

GENERAL CERTIFICATE OF SECONDARY EDUCATION
TWENTY FIRST CENTURY SCIENCE
ADDITIONAL APPLIED SCIENCE A
Communications (Higher Tier)

A326/02

Wednesday 26 January 2011
Afternoon

Duration: 45 minutes

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)



Candidate forename		Candidate surname	
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Centre number						Candidate number				
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INSTRUCTIONS TO CANDIDATES

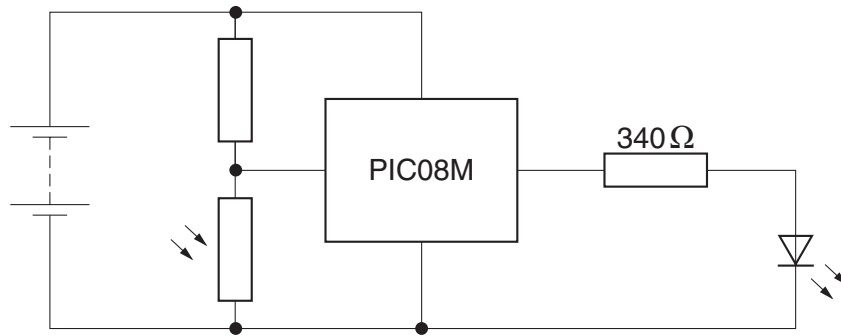
- Write your name, centre number and candidate number in the boxes above. Please write clearly and in capital letters.
- Use black ink. Pencil may be used for graphs and diagrams only.
- Read each question carefully. Make sure you know what you have to do before starting your answer.
- Write your answer 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.
- Do **not** write in the bar codes.

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**.
- This document consists of **12** pages. Any blank pages are indicated.

Answer **all** the questions.

1 Andy is testing this circuit.



(a) The circuit contains an LED.

Put a **ring** around the LED.

[1]

(b) Andy measures the voltage across the 340Ω resistor.

Describe how he should do this.

.....

.....

..... [2]

(c) Andy finds that the voltage across the 340Ω resistor is 6.8V.

Use $I = \frac{V}{R}$ to calculate the current in the resistor.

current = A [1]

(d) Andy calculates that the heating power of the resistor is 0.14W.

Suggest why Andy needs to know the heating power of the resistor.

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

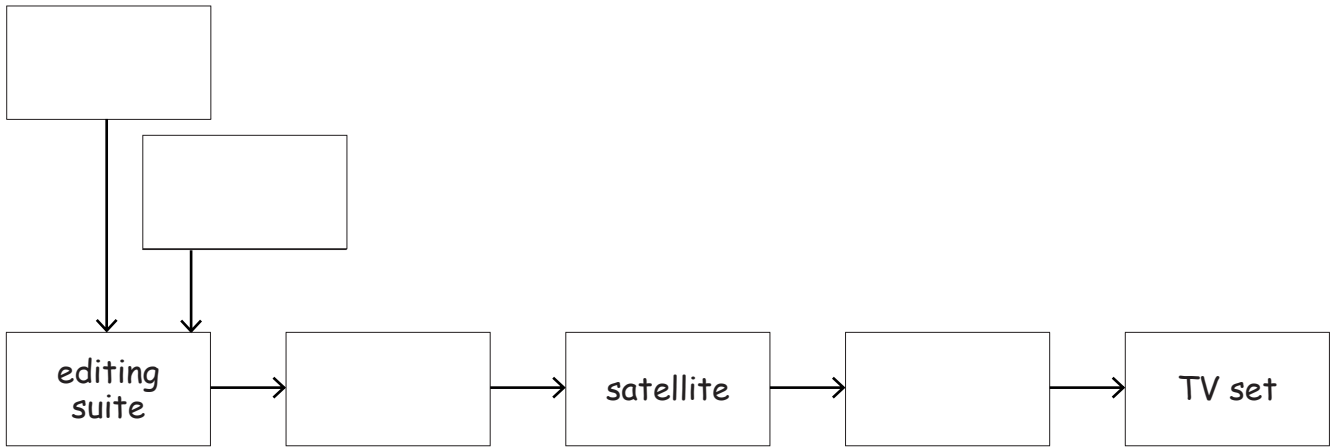
(e) The PIC08M integrated circuit shown above is programmable.

Explain why this reduces the cost of making the circuit.

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

[Total: 6]

2 Here is an incomplete block diagram for a satellite TV system.



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

camera loudspeaker microphone receiver transmitter

[2]

(b) People who edit the TV programme work in the editing suite.

Suggest what these editors do to produce the final TV programme.

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

(c) Describe the best type of aerial for communicating with the satellite.

You can use a labelled diagram in your answer.

.....
.....
.....

[1]

(d) Put a ring around the most likely radio frequency used to communicate with the satellite.

10Hz 10kHz 10MHz 10GHz

[1]

[Total: 5]

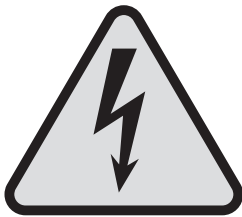
3 Polly repairs radio transmitters for the police.

(a) Here are two of the safety signs near the bench where she works.

What is the meaning of each safety sign?



.....
.....
.....



.....
.....
.....

[2]

(b) The transmitters are connected to the mains supply when Polly repairs them.

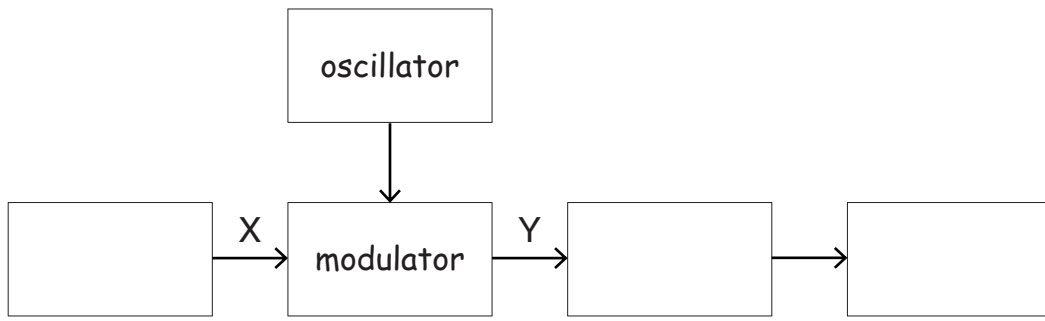
She relies on an **earth leakage device** for her safety.

Explain how an earth leakage device improves her safety.

.....
.....
.....
.....

[2]

(c) Here is an incomplete block diagram for a radio **transmitter**.

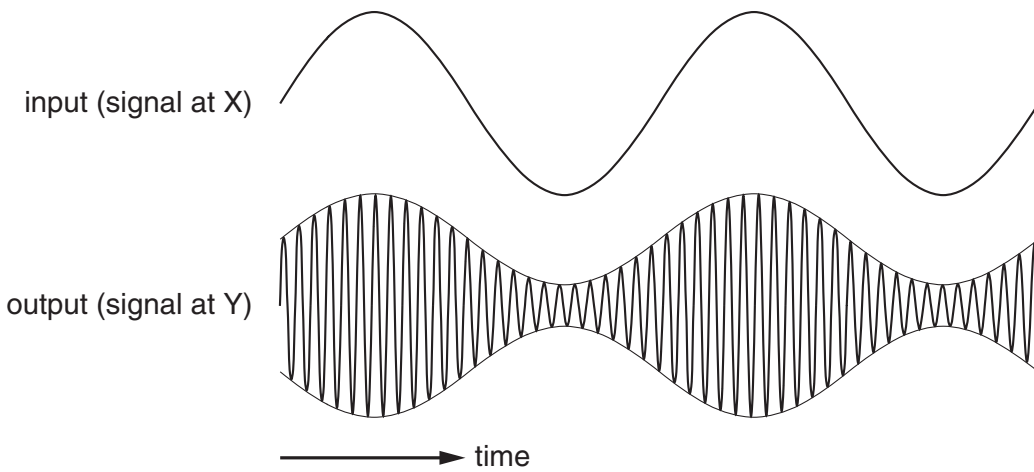


(i) Complete the diagram. [3]

(ii) Explain the function of the modulator in the system.

.....
 [2]

(iii) Here are oscilloscope traces of the signals at the input and output of the modulator.

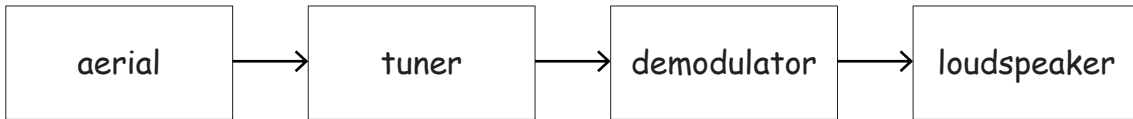


State the type of modulation being used.

..... [1]

[Total: 10]

4 Here is a block diagram for a radio **receiver**.



(a) Explain the function of the aerial and tuner in the system.

.....

.....

.....

..... [3]

(b) The police use radio receivers to communicate with each other.



Police radio receivers use digital signals to send information.

This allows information to be **compressed**.

(i) Explain what is meant by compression and why it is an advantage.

.....

.....

..... [2]

(ii) Give two **other** advantages, other than compression, of using digital signals for police radios.

1

.....

2

..... [1]

[Total: 6]

5 Jack and Jill live a long way apart. Jack communicates with Jill by telephone.



(a) Here is an incomplete block diagram for the telephone system.



Complete the diagram. Choose words from this list.

exchange handset optical fibre

[3]

(b) The incomplete table shows what each part of the telephone system does.

Complete the table. Choose words from this list.

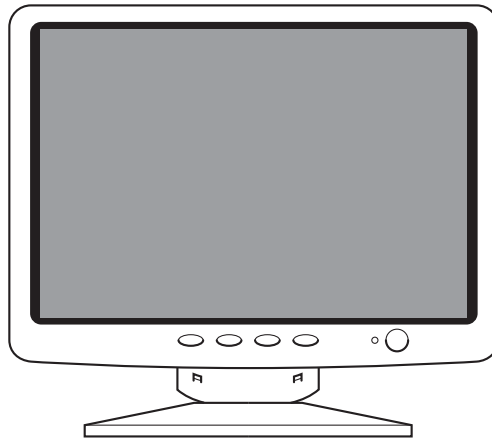
exchange handset optical fibre

input	output	processor	link
handset			

[1]

[Total: 4]

6 A computer monitor uses a stream of bits in a video signal to generate a picture on a screen.



(a) Explain how the information in the video signal displays pictures on the screen.

Include these words in your answer.

frame pixel row

.....

.....

.....

.....

.....

..... [3]

(b) Here is some information about the computer monitor.

- bits per pixel = 3 bits
- pixels per frame = 32 000 pixels
- refresh rate = 60 frames per second

(i) Use the information to calculate the bits per second required in the video signal.

video bit rate = bits per second [1]

(ii) Convert your answer into bytes per second.

video bit rate = bytes per second [1]

[Total: 5]

END OF QUESTION PAPER

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