

<b>Candidate Forename</b>		<b>Candidate Surname</b>	
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<b>Centre Number</b>						<b>Candidate Number</b>				
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**OXFORD CAMBRIDGE AND RSA EXAMINATIONS  
GENERAL CERTIFICATE OF SECONDARY EDUCATION**

**A326/01**

**TWENTY FIRST CENTURY SCIENCE**

**ADDITIONAL APPLIED SCIENCE A**

**Unit 5: Communications (Foundation Tier)**

**TUESDAY 22 JUNE 2010: Morning**

**DURATION: 45 minutes**

**SUITABLE FOR VISUALLY IMPAIRED CANDIDATES**

**Candidates answer on the Question Paper**

**A calculator may be used for this paper**

**OCR SUPPLIED MATERIALS:**

**None**

**OTHER MATERIALS REQUIRED:**

**Pencil**

**Ruler (cm/mm)**

**READ INSTRUCTIONS OVERLEAF**

## **INSTRUCTIONS TO CANDIDATES**

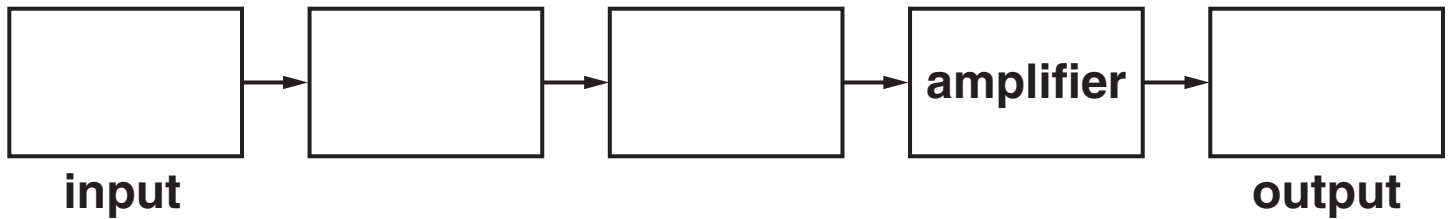
- **Write your name clearly in capital letters, your Centre Number and Candidate Number in the boxes on the first page.**
- **Use black ink. Pencil may be used for graphs and diagrams only.**
- **Read each question carefully and make sure that you know what you have to do before starting your answer.**
- **Answer ALL the questions.**
- **Write your answer to each question in the space provided. Additional paper may be used if necessary but you must clearly show your Candidate Number, Centre Number and question number(s).**

## **INFORMATION FOR CANDIDATES**

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

Answer ALL the questions.

1 Here is an incomplete block diagram for a radio RECEIVER.



(a) Complete the block diagram.

Choose words from this list.

AERIAL    DEMODULATOR    LOUDSPEAKER    TUNER  
[3]

(b) The diagram has an INPUT block on the left.  
There is an OUTPUT block on the right.

What type of block are the other three?

Put a ring around the correct answer.

MODULATOR    PROCESSOR    SAMPLER    [1]

(c) Draw straight lines to link each RADIO BAND with the correct TYPICAL FREQUENCY.

<u>RADIO BAND</u>	<u>TYPICAL FREQUENCY</u>
VHF	250 kHz
	1.0 MHz
medium wave	100 MHz
	600 MHz

[2]

(d) Here are the broadcast frequencies for three different radio channels.

<b>RADIO CHANNEL</b>	<b>BROADCAST FREQUENCY</b>
<b>1</b>	<b>27.60 MHz</b>
<b>11</b>	<b>27.70 MHz</b>
<b>21</b>	<b>27.80 MHz</b>

(i) Why must each channel have a different frequency?

\_\_\_\_\_ [1]  
\_\_\_\_\_

(ii) Complete the sentences by putting a **ring** around the best word.

The frequency for each channel is decided by the

GOVERNMENT      MANUFACTURER      OWNER

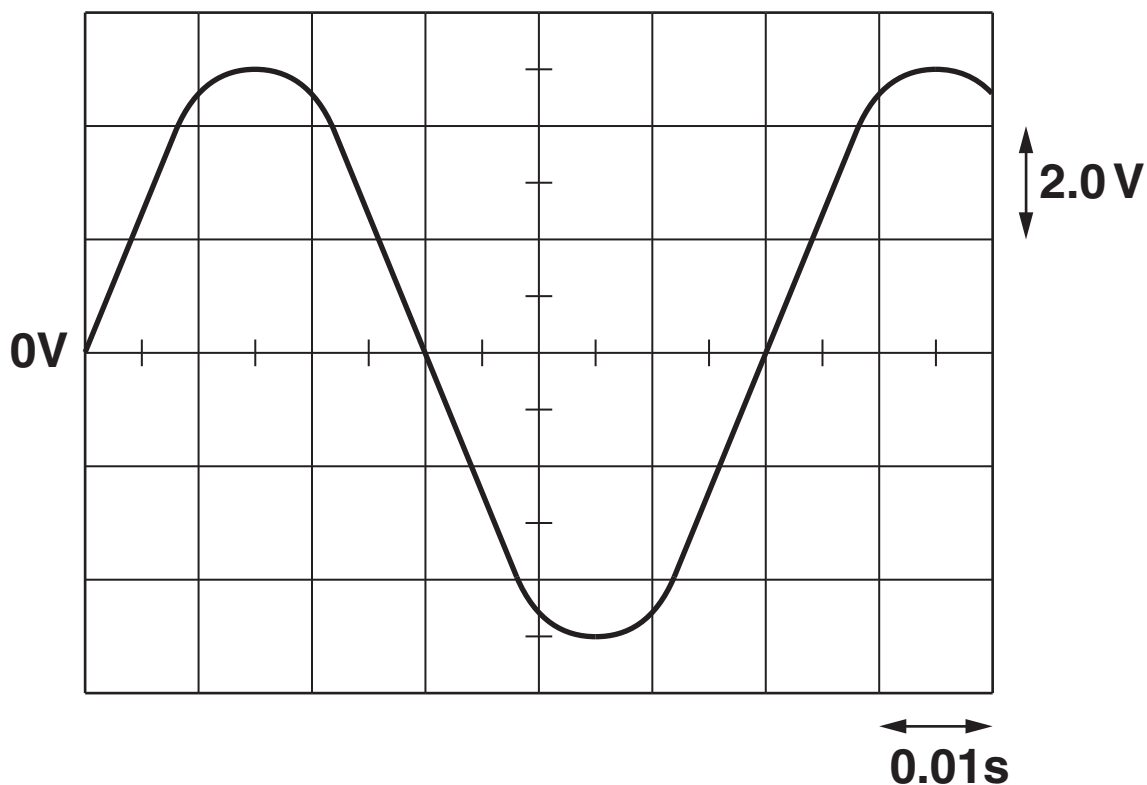
To switch from one channel to another, the owner adjusts the

AERIAL      LOUDSPEAKER      TUNER

[2]

[Total: 9]

2 Here is the trace of a signal as seen on an oscilloscope screen.



(a) Use the trace to show that the AMPLITUDE of the signal is 5.0V.

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[2]

(b) How long does it take for one cycle of the signal?  
Put a ring around the correct answer.

0.01 s

0.03 s

0.06 s

0.08 s

[1]

(c) Which of these statements best describes how to find the FREQUENCY of the signal?

Put a tick (✓) in the box next to the correct answer.

Divide 1.0 by the time for one cycle.

Multiply the time for one cycle by 1000.

Divide the time for one cycle by the amplitude.

Multiply the time for one cycle by the amplitude.  [1]

[Total: 4]

**3 Jo is thinking of buying a printer for her laptop computer.**

**She finds this data sheet comparing the specification for three different printers.**

	<b>PRINTER MODEL</b>		
	<b>MWB58</b>	<b>JCB42</b>	<b>OCR12</b>
<b>mass of printer</b>	<b>2.5 kg</b>	<b>2.0 kg</b>	<b>1.5 kg</b>
<b>time to print a test page</b>	<b>2.5 s</b>	<b>10 s</b>	<b>5.0 s</b>
<b>range of power sources</b>	<b>230V mains only</b>	<b>230V mains or 6V battery</b>	<b>230V mains only</b>
<b>possible computer connections</b>	<b>USB cable optical fibre</b>	<b>USB cable radio wave</b>	<b>optical fibre radio wave</b>

**(a) Jo wants a wireless connection between computer and printer.**

**Which printer should she NOT choose?**

**Give a reason for your answer.**

\_\_\_\_\_

\_\_\_\_\_ [2]



**(b) Which printer could Jo use anywhere?**

**Give a reason for your answer.**

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**[2]**

**(c) Data can be transmitted in analogue form or digital form.**

**The computer transmits data to the printer in digital form.**

**What are the advantages of sending data in digital form?**

**Put ticks (✓) in the boxes next to the TWO correct statements.**

**The data needs less processing.**

**The electronic circuits are much simpler.**

**The electronic circuits are programmable.**

**The data is transferred with no loss of quality.**

**The data can be encrypted to increase security.**  **[2]**

**[Total: 6]**

4 Voice messages can be sent from one place to another along three different links.

(a) Draw straight lines to match each LINK with the type of SIGNAL passing through it.

<u>LINK</u>	<u>SIGNAL</u>
air	radio waves
optical fibre	electric current
copper wire	light and infrared

[2]

(b) (i) Give one example of a communication system which uses optical fibre to send messages from one place to another.

\_\_\_\_\_ [1]

(ii) Give a reason why your example uses optical fibre.

\_\_\_\_\_  
\_\_\_\_\_ [1]



**5 Sam sells two-way radio communication systems.**

**He wants to sell his radios for parents to keep in touch with their children.**

**Each child would carry a radio all of the time.**

**The parents could then talk to them from anywhere in the house or garden.**

**Sam starts to write down the KEY FACTORS of the product specification.**

**He gives a reason for each key factor.**

<b>KEY FACTOR</b>	<b>REASON</b>
<b>weight</b>	<b>must be light enough for children to carry</b>
<b>power output</b>	<b>less than 4W to comply with OfCom regulations</b>

**(a) Complete the table with THREE more key factors. Give a reason for each one. [3]**

(b) Sam considers effects which could limit the range of the two-way radio system.

Draw straight lines to link each EFFECT with its correct EXPLANATION.

**EFFECT**

reflection

absorption

interference

**EXPLANATION**

radio waves can cancel each other out

radio waves can't pass through walls easily

the direction of radio waves can be easily changed

[2]

**(c) Sam decides to use a digital format for the voice signals.**

**Here are the processing stages required.**

**They are in the wrong order.**

- A Demodulate the radio waves.**
- B Amplify the signal from the microphone.**
- C Convert each sample into a binary code.**
- D Convert each binary code into a voltage.**
- E Sample the signal many times in each second.**
- F Use the binary codes to modulate the radio waves.**
- G Use an amplifier to feed the voltage out of a loudspeaker.**

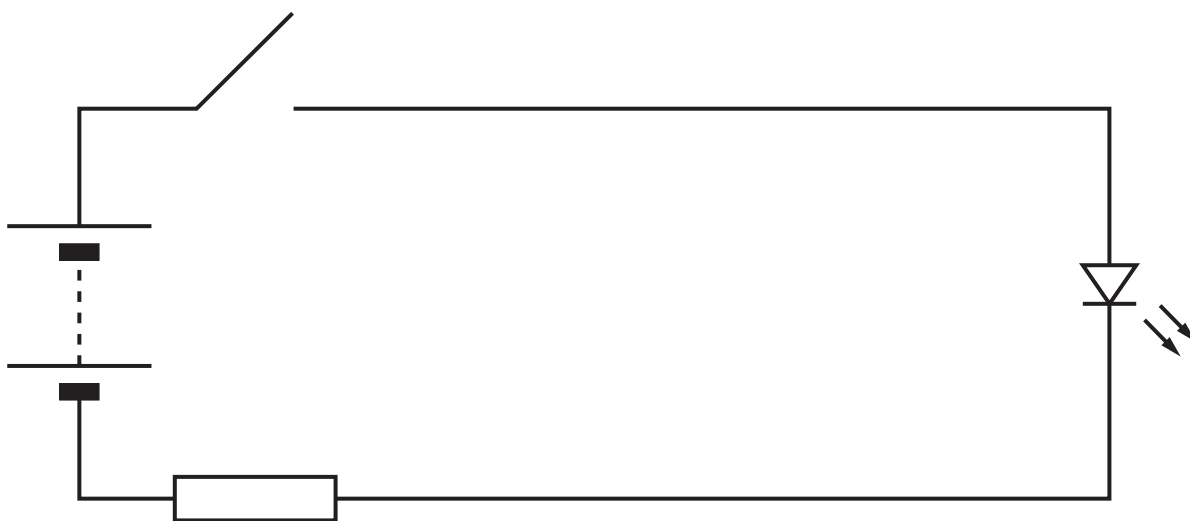
**Complete the table to show the correct order.**

<b>B</b>						<b>G</b>
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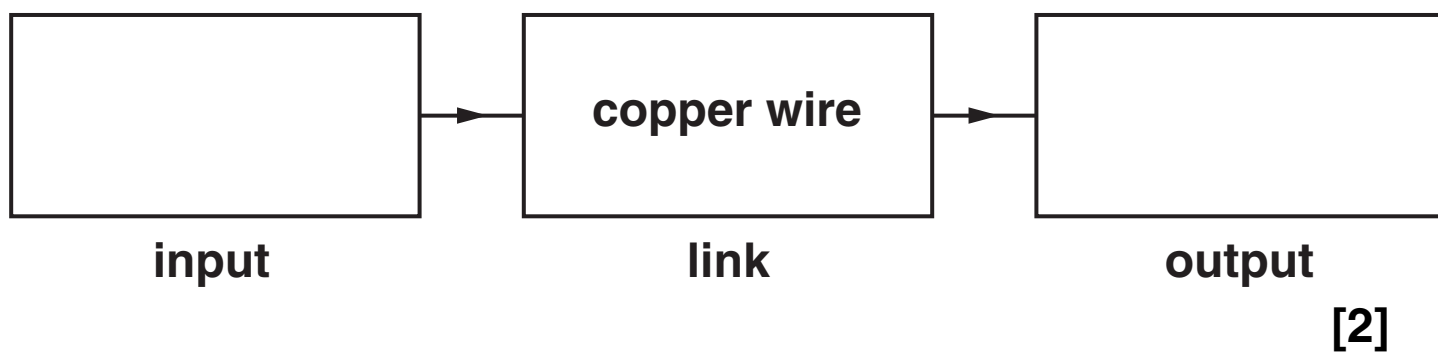
**[2]**

**[Total: 7]**

6 Here is the circuit diagram for a simple signalling system.



(a) Use the circuit diagram to complete the block diagram for the system.



**(b) The system uses BINARY CODE to send messages from one place to another.**

**(i) State another code which can be used to send messages along wires.**

\_\_\_\_\_  
\_\_\_\_\_ [1]

**(ii) Sound can also be used to carry messages by using a code.**

**Describe an example of the use of sound to carry a coded message.**

\_\_\_\_\_  
\_\_\_\_\_ [1]

**[Total: 4]**

**END OF QUESTION PAPER**



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