Candidate forename		Candidate surname	

Centre number						Candidate number				

OXFORD CAMBRIDGE AND RSA EXAMINATIONS
GENERAL CERTIFICATE OF SECONDARY EDUCATION

A326/01

TWENTY FIRST CENTURY SCIENCE
ADDITIONAL APPLIED SCIENCE A

Communications
(Foundation Tier)

FRIDAY 17 JUNE 2011: 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

DC (KN/KN) 11MEP06435 49060/1

INSTRUCTIONS TO CANDIDATES

- **Write your name, centre number and candidate number in the boxes on the first page. Please write clearly and in capital letters.**
- **Use black ink. Pencil may be used for graphs and diagrams only.**
- **Read each question carefully. Make sure you know what you have to do before starting your answer.**
- **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).**
- **Answer ALL the questions.**

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.**

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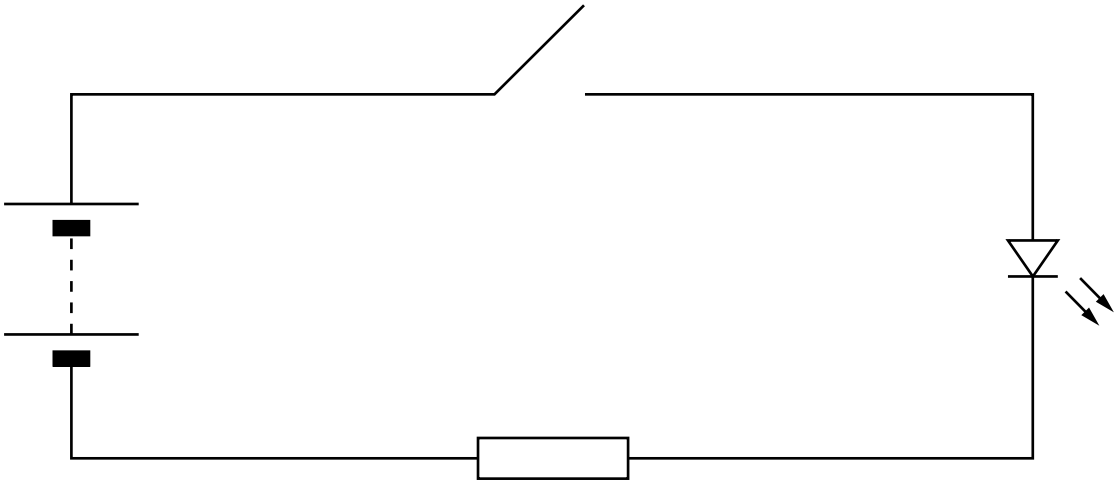
Answer ALL the questions.

1 Bob builds this simple signalling circuit.



(a) The circuit contains an LED.

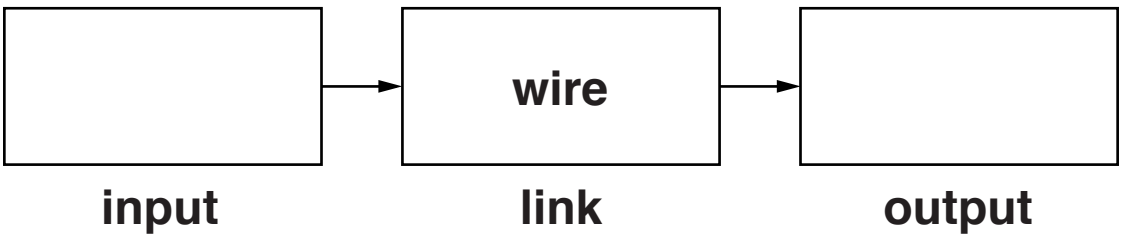
Put a (ring) around the LED. **[1]**

(b) Bob presses the switch to make the LED glow.

Complete this block diagram for the signalling circuit.

Choose from these words.

BATTERY
LED
RESISTOR
SWITCH



[2]

(c) Bob uses the circuit to communicate with Sally in another room.

He uses Morse code.

Draw lines to connect the START of each sentence to its correct END.

START	END
The error rate is …	… the distance between Bob and Sally.
The transmission rate is …	… how many mistakes Bob makes in each minute.
The range of the system is …	… how many characters Bob sends in each minute.

[2]

(d) The long and short flashes of light from the LED are a visual code.

Each letter has a different pattern of long and short flashes.

State ANOTHER example of a system which uses a visual code.

Describe how the code works.

_____

_____

_____

_____ **[2]**

[Total: 7]

2 Saleem has a wireless printer for his computer system.

(a) The computer and printer are not linked by a cable.

What is the link which connects the computer to the printer?

Put a (ring) around the answer.

COPPER WIRE

OPTICAL FIBRE

RADIO WAVES **[1]**

(b) The sentences below explain how the computer sends a document to the printer.

Complete the sentences. Choose from these words.

DEMODULATES
MODULATES
TRANSMITS
RECEIVES

The computer first _____ the signal onto a carrier wave.

The computer then _____ the carrier wave to the printer.

The printer first _____ the carrier wave from the computer.

The printer then _____ the carrier wave to extract the signal.

[3]

(c) The printer has a large memory.

This stores digital information as it arrives from the computer.

State TWO other devices which can store digital information.

_____

_____ **[2]**

[Total: 6]

3 Pete is a policeman. He uses the radio in his car to communicate with other police.

(a) Pete's messages are secret. They can only be understood by other police.

What is the process used by the radio to keep his messages secret?

Put a (ring) around the correct answer.

ABSORPTION

COMPRESSION

ENCRYPTION

TRANSMISSION **[1]**

(b) Pete's radio can receive video signals and display them on a screen.

Here are some statements about video pictures on a screen.

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

Each frame is made from rows of pixels. ☐

Each pixel is made from rows of frames. ☐

Each row is made from frames of pixels. ☐

The video signal sets the brightness of each pixel. ☐

The refresh rate sets the number of rows in a frame. ☐

[2]

(c) Pete makes sure that his radio is tuned to 75.65 MHz at the start of each shift.

(i) Suggest why he needs to do this.

_____

_____ **[1]**

(ii) The police authority has a licence to use the frequency 75.65 MHz.

Who issues the licence? Put a (ring) around the answer.

THE BBC

THE GOVERNMENT

THE ARMED FORCES

THE MANUFACTURER OF THE RADIO SETS

[1]

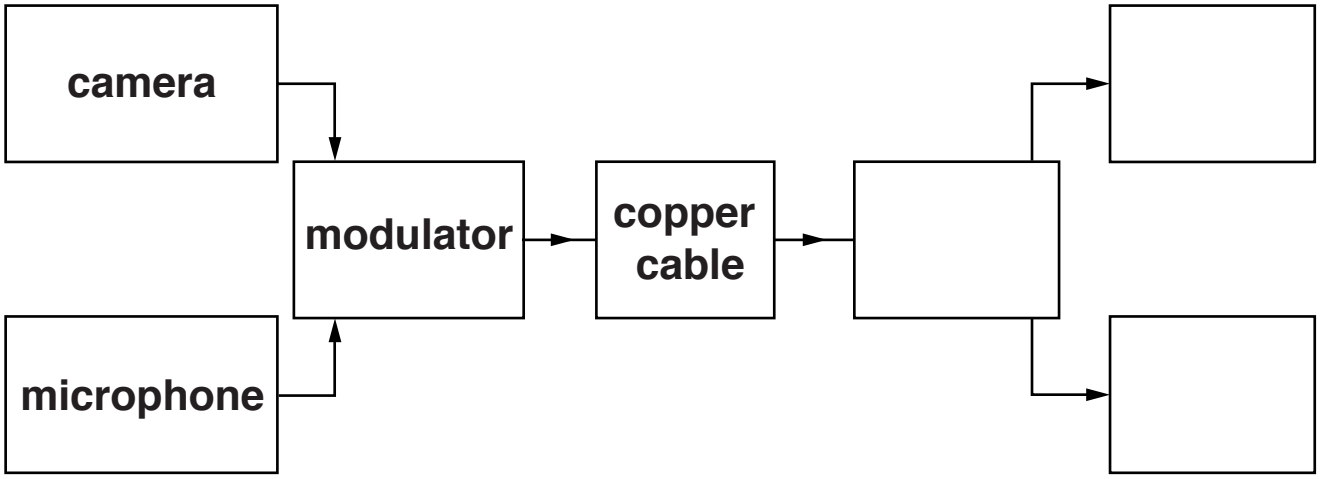
(d) Draw lines to link each RADIO FREQUENCY with its USE.

RADIO FREQUENCY	USE
1 MHz	Bluetooth
100 MHz	FM broadcasts
2.4 GHz	MW broadcasts

[2]

[Total: 7]

4 Here is the block diagram for a simple television system.



(a) Complete the block diagram for a television system. Choose from these words.

DEMODULATOR
LOUDSPEAKER
PRINTER
SCREEN **[2]**

(b) The modulator converts the analogue signal from the microphone into a digital signal before it is sent down the copper wire. The sentences describe how this is done.

A The analogue signal is sampled.

B The word is sent out as a series of bits.

C The voltage is converted into a binary word.

D The voltage of the sample is measured.

Complete the table to show the correct order of the sentences.

A			

[1]

(c) The video signal from the camera is sent down the copper wire as an analogue signal.

What are the advantages of using ANALOGUE signals instead of digital signals?

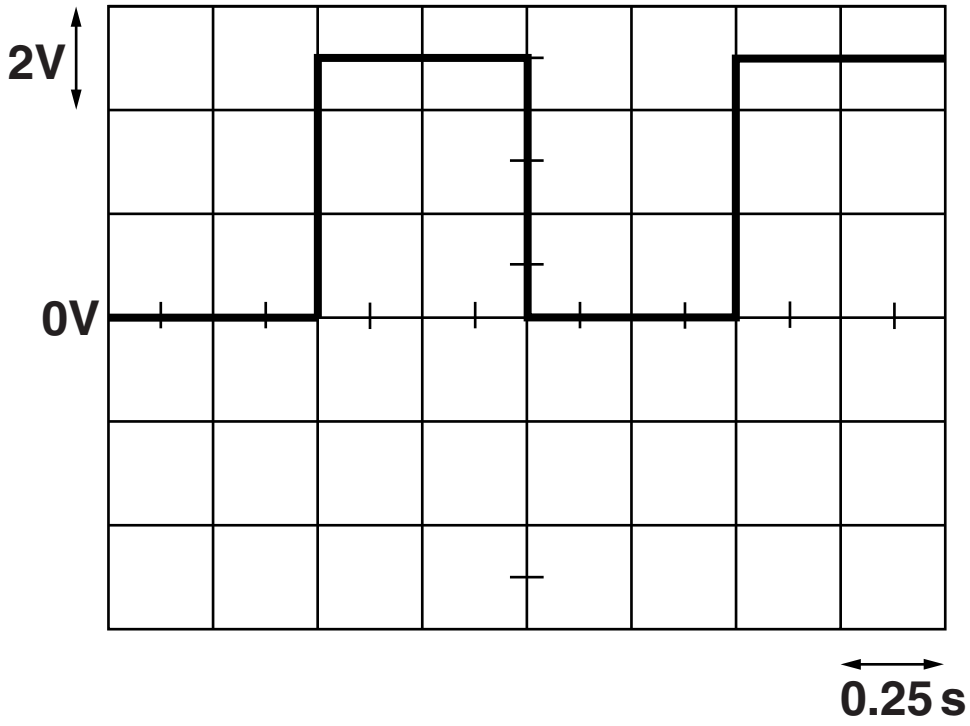
Put ticks (✓) in the boxes next to the TWO correct statements.

Analogue signals travel faster than digital ones.	☐
Analogue signals can go further than digital ones.	☐
The circuits needed for analogue circuits are simpler.	☐
Analogue signals suffer less loss of quality than digital ones.	☐
Analogue signals carry all of the information from the camera.	☐

[2]

[Total: 5]

5 Here is an oscilloscope trace of a digital signal.



(a) How can you tell that the signal is a DIGITAL one?

_____

_____ **[1]**

(b) The oscilloscope is set up with 0V at the centre of the screen.

Calculate the maximum voltage of the signal.

maximum voltage = _____ **V [1]**

(c) Calculate the time for one cycle (period) of the signal on the screen.

Then draw one straight line to link your value of the PERIOD to its FREQUENCY.

PERIOD	FREQUENCY
0.25 s	0.5 Hz
0.50 s	1.0 Hz
1.00 s	2.0 Hz
2.00 s	4.0 Hz

[2]

(d) Digital signals are used a lot in communications.

This is because they do not lose their quality as they travel.

State TWO other advantages of using digital signals for communication.

_____

_____

_____

_____ **[2]**

[Total: 6]

6 Jim plans to buy a new radio receiver.

(a) He finds these details in a catalogue.

receiver name	AW36	LH56	ZB02	SD99
cost	£42	£32	£36	£27
size	stand alone	table top	table top	pocket
weight	75 N	20 N	15 N	2 N
channels	DAB only	LW, MW and FM	FM only	MW and FM
power source	mains	mains or battery	battery	battery
sound power	42W	10W	1.5W	0.1W

(i) Jim wants a radio that he can easily carry around with him.

Which one should he choose? Give TWO reasons for your answer.

_____

_____

_____ **[1]**

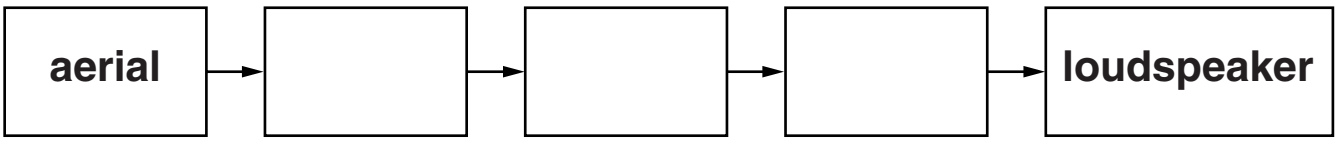
(ii) **Jim wants a receiver which is cheap to run and picks up FM channels.**

Which receiver should he choose? Give a reason for your answer.

_____

_____ **[1]**

(b) Here is a block diagram for a radio receiver.



(i) **Complete the diagram. Choose from these words.**

AMPLIFIER
DEMODULATOR
MICROPHONE
MODULATOR
TUNER **[2]**

(ii) **What do the arrows in the diagram represent?**

_____

_____ **[1]**

[Total: 5]

END OF QUESTION PAPER

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