Cambridge International AS & A Level

Cambridge International Examinations
Cambridge International Advanced Subsidiary and Advanced Level

CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER			

5013810887

COMPUTER SCIENCE **9608/12**

Paper 1 Theory Fundamentals **October/November 2017**

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.

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1 One of the tasks of the operating system (OS) is the management of the main memory of the computer system.

State and describe **three** other operating system management tasks.

1 .....

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2 .....

.....

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3 .....

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.....

[6]

2 **(a)** The diagram shows three items of software that translate program code.

Draw **one** line from each context to the correct item of translation software.

Context	Item of translation software
The source code is written in a high-level language. An executable file is produced.	Assembler
The source code uses instructions from the processor's instruction set.	Interpreter
The source code and translation software must both be in main memory at execution time.	Compiler
A web page contains some JavaScript code.	

[4]

(b) A programmer is developing software and has both a compiler and interpreter for the high-level language used.

Describe **two** benefits of using each form of translation software.

(i) Benefits of a compiler

1 .....

.....

2 .....

.....

[2]

(ii) Benefits of an interpreter

1 .....

.....

2 .....

.....

[2]

3 A Local Area Network is used by school staff who access data stored in a Database Management System (DBMS).

(a) **(i)** Explain the difference between security and privacy of data.

.....

.....

.....

.....

.....

.....[3]

(ii) Give an example for this application where privacy of data is a key concern.

.....

.....[1]

(b) Name and describe **two** security measures the Network Manager has in place to protect the security of the data held in the DBMS.

1 .....

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.....

.....

2 .....

.....

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.....

[4]

(c) A task for staff at the start of the school year is to key in new pupil data from a paper document.

The data is entered to a screen form and includes the data verification of some fields.

Describe what is meant by **verification**.

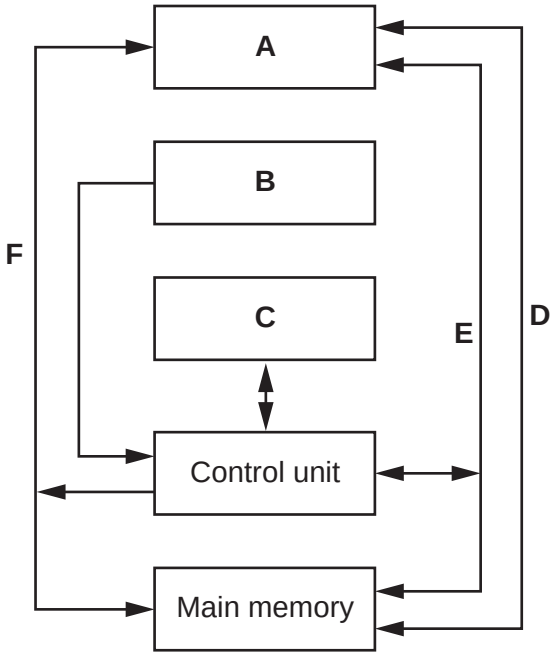
.....

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.....[2]

4 The following diagram shows the components and buses found inside a typical personal computer (PC).



(a) Some components and buses only have labels **A** to **F** to identify them.

For each label, choose the appropriate title from the following list. The title for label **D** is already given.

- Control bus
- Address bus
- Arithmetic Logic Unit (ALU)
- General purpose registers
- Secondary storage
- System clock

A .....

B .....

C .....

D Data bus

E .....

F .....

[5]

(b) Clock speed is a factor that affects the performance of a PC. Explain this statement.

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.....[2]

(c) An assembly language program can contain both **macros** and **directives**.

(i) Explain what is meant by these terms.

Macro .....

.....

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Directive .....

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[3]

(ii) Give an example of the use of a directive.

.....

.....[1]

(d) The following table shows part of the instruction set for a processor. The processor has one general purpose register, the Accumulator (ACC), and an Index Register (IX).

Instruction		**Explanation**
Op code (mnemonic)	**Operand**	
LDD	<address>	Direct addressing. Load the contents of the given address to ACC.
LDV	#n	Relative addressing. Move to the address n locations from the address of the current instruction. Load the contents of this address to ACC.
STO	<address>	Store the contents of ACC at the given address.
INC		Increment the contents of ACC.
OUTCH		Output the character corresponding to the ASCII character code in ACC.
JPE	<address>	Following a compare instruction, jump to <address> if the compare was True.
JMP	<address>	Jump to the given address.
CMP	#n	Compare the contents of ACC with number n.

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Complete the trace table for the following assembly language program.

Label	Instruction
StartProg:	LDV #Offset
	CMP Value
	JPE EndProg
	OUTCH
	LDD Offset
	INC
	STO Offset
	JMP StartProg
EndProg:	END
Offset:	10
	50
	65
	89
	32
Value:	32

ASCII code table (selected codes only)				
<Space>	2	A	B	Y
32	50	65	66	89

Trace table:

ACC	Offset	OUTPUT
	10	
50		2
10		

[5]

(e) The program given in **part (d)** is to be translated using a two-pass assembler. The program has been copied here for you.

Label	Instruction
StartProg:	LDV #Offset
	CMP Value
	JPE EndProg
	OUTCH
	LDD Offset
	INC
	STO Offset
	JMP StartProg
EndProg:	END
Offset:	10
	50
	65
	89
	32
Value:	32

On the first pass, the assembly process adds entries to a symbol table.

The following symbol table shows the first five entries, part way through the first pass.

The circular labels show the order in which the assembler made the entries to the symbol table.

Complete the symbol table. Use circular labels to show the order in which the assembler makes the entries.

Symbol table

Symbolic address	Relative address
StartProg (1)	0 (2)
Offset (3)	UNKNOWN (4)
Value (5)	

[6]

5 The IEEE Software Engineering Code of Ethics uses eight key principles shown in the right-hand column of the following diagram.

Tom is employed as a tester with a software company. He is keen to become a trainee programmer.

The middle column in the diagram labels six incidents which have happened to Tom this week. The table that follows the diagram describes each incident.



Incident	Description
A	Tom has received some phishing emails. He reported this to the bank they were supposed to have come from.
B	Tom has asked his manager if they will pay for him to attend a programming course.
C	Tom is testing beta versions of new games software at work. He copies the software on to CD-Rs and sells them to his friends.
D	Tom has completed the application forms to join the Chartered Institute for IT.
E	Tom finds it difficult to work with one of his colleagues. His way of dealing with this has been to refuse to speak with the colleague.
F	Tom's manager had considered the testing of a new game was completed. Tom reported to his manager that he thought there were still bugs which needed to be rectified.

(a) Draw a line on the diagram to link each of the six incidents to either ethical behaviour or unethical behaviour. [2]

(b) Consider each incident you have identified as **ethical behaviour**.

Draw a line from each incident to indicate the IEEE category it maps to. [4]

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6 **(a)** A personal computer (PC) is extensively used for a wide range of applications, including the three shown in the following table.

Write in the table, a suitable input device, output device, or both needed for each application.

Do not give a monitor, keyboard or mouse in your answers.

Application	Input device	Output device
Capture the text from a paper document, in order that the text can be word processed		
Producing a replica of a small plastic component from a washing machine		
A museum has interactive information facilities throughout the building		

[3]

(b) Explain the basic internal operation of a hard disk drive.

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.....[4]

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7 A company takes customer service for its clients very seriously.

The client

- The client names are unique.

A visit

- The company arranges a date for a visit to gather feedback from a client.
- A visit to a client never takes more than one day.
- Over time, the client receives many visits.

Staff (Interviewers)

- One or more staff attend the visit.
- If there is more than one staff member visiting, each performs a separate interview.

Interviews

- Each interview is classified as either 'general' or by some specialism, for example, marketing, customer service or sales.
- A report is produced for each interview, `InterviewText`.
- Each interview is conducted by a single staff member.

The client, visit, staff and interview data will be stored in a relational database.

(a) (i) Underline the primary key for each table in the following suggested table designs.

```
STAFF(StaffID, StaffName, Department)

CLIENT(ClientName, Address, Town)

VISIT(ClientName, VisitDate)

INTERVIEW(ClientName, VisitDate, StaffID, SpecialistFocus, InterviewText)
```

[3]

(ii) For each of the pairs of entities, A, B and C, draw the relationship between the two entities.

A `CLIENT` `VISIT`

B `VISIT` `INTERVIEW`

C `INTERVIEW` `STAFF`

[3]

(b) The company decides to produce a visit report, `VisitReportText`, for each visit made.

This text will be produced from the one or more interview texts obtained at the visit.

State how one or more of the given table designs can be changed to add this attribute.

.....

.....[1]

(c) Client ABC Holdings are now trading under the name of Albright Holdings.

(i) Write an SQL script to update this client's record in the database.

```
UPDATE .....

SET .....

WHERE .....
```
[3]

(ii) Describe why this update could cause problems with the existing data stored.

.....

.....

.....[2]

(d) Write an SQL script to display the Staff ID of each member of staff who performed an interview when they visited New Age Toys on 13/10/2016.

.....

.....

.....[3]

(e) At present, all interviews are performed in the UK. Many clients now operate in other countries in Europe. The company wants to perform interviews with the client's staff in other countries. Not all interview staff are willing to travel outside of the UK.

State how one or more of the table designs should be revised to store this information.

.....

.....[1]

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