

A326/01

GENERAL CERTIFICATE OF SECONDARY EDUCATION

TWENTY FIRST CENTURY SCIENCE

ADDITIONAL APPLIED SCIENCE A

Communications (Foundation Tier)

FRIDAY 25 JANUARY 2008

Morning

Time: 45 minutes

Candidates answer on the question paper.

Additional materials: Calculator
Pencil
Ruler (cm/mm)

Candidate
ForenameCandidate
SurnameCentre
Number

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Candidate
Number

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INSTRUCTIONS TO CANDIDATES

- Write your name in capital letters, your Centre Number and Candidate Number in the boxes above.
- Use blue or black ink. Pencil may be used for graphs and diagrams only.
- Read each question carefully and make sure that you know what you have to do before starting your answer.
- Answer **all** the questions.
- Do **not** write in the bar codes.
- Do **not** write outside the box bordering each page.
- Write your answer to each question in the space provided.

INFORMATION FOR CANDIDATES

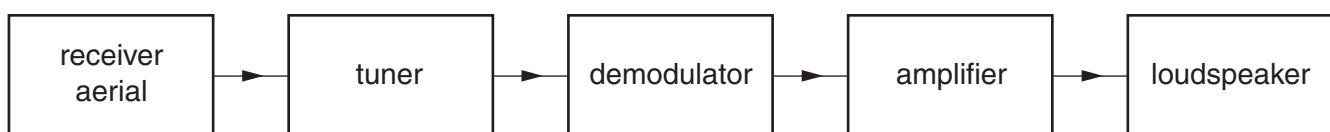
- The number of marks for each question is given in brackets [] at the end of each question or part question.
- The total number of marks for this paper is **36**.

FOR EXAMINER'S USE		
Qu.	Max.	Mark
1	7	
2	8	
3	10	
4	5	
5	6	
TOTAL	36	

This document consists of **11** printed pages and **1** blank page.

Answer **all** the questions.

- 1 Here is the block diagram of a simple radio receiver.



- (a) Complete the sentence.

Choose a word from the list.

information

electricity

radio waves

The arrows show the flow of through the receiver.

[1]

- (b) Draw a straight line to join the **start** and **end** of each sentence.

start

end

The tuner ...

... converts electrical signals into sound.

The amplifier ...

... increases the power of electrical signals.

The loudspeaker ...

... converts radio signals into electrical signals.

The receiver aerial ...

... selects signals with a narrow range of frequencies.

[3]

- (c) The receiver picks up radio signals from a **transmitter**.

Complete the blank block diagram for a radio transmitter.

Choose words from the list.

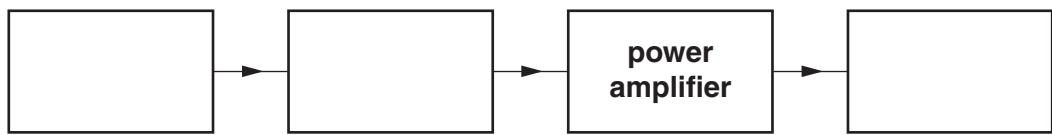
aerial

amplifier

loudspeaker

modulator

microphone



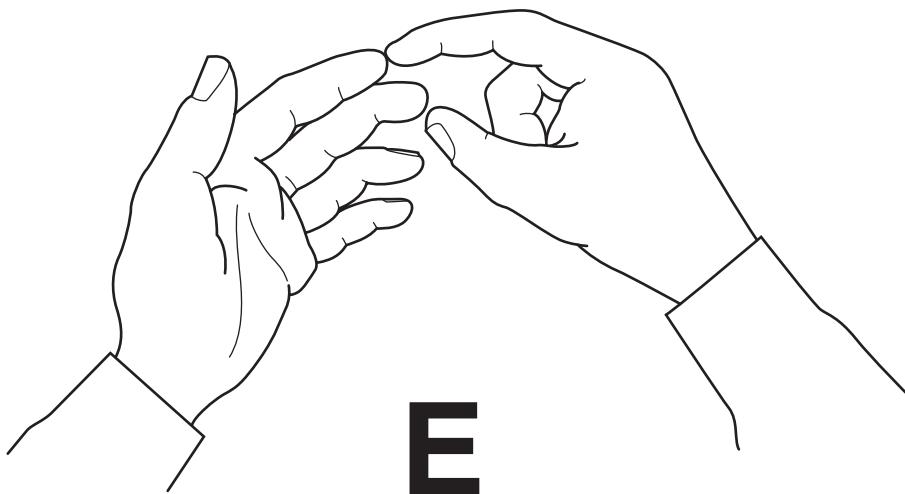
[3]

[Total: 7]

- 2 Sign language uses fingers and hands to communicate with deaf people.

Here is the code for the letter E.

This is an example of a **visual code**.



- (a) Give **another** example of a communication system which uses a visual code.

Say how it works.

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

- (b) The sentences describe how to send a coded message and then receive it.

They are in the wrong order.

A	Decode the signal.
B	Receive the signal.
C	Transmit the signal.
D	Encode the message.
E	Compose the message.

Put the sentences in the correct order by filling the boxes.

The first one has been done for you.

<input type="text" value="E"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
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[3]

- (c) Sign language uses analogue signals to send data.

Many electronic communication systems use digital signals instead.

- (i) Give **two** advantages of using **digital signals** to send data.

1

.....

2

..... [2]

- (ii) Digital information can be stored on the hard disc of a computer.

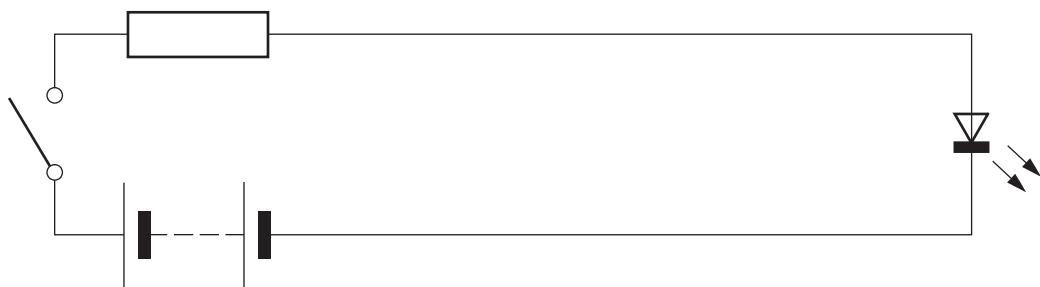
State one **other** device which stores digital information.

.....

..... [1]

[Total: 8]

- 3 Here is the circuit diagram of a simple signalling system.



- (a) The circuit contains a battery.

(i) Put a **ring** around the battery.

[1]

(ii) The 6V battery provides the system with power.

A mains transformer could be used instead.

Give **two** advantages of using the mains supply to provide power.

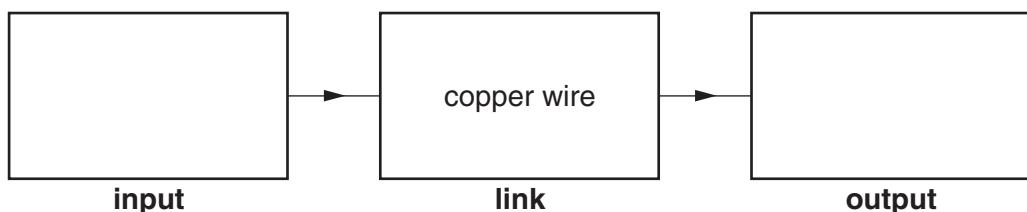
1

.....

2

..... [2]

- (b) Here is an incomplete block diagram for the signalling system.



Use the circuit diagram at the top of the page to complete the block diagram.

Choose words from this list.

battery

LED

resistor

switch

[2]

- (c) The signalling system uses **copper wire** to carry **digital signals** as **electric current** between the input and the output.
- (i) Give an example of a communication system which uses **optical fibre** to carry signals from the input to the output.

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

- (ii) Complete the sentence for your example.

Choose words from the list.

analogue

digital

electric current

infrared light

radio waves

The system uses optical fibre to carry signals which are carried by between the input and the output. [2]

- (iii) What are the advantages of using optical fibre as the link in your example?

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

[Total: 10]

- 4 This question is about how a company determines product specifications.



Cambridge Radio Solutions is designing a new two-way radio system for use on farms.

- (a) They start to fill in a specification for the new two-way radio system.

key factor	notes
cost	must be cheaper to use than mobile phones
network coverage	use citizen band frequencies to avoid need for a licence

Write in **three** more key factors, with notes to justify them.

[3]

- (b) The design team at Cambridge Radio Solutions discuss some wider aspects of the product specification.



One aspect they consider is their profit margin.

This is how much money they need to make on each two-way radio system that they sell.

Suggest and justify **two** other wider aspects of the product specification that they should consider.

wider aspect	notes
profit margin	we must make money on each system or we'll go bust

[2]

[Total: 5]

- 5 Digital signals can be used to carry information about pictures.



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- (a) The picture is displayed on a computer screen.

Complete the sentences. Choose words from the list.

circles **frame** **pixels** **rows** **screen** **window**

The whole picture is called a

It is made of which are arranged in

[3]

- (b) A single picture on the screen requires 42 000 **bytes** of information.

- (i) Calculate the number of **bits** of information for a single picture.

$$\text{bits per picture} = \dots \quad [1]$$

- (ii) The video signal to the screen has a bit rate of 6 720 000 **bits** per second.

Calculate the refresh rate for the screen.

$$\text{refresh rate} = \dots \text{ pictures per second} \quad [2]$$

[Total: 6]

END OF QUESTION PAPER

11
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