

CANDIDATE  
NAME

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CENTRE  
NUMBER

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CANDIDATE  
NUMBER

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## COMPUTING

## Paper 1

**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 on all the work you hand in.

Write in dark blue or black pen.

You may use a soft 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 for 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.

This document consists of **14** printed pages and **2** blank pages.

1 Once a new system has been fully developed and tested it will be implemented.

(a) One method of implementation is direct changeover.

(i) Give **one** advantage of direct changeover when compared to other methods.

.....  
.....  
.....[1]

(ii) Give **one** disadvantage of direct changeover when compared to other methods.

.....  
.....  
.....[1]

(b) Identify **three** tasks which are part of the installation process.

1 .....  
.....  
2 .....  
.....  
3 .....  
.....[3]

(c) State what is meant by the following **two** terms:

requirements specification .....  
.....  
.....  
design specification .....  
.....  
.....[2]

- 2 (a) A file is set up containing information about films available to rent.

Four of the fields are shown in the table below.

Indicate in the right-hand column of the table the most appropriate data type for each of the four fields (each data type should be different).

Description of field	Data type
Name of the film	
Running time (minutes)	
Category (A, B or C)	
Available on Blu-ray	

[4]

- (b) Customers who are visually-impaired want to choose films.

Identify **two** features that this interface should have to help them.

.....

.....

.....

.....

.....

.....

.....[2]

**3** Five descriptions and eight computer terms are shown below.

Draw lines to connect each description to its correct term.

**description**

Signal from hardware or software that causes the operating system to run the appropriate service routine

Set of rules for data communication

Memory to store data temporarily until it is required for use

A First-In-First-Out (FIFO) structure where items are added at one end and then retrieved from the other end

Form of data transmission in which bits of each character are sent simultaneously using a communications path for each bit

**computer term**

Broadband

Buffer

Interrupt

Parallel transmission

Parity check

Protocol

Queue

Stack

4 Secondary storage media are categorised as:

- magnetic
- optical
- solid state

(a) Give **one** example of each type of storage medium.

magnetic .....

optical .....

solid state .....[3]

(b) Describe a use for **each** of the types of storage medium named above. Give a different use in each case.

magnetic .....

.....

optical .....

.....

solid state .....

.....[3]

(c) Give **two** advantages of using optical media when compared to magnetic media.

1 .....

.....

2 .....

.....[2]

- 5 A microprocessor-controlled alarm clock uses the 24-hour clock. The current time is stored in two 8-bit memory locations:

- the hours value is stored in memory location **A**
- the minutes value is stored in memory location **B**

(a) State the time currently stored in **A** and **B**.

<b>A</b>									<b>B</b>							
0	0	0	1	0	0	1	0	:	0	0	1	1	0	1	0	1

hours: ..... minutes: ..... [2]

- (b) Two 8-bit memory locations, **C** and **D**, store the hours (**C**) and minutes (**D**) of the alarm time.

The alarm has been set for 07:30. Show how 07:30 would be stored:

<b>C</b>									<b>D</b>							

[2]

- (c) Describe how the microprocessor can determine when to sound the clock alarm.

.....  
 .....  
 .....  
 .....  
 ..... [2]

- (d) The liquid crystal display (LCD) on the clock face is back-lit using a blue LED. The LED brightness is controlled by the voltage supplied to it.

At a certain time at night (i.e. at dusk) or when the room darkens, the LCD display is dimmed **automatically**.

Describe how the microprocessor could determine when to adjust the brightness of the display (i.e. brightness of the LED).

.....

.....

.....

.....

.....

.....

.....

.....

.....[4]

- (e) The microprocessor contains both RAM and ROM.

Give **one** function of **each** type of memory in the alarm clock.

RAM .....

.....

ROM .....

.....[2]

- 6 A small football league has eight teams. The league table after seven games is:

team name	played	won	drawn	lost	goals for	goals against
United	7	5	1	1	19	5
Rovers	7	3	3	1	9	6
City	7	3	2	2	13	12
Tryers	7	3	2	2	11	12
Rangers	7	2	3	2	10	11
Hasbeens	7	2	2	3	8	8
Albion	7	1	2	4	5	13
Atlas	7	0	3	4	7	15

- (a) (i) Describe how to store the team names in a suitable data structure.

.....  
 .....  
 .....  
 .....[2]

- (ii) Describe how to store the data from the remaining six columns of the league table in a suitable data structure.

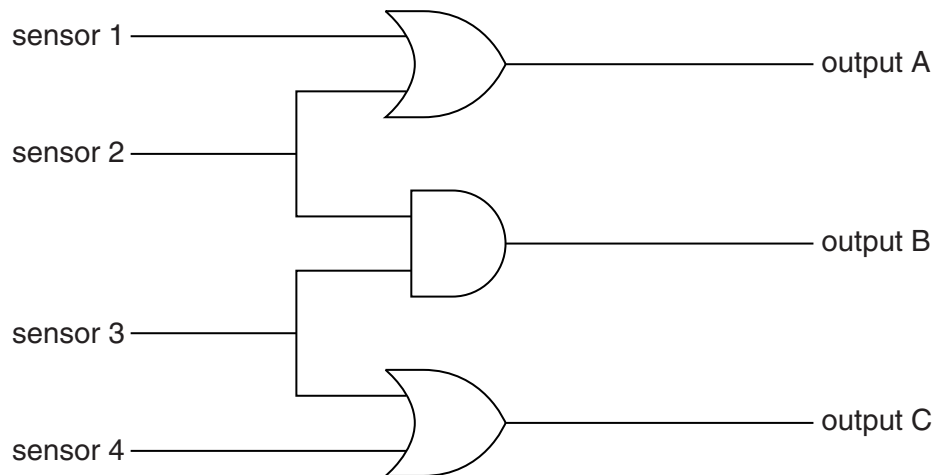
.....  
 .....  
 .....  
 .....[3]

- (b) Describe how to search for teams who have drawn more than two games and display their team names. You may use pseudocode in your answer.

.....  
 .....  
 .....  
 .....  
 .....  
 .....[4]



- 7 Four sensors (numbered 1 to 4) produce binary output which controls the lights at a rock concert. The diagram shows how the sensors are connected:



- (a) Complete the truth table for this logic circuit.

inputs				outputs		
sensor 1	sensor 2	sensor 3	sensor 4	A	B	C
0	0	0	0			
0	0	0	1			
0	0	1	0			
0	0	1	1			
0	1	0	0			
0	1	0	1			
0	1	1	0			
0	1	1	1			
1	0	0	0			
1	0	0	1			
1	0	1	0			
1	0	1	1			
1	1	0	0			
1	1	0	1			
1	1	1	0			
1	1	1	1			

[4]

The output values from the logic circuit, are sampled and stored in the three right-most bits of an 8-bit buffer.

					A	B	C
--	--	--	--	--	---	---	---

Depending on the bit pattern in the buffer, a different colour light is switched on.

The bit patterns represent:

0 0 0 = green light  
 0 0 1 = red light  
 1 0 0 = blue light  
 1 0 1 = yellow light  
 1 1 1 = white light

The value in the 5 left-most bits of the buffer is randomly generated. This value represents the time (in tenths of a second) that will elapse before the logic circuit is sampled again.

For example,

16	8	4	2	1		4	2	1
0	0	1	0	1		0	0	1

indicates that the current **red light** (value 0 0 1) stays on for **five** tenths (value 0 0 1 0 1) of a second.

- (b) (i) Using your output values from the truth table in **part (a)**, decide which coloured light the sensors activate in each case.

Complete the **coloured light** column below.

sensor 1	sensor 2	sensor 3	sensor 4	coloured light
0	0	0	1	
1	0	0	1	
1	1	1	0	
0	1	0	0	



- 8 (a) (i) Describe circuit switching and packet switching.

circuit switching .....

.....

.....

.....

.....

packet switching .....

.....

.....

.....

.....[4]

- (ii) Which of the above methods is used for Internet telephone calls (VoIP)?

.....[1]

- (iii) Explain the benefits and drawbacks of making Internet telephone calls.

.....

.....

.....

.....

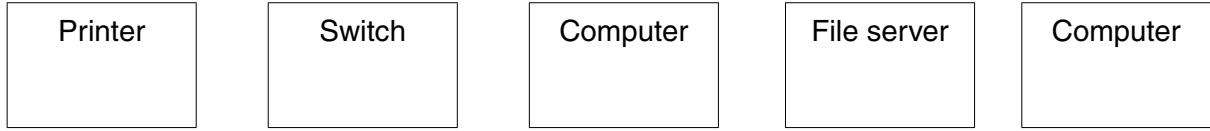
.....

.....

.....[3]

(b) (i) The following components are to be wired as a star network.

Draw the wired connections to complete this star network topology.



[3]

(ii) Give **one** advantage of a star network topology over a bus network topology.

.....

.....[1]

- 9 (a) Explain the function of each of the following parts in an expert system:

knowledge base .....  
 .....  
 rule base .....  
 .....  
 inference engine .....  
 .....[3]

- (b) An expert system is being used to diagnose faults in electronic circuit boards.

Describe **two** features of a suitable user interface.

1 .....  
 .....  
 2 .....  
 .....[2]

- (c) An expert system can be built from either an expert system shell (off-the-shelf software) or it can be custom-written.

Describe **two** differences between off-the-shelf software and custom-written software.

1 .....  
 .....  
 2 .....  
 .....[2]



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