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Centre Number						Candidate Number				
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**OXFORD CAMBRIDGE AND RSA EXAMINATIONS
GENERAL CERTIFICATE OF SECONDARY EDUCATION**

A326/01

**TWENTY FIRST CENTURY SCIENCE
ADDITIONAL APPLIED SCIENCE A**

Communications (Foundation Tier)

WEDNESDAY 27 JANUARY 2010: Afternoon

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, however additional paper may be used if necessary.**

INFORMATION FOR CANDIDATES

- **The number of marks is given in brackets [] at the end of each question or part question.**
- **The marks allocated and the spaces provided for your answers are a good indication of the length of answers required.**
- **The total number of marks for this paper is 36.**

BLANK PAGE

Answer ALL the questions.

1 Joe opens up a computer to repair it.
He sees these two symbols on the cover.

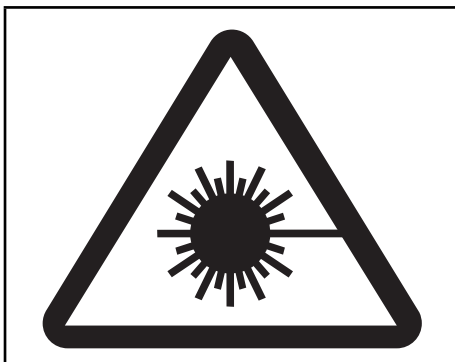
(a) Draw straight lines to link each SYMBOL with its correct MEANING.

SYMBOL

MEANING



danger



high voltage

laser hazard

[2]

(b) The two symbols opposite are an example of one type of **SHARED VISUAL CODE**.

Give an example of a different type of shared visual code.

State what it does.

[2]

(c) Joe studies some technical data for the computer before he opens it.

mains supply	230V, 50 Hz
power output	40W
memory capacity	512 Gbytes

(i) Which piece of data tells Joe about a possible **ELECTRICAL** hazard?

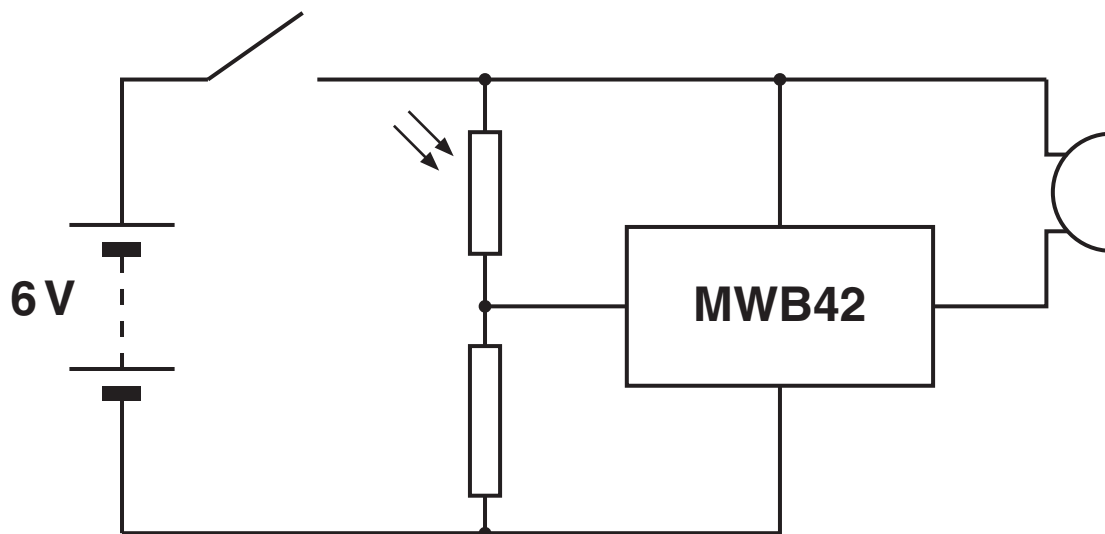
[1]

(ii) Suggest one precaution that Joe could take to reduce the risk from this **ELECTRICAL** hazard.

[1]

[Total: 6]

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



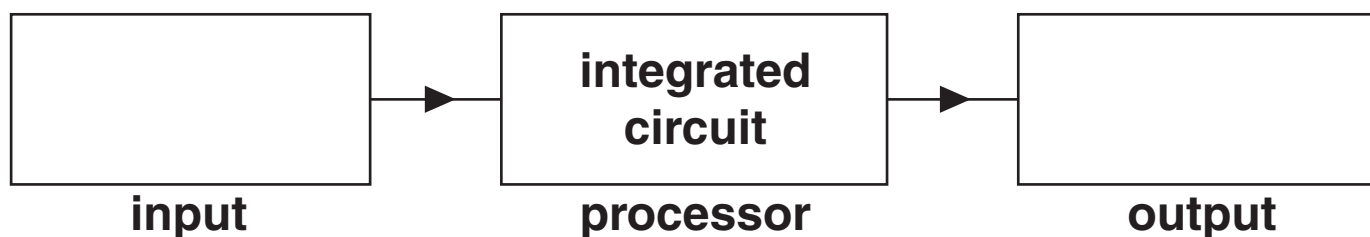
(a) Look at the symbols used in the circuit diagram. Put a **ring** around the integrated circuit. [1]

(b) Use the circuit diagram to complete this block diagram. Choose words from the list.

buzzer

LDR

microphone



[2]

(c) The maximum current in the integrated circuit is 0.25 A when it runs from a 6V supply.

(i) Use $P = IV$ to calculate the maximum heating power of the integrated circuit.

heating power = _____ W [1]

(ii) Why is it useful to know the maximum heating power of a component?

_____ [1]

(d) A voltmeter is needed to check the voltage across the battery.

Choose the correct meter symbol from the list below.

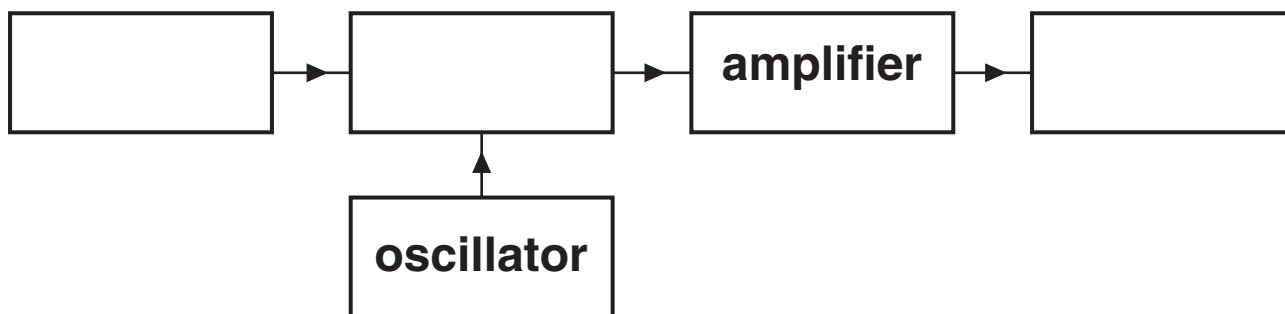
Draw it connected in the correct place on the circuit diagram at the top of the opposite page.



[2]

[Total: 7]

3 This question is about the radio TRANSMITTER in a mobile phone.



(a) Complete the block diagram for the TRANSMITTER. Use the words in this list.

AERIAL

MICROPHONE

MODULATOR

[2]

(b) Use straight lines to link the START of each sentence with its correct end.

START

END

The aerial ...

... provides a signal for the modulator.

The oscillator ...

... provides a carrier for the modulator.

The amplifier ...

... sends out modulated radio waves.

The microphone ...

... increases the amplitude of a signal.

[3]

(c) Modern mobile phones use a DIGITAL format to send information.

(i) Suggest ONE advantage of sending information in a digital format.

_____ [1]

(ii) Old mobile phones used an analogue format to send information.
Which process CANNOT be used with an analogue format?

Put a ring around the correct answer.

ENCRYPTION

RECEPTION

TRANSMISSION

[1]

[Total: 7]

4 Sue uses the internet to communicate over large distances.

(a) Complete each sentence by putting a **ring** around the correct word.

Sue types a message.

The keyboard is the

INPUT OUTPUT PROCESSOR.

The message is to go on the internet.

It must be

BAR CODED DECODED ENCODED.

The message arrives with no mistakes.

This means that the internet has a low

DATA RATE ERROR RATE RANGE.

[3]

(b) For internet messaging to work, there have to be standard PROTOCOLS.

Who decides these protocols?

Put a **ring** around the answer.

ADVERTISERS

AMATEURS

GOVERNMENTS

[1]

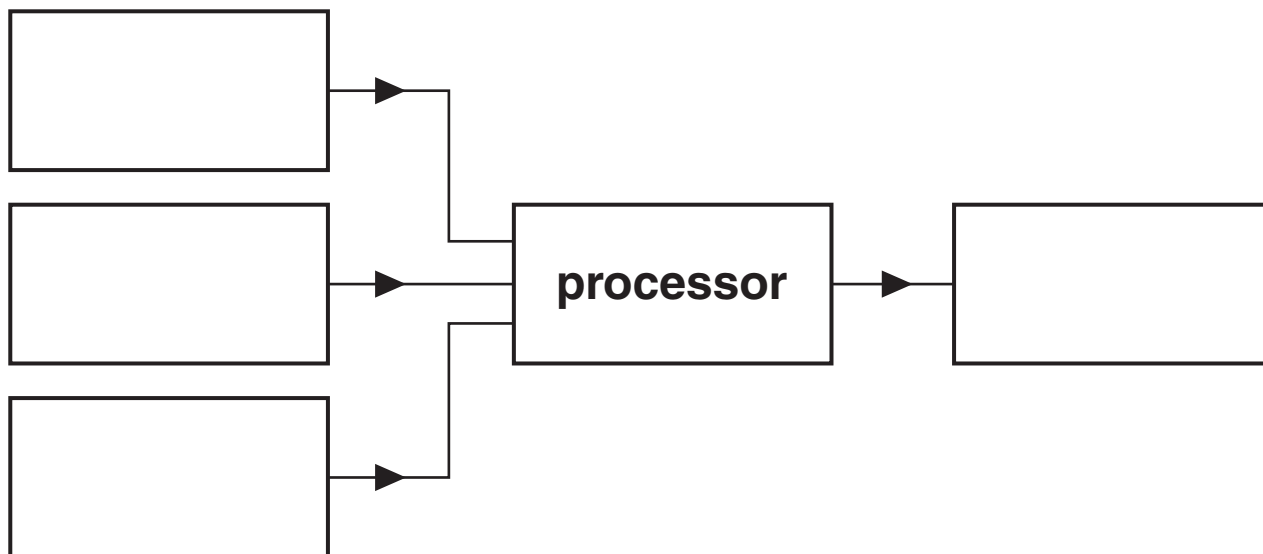
(c) The internet has increased the QUANTITY of human communication.
Give an example of ANOTHER electronic device which has increased the quantity of human communication.

[1]

[Total: 5]

- 5 Anita worries about burglars.
She uses a video screen to view pictures from THREE cameras placed around her house.

(a) Complete this block diagram for her system.



[1]

(b) Complete the sentence.

Choose a word from this list.

CURRENT

INFORMATION

LIGHT

MICROWAVES

The arrows in the diagram show the flow of
_____ from one block
to another.

[1]

(c) State one feature of a circuit diagram which makes it look different from a block diagram.

_____ [1]

(d) Here is some technical data for the video screen.

bits for each pixel	4
pixels per frame	65 536
frame refresh rate	32 per second

(i) Use the data to calculate the video bit rate for the cable leading to the screen.

video bit rate = _____ bits per second [1]

**(ii) Each row of the screen has 256 pixels.
How many bits of information are needed for each row of the screen?**

information = _____ bits [1]

[Total: 5]

6 An office uses copper wire to link its fax machines to each other.

This is because copper wire is cheap and easy to use. Other communication systems use radio waves.

(a) Describe your own example of a different communication system that uses RADIO WAVES as the link.

_____ [1]

(b) Explain why radio waves are the best link for your example.

_____ [2]

(c) Communication systems use different radio frequencies.

Put a ring around the frequency that best matches your example.

100 MHz

600 MHz

2 GHz

10 GHz

[1]

- (d) Using radio waves as the link for a communication system is quite expensive.
Explain ANOTHER disadvantage of using radio waves as the link.

[2]

[Total: 6]

END OF QUESTION PAPER



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