Centre No.						Paper Reference	Surname	Initial(s)
Candidate No.						3 9 7 4 / 2 F	Signature	

Paper Reference(s)

3974/2F

Edexcel GCSE

Design and Technology: Systems & Control Technology (Electronics)

(Short Course – 3974)

Paper 2F

Foundation Tier

Monday 9 June 2008 – Afternoon

Time: 1 hour

Examiner's use only

Team Leader's use only

Question Number	Leave Blank
1	
2	
3	
Total	

Materials required for examination	Items included with question papers
Nil	Nil

Instructions to Candidates

In the boxes above, write your centre number, candidate number, your surname, initials and signature.
Check that you have the correct question paper.
Answer ALL the questions. Write your answers in the spaces provided in this question paper.

Information for Candidates

The marks for individual questions and the parts of questions are shown in round brackets: e.g. **(2)**.
There are 3 questions in this question paper. The total mark for this paper is 44.
There are 12 pages in this question paper. Any blank pages are indicated.
You may use drawing equipment. If pencil is used for diagrams/sketches it must be dark (HB or B).
Coloured pens, pencils and highlighter pens must not be used.
All measurements are in millimetres (mm) unless otherwise stated.

Advice to Candidates

You are reminded of the importance of clear English and careful presentation in your answers.
Include diagrams in your answers where these are helpful.

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Answer ALL the questions. Write your answers in the spaces provided.

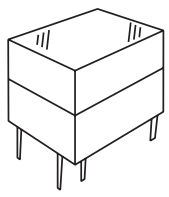
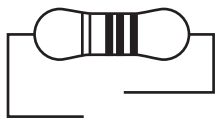
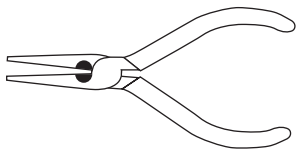
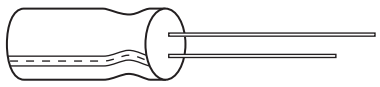
1. The table below shows some tools, equipment and components used in the making of electronic circuits.

(a) Complete the table by:

(i) naming each tool, piece of equipment or component

(ii) describing its use.

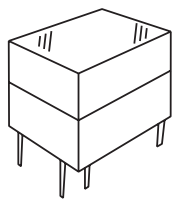
The first one has been done for you.

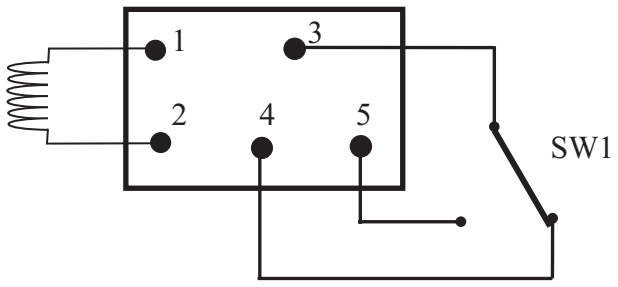
Tool/Equipment/Component	Name	Use
	Relay	Separates DC and AC circuits
		
		
		

(6)

Leave blank

(b) The drawings below show a relay and its circuit diagram.





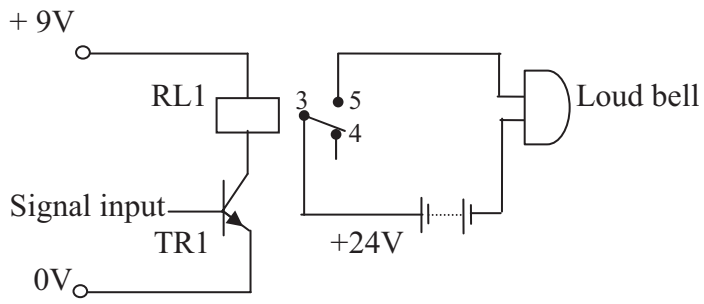
A relay has a coil between pins 1 and 2 and a switch (SW1) between pins 4 and 5 and pin 3.

State what happens to the switch (SW1) when +9V is applied to pin 1 and 0V is applied to pin 2 of the relay.

.....

(1)

(c) The circuit diagram below shows the relay connected between a transistor and a loud bell.



(i) One reason for connecting the relay (RL1) between the transistor (TR1) and the loud bell is to separate the two power supplies.

Give **two** other reasons for connecting the relay between the transistor and the loud bell.

1 .....

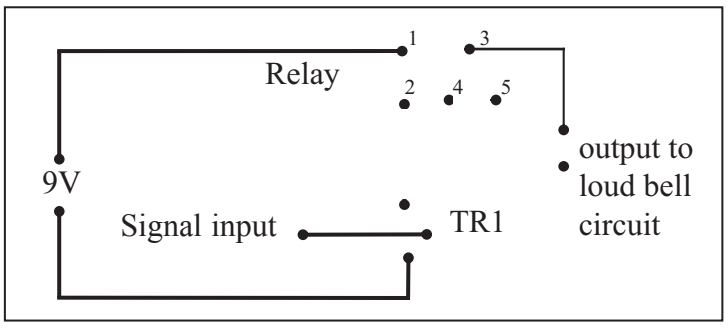
2 .....

(2)

Leave blank

(ii) The relay circuit is to be prototyped. The electronic components will be mounted on a printed circuit board (PCB).

The diagram below shows part of the PCB layout.



Complete the PCB layout by drawing in the **two** missing tracks.

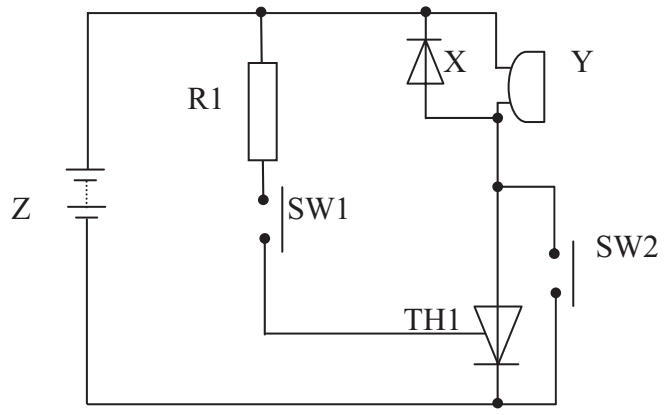
(2)

Q1

(Total 11 marks)

Leave blank

2. The diagram below shows a simple thyristor alarm circuit.



(a) (i) Name components SW1, X, Y and Z shown in the diagram above.

SW1 .....

X .....

Y .....

Z .....

(4)

(ii) State the action of thyristor (TH1) in the circuit when SW1 is operated.

.....

(1)

(iii) State the action of TH1 in the circuit when SW1 is released.

.....

(1)

(iv) Give **one** reason why SW2 is in the circuit.

.....

(1)

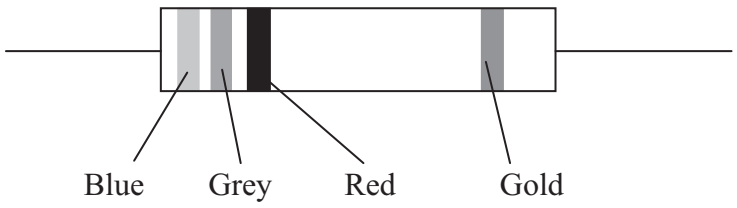
(v) Give **one** reason for using component X in the circuit.

.....

(1)

Leave blank

(b) R1 in the circuit has the following coloured bands.



The resistor colour code is shown below.

Black	Brown	Red	Orange	Yellow	Green	Blue	Violet	Grey	White
0	1	2	3	4	5	6	7	8	9

The resistor tolerance is

- Red = 2%
- Gold = 5%
- Silver = 10%

(i) Using the resistor colour code determine the resistance of R1.

.....

(2)

(ii) Give the meaning of the term “tolerance” as used above.

.....

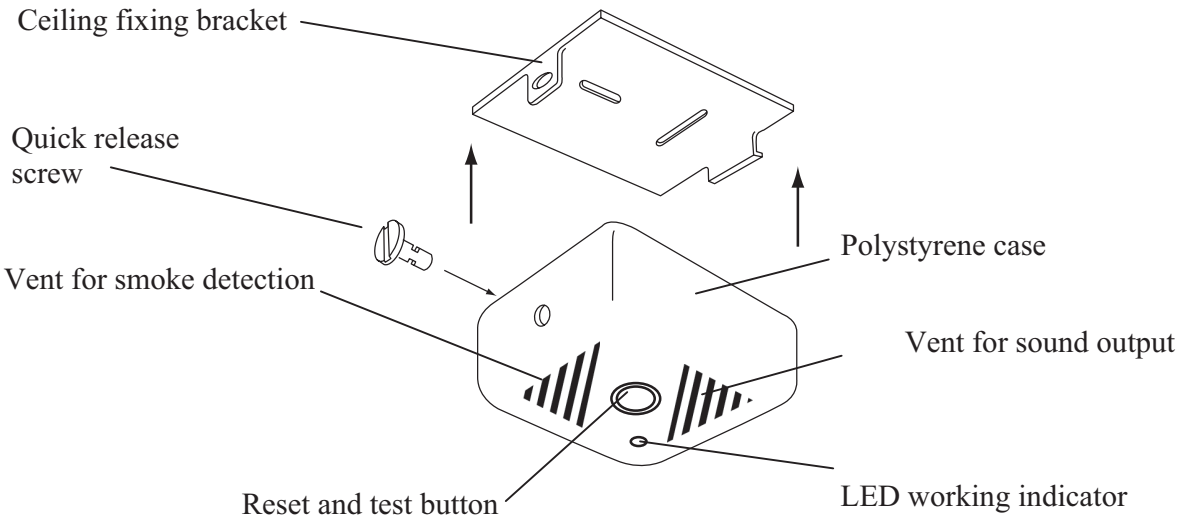
(1)

(Total 11 marks)

Q2

Leave blank

3. The drawings below show details of a smoke alarm.



(a) Two specification points for the smoke alarm are that

- the alarm sound must be clearly heard
- it must have a means of fixing to a ceiling

Under each of the following headings, give **one** more point that should be included in the specification for the smoke alarm.

For each point, give **one** reason why it should be included.

(i) **Market**

Point .....

Reason .....

.....

(2)

(ii) **Quality**

Point .....

Reason .....

.....

(2)

(iii) **Environment**

Point .....

Reason .....

.....

(2)

Leave blank

(b) The ceiling fixing bracket for the smoke alarm is made from aluminium.
One reason for using aluminium is that it can be finished using plastic dip coating.

(i) Give **two** other reasons why aluminium is a suitable material from which to make the ceiling fixing bracket for the smoke alarm.

1 .....

2 .....

(2)

(ii) Give **two** reasons why plastic dip coating is a suitable process for finishing the ceiling fixing bracket.

1 .....

2 .....

(2)

(c) The connections between the electronics and the battery of the smoke alarm are made from copper.

Give **two** properties of copper that make it suitable for the connections between the electronics and the battery.
For each property, give **one** reason why it makes copper suitable.

Property .....

Reason .....

Property .....

Reason .....

(4)

(d) Quality control checks are carried out at important stages during the manufacture of the smoke alarm.

Name **two** important electronic quality control checks that should be made during the manufacture of the smoke alarm.

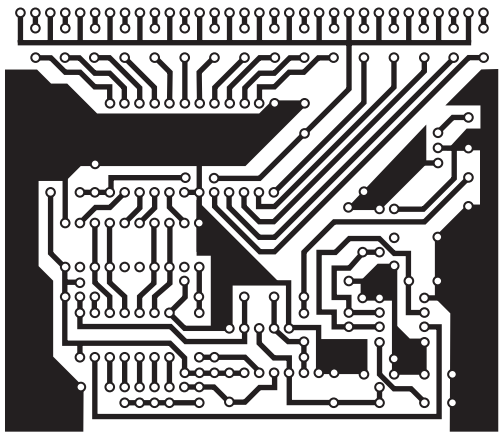
1 .....

2 .....

(2)

Leave blank

(e) The drawing below shows the layout of the tracks for the Printed Circuit Board (PCB) inside the smoke alarm. It is made in batches using the photo-sensitive etching process.



Describe **one** way in which the layout of the tracks makes it suitable to be made in batches using the photo-sensitive etching process.

.....

.....

(2)

(f) Two purposes of the smoke alarm are that

- the alarm sound must be clearly heard
- it must have a means of fixing to a ceiling

Explain, under the following headings, how the smoke alarm achieves these purposes.

(i) The alarm sound must be clearly heard.

.....

.....

.....

(2)

(ii) Have a means of fixing to a ceiling.

.....

.....

.....

(2)

Q3

(Total 22 marks)

TOTAL FOR PAPER: 44 MARKS

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