

**GENERAL CERTIFICATE OF SECONDARY EDUCATION**

**DESIGN AND TECHNOLOGY**

**1953/03**

Electronic Products

Paper 3 (Foundation Tier)

Candidates answer on the Question Paper

**OCR Supplied Materials:**

None

**Other Materials Required:**

None

**Tuesday 22 June 2010**

**Morning**

**Duration: 1 hour**



Candidate Forename		Candidate Surname	
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Centre Number						Candidate Number				
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**INSTRUCTIONS TO CANDIDATES**

- Write your name clearly in capital letters, your Centre Number and Candidate Number in the boxes above.
- 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.
- Do **not** write in the bar codes.
- 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).
- All necessary formulae are provided within the questions. No extra formulae sheet is required.

**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 **50**.
- The marks allocated and the spaces provided for your answers are a good indication of the length of answers required.
- Marks will be awarded for the use of correct conventions.
- Dimensions are in mm unless stated otherwise.
- Show all working for calculations.
- This examination paper contains a product analysis question based on the theme of **Speed Cameras**.
- This document consists of **12** pages. Any blank pages are indicated.

1 The table in Fig. 1 shows some common components found in electronic products.

(a) Complete the table in Fig. 1 by choosing the correct name and function for each component shown from the list below. Part of the table has been completed for you.



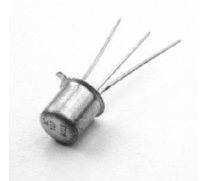

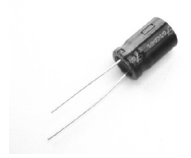
Component	Name (A–E)	Function (1–5)
		<b>2</b>
	<b>C</b>	<b>1</b>
		
	<b>E</b>	
		

Fig. 1

[6]

Name

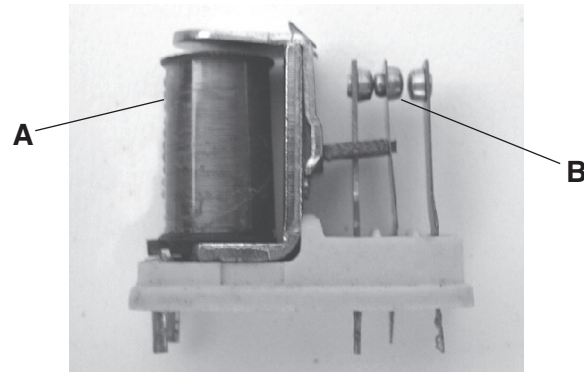
- A** transistor
- B** electrolytic capacitor
- C** fuse
- D** diode
- E** pre-set resistor

Function

- 1** stops too much current from doing damage
- 2** allows current to flow only one way
- 3** can store small amounts of electricity
- 4** amplifies (increases) small currents
- 5** can be adjusted to control the size of a current

- (b) (i) State the name of the component shown in Fig. 2.

..... [1]



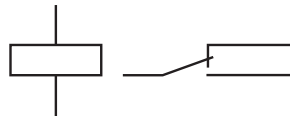
**Fig. 2**

- (ii) State the names of parts **A** and **B** as shown in Fig. 2.

Part **A** ..... [1]

Part **B** ..... [1]

- (iii) Fig. 3 shows the symbol used to represent the component shown in Fig. 2.



**Fig. 3**

From the following list select the type of switch used in the component shown in Figs. 2 and 3.

DPDT

DPST

SPST

SPDT

..... [1]

**[Total: 10]**

- 2 (a) Resistance values are measured in ohms.  
State the value in ohms of the resistors shown in Fig. 4.

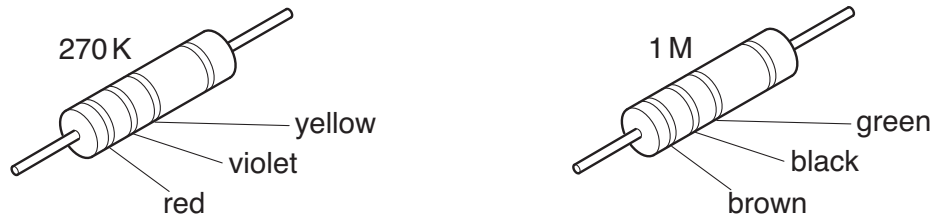


Fig. 4

Resistor value

Resistor value

1 .....ohms      2 .....ohms      [2]

- (b) The list below shows four different capacitor values.

**100 $\mu$ F**

**470nF**

**0.001F**

**1000pF**

- (i) State the lowest capacitance value shown in the list.

..... [1]

- (ii) State the highest capacitance value shown in the list.

..... [1]

- (iii) Fig. 5 shows an electrolytic capacitor.

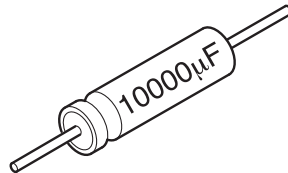
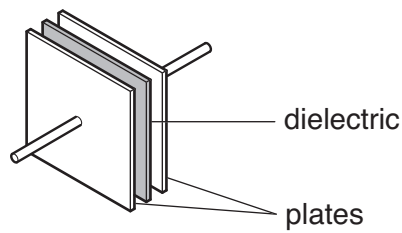


Fig. 5

State the precaution that needs to be taken when placing this capacitor in a circuit.

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

(c) Fig. 6 shows the structure of a capacitor.



**Fig. 6**

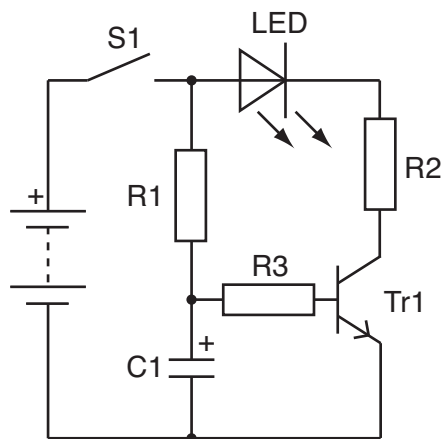
(i) State the name of a suitable material to use as the dielectric.

..... [1]

(ii) State the name of a suitable material to use for the plates.

..... [1]

(d) Fig. 7 shows a time delay circuit.



**Fig. 7**

(i) State **two** changes that could be made to the circuit to increase the time delay.

1 .....

..... [1]

2 .....

..... [1]

(ii) State how the time delay could be made variable.

.....

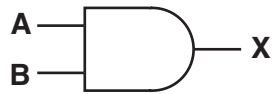
..... [1]

**[Total: 10]**

**Turn over**

3 (a) State the name of each logic gate shown in Fig. 8 and complete the truth table for each.

(i)

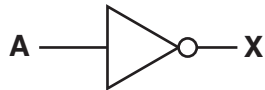


A	B	X
0	0	
0	1	
1	0	
1	1	

Logic gate .....

[2]

(ii)



A	X
0	
1	

Logic gate .....

[2]

(iii)



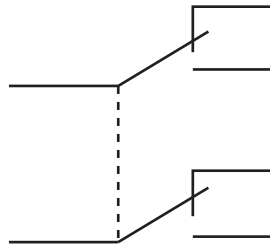
A	B	X
0	0	
0	1	
1	0	
1	1	

Logic gate .....

[2]

Fig. 8

(b) Fig. 9 shows the symbol for a switch often used to reverse the direction of d.c. motors.



**Fig. 9**

(i) From the following list select the type of switch shown in Fig. 9.

DPDT

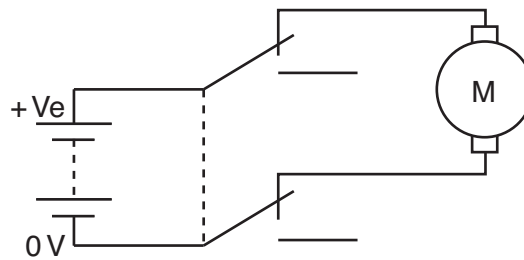
SPDT

DPDT

SPST

..... [1]

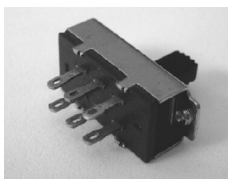
(ii) Complete Fig. 10 to show how the switch can be used to reverse the direction of a d.c. motor when operated.



[2]

**Fig. 10**

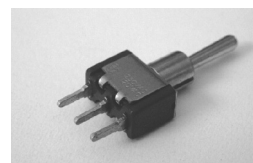
(iii) Fig. 11 shows a selection of available switches.



**A**



**B**



**C**



**D**

**Fig. 11**

State the switch which is suitable for use in the circuit shown in Fig. 10.

..... [1]

[Total: 10]

4 (a) Fig. 12 shows a table of products that require the use of solder in their manufacture.

(i) Complete the table in Fig. 12 to show a suitable soldering method for each product application.

Product	Soldering method / equipment
SMT (surface mount technology) PCB boards for mobile phones.	
Prototype PCB board for an egg timer project.	
'through-hole' PCB's for use in DVD video recorders.	

[3]

Fig. 12

(ii) State **two** health hazards when using 230V a.c. soldering irons.

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

2 .....  
..... [1]

- (b) There is growing concern about the pollution caused by the disposal of broken and obsolete electronic products containing lead solder.

(i) State the reason for the concern about pollution due to lead solder.

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

(ii) State **two** methods of reducing lead pollution.

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

2 .....  
 ..... [1]

(c) Fig. 13 shows two solder joints, one of which is faulty.



**Fig. 13**

State **two** possible causes for the faulty solder joint shown in Fig. 13.

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

2 .....  
 ..... [1]

**[Total: 10]**

## 5 Product Evaluation Question.

(a) Increasing numbers of speed cameras are being introduced onto our roads.

(i) Complete the table shown in Fig. 14 by choosing the correct speed camera type from the list below.

	Laser gun	Gatso	Truvelo	Specs/SVDD
Type	Description			Camera type
1	Uses radar, flash guns and a camera to photograph the back of speeding cars as they pass.			
2	Uses piezo or magnetic sensors in the road and photographs approaching cars as they pass over road markings.			
3	Uses number plate scanning to identify a vehicle and calculate its average speed over a set journey.			
4	Is portable, accurate and has a longer operating range than similar wireless radar based systems.			

**Fig. 14**

[4]

(ii) Both types 1 and 2 shown in Fig. 14 require a flash to illuminate the vehicle and take a photograph.  
Type 1 takes the photograph from the back to prevent the flash from distracting the driver.

State the method used by type 2 that prevents the driver from being distracted by the frontal flash.

..... [1]

(iii) State the reason that makes type 2 more likely to detect a speeding motorist than type 1.

..... [1]

- (b) (i) State **one** advantage of replacing speed cameras with flashing warning signs that display the driver's speed.

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

- (ii) Road traffic warning signs are often placed in remote locations without access to mains electricity.

State **two** alternative energy sources that can be used to provide electrical power for traffic warning signs.

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

2 .....  
 ..... [1]

- (iii) Motorists can use GPS to help them identify accident black spots.

State the measure that needs to be taken to ensure the accuracy of the information about accident black spots.

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

[Total: 10]

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