Application program passes file read request to the operating system.
H	The hard disk drive waits for the correct sector to arrive under the head.

1. The application program executes a statement to read a file.
2. .....
3. The operating system begins to spin the hard disk, if it is not currently spinning.
4. .....
5. .....
6. .....
7. .....
8. .....
9. .....
10. .....

[8]

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4 Hexadecimal, Binary Coded Decimal (BCD) and binary values are shown below.

Draw a line to link each value to its correct denary value.

Hexadecimal, BCD, binary	**Denary**
	93
Hexadecimal: 3A	−65
BCD representation: 0100 1001	58
	−63
Binary integer: 01011101	73
Two's complement binary integer: 11000001	49
	−93

[4]

5 The table shows assembly language instructions for a processor that 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 given address to ACC.
LDX	<address>	Index addressing. Form the address from <address> + the contents of the index register. Copy the contents of this calculated address to ACC.
LDI	<address>	Indirect addressing. The address to be used is at the given address. Load the contents of this second address to ACC.
STO	<address>	Store the contents of ACC at the given address.
INC	<register>	Add 1 to contents of the register (ACC or IX).
ADD	<address>	Add the contents of the given address to the ACC.
END		Return control to the operating system.

The diagram shows the contents of a section of main memory:

Main memory

100	0000 0010
101	1001 0011
102	0111 0011
103	0110 1011
104	0111 1110
105	1011 0001
106	0110 1000
107	0100 1011
…	
200	1001 1110

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(a) (i) Show the contents of the Accumulator after the execution of the instruction:

```
LDD 102
```

ACC:								

[1]

(ii) Show the contents of the Accumulator after the execution of the instruction:

```
LDX 101
```

IX:	0	0	0	0	0	1	0	0

ACC:								

Explain how you arrived at your answer.

.....

.....

.....

.....[2]

(iii) Show the contents of the Accumulator after the execution of the instruction:

```
LDI 103
```

ACC:								

Explain how you arrived at your answer.

.....

.....

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.....[3]

(b) Complete the trace table below for the following assembly language program.

800	`LDD 810`
801	`INC ACC`
802	`STO 812`
803	`LDD 811`
804	`ADD 812`
805	`STO 813`
806	`END`
...	
810	`28`
811	`41`
812	`0`
813	`0`

Trace table:

ACC	**Memory address**			
	810	811	812	813
	28	41	0	0

[6]

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6 **(a)** Describe **two** differences between RAM and ROM.

1 .....

.....

2 .....

.....[2]

(b) State **three** differences between Dynamic RAM (DRAM) and Static RAM (SRAM).

1 .....

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2 .....

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3 .....

.....[3]

7 One management task carried out by an operating system is to provide a user interface.

Describe **two** more of these management tasks.

1 .....

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2 .....

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.....[4]

8 A programmer is writing a program that includes code from a program library.

(a) Describe **two** benefits to the programmer of using one or more library routines.

1 .....

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2 .....

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.....[4]

(b) The programmer decides to use a Dynamic Link Library (DLL) file.

(i) Describe **two** benefits of using DLL files.

1 .....

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2 .....

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.....[4]

(ii) State **one** drawback of using DLL files.

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.....[2]

9 A health club offers classes to its members. A member needs to book into each class in advance.

(a) The health club employs a programmer to update the class booking system. The programmer has to decide how to store the records. The choice is between using a relational database or a file-based approach.

Give **three** reasons why the programmer should use a relational database.

1 .....

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2 .....

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3 .....

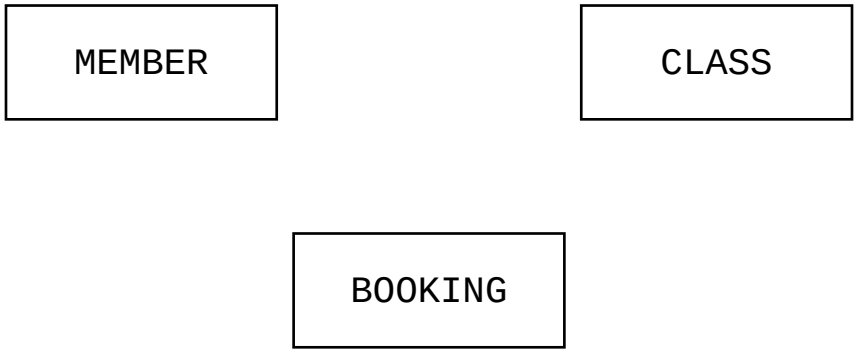
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.....[6]

(b) The programmer decides to use three tables: `MEMBER`, `BOOKING` and `CLASS`.

Complete the Entity-Relationship (E-R) diagram to show the relationships between these tables.



[2]

(c) The CLASS table has primary key ClassID and stores the following data:

ClassID	Description	StartDate	ClassTime	NoOfSessions	AdultsOnly
DAY01	Yoga beginners	12/01/2016	11:00	5	TRUE
EVE02	Yoga beginners	12/01/2016	19:00	5	FALSE
DAY16	Circuits	30/06/2016	10:30	4	FALSE

Write an SQL script to create the CLASS table.

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.....[6]

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