

**GENERAL CERTIFICATE OF SECONDARY EDUCATION
 DESIGN AND TECHNOLOGY
 Electronic Products**

1953/03

Paper 3 (Foundation Tier)

MONDAY 9 JUNE 2008

Afternoon
 Time: 1 hour

Candidates answer on the question paper

Additional materials: No additional materials are required



Candidate Forename

Candidate Surname

Centre Number

Candidate Number

INSTRUCTIONS TO CANDIDATES

- Write your name in capital letters, your Centre Number and Candidate Number in the boxes above.
- Use blue or 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.
- All necessary formulae are provided within the questions. No extra formulae sheet is required.

INFORMATION FOR CANDIDATES

- The number of marks for each question 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 **Mobile Phones**.

FOR EXAMINER'S USE	
1	
2	
3	
4	
5	
TOTAL	

This document consists of **12** printed pages.

- 1 (a) The table in Fig. 1 shows some common electronic components which normally function as input or output devices.

Complete the table in Fig. 1 by:

- adding in the missing component names using the list below.

motor

LED

micro switch

- placing a tick [✓] in the correct box to identify each component as an input **or** output device. **Do not tick more than 3 boxes.**



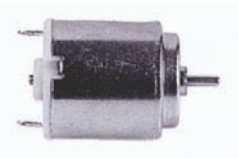


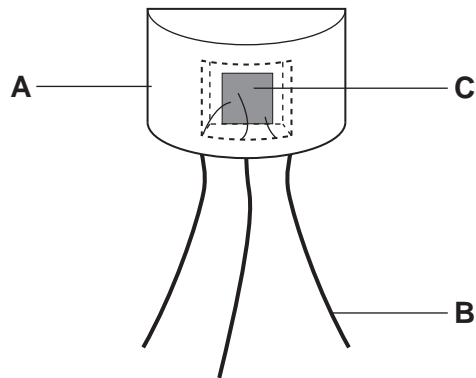
Component	Name	Input device	Output device
	LDR		
			
			✓
	thermistor	✓	
			

Fig. 1

[6]

(b) Fig. 2 shows a transistor and a list of materials.



copper

epoxy

silicon

polythene

lead

Fig. 2

(i) From the list select the material used to make the following parts of the transistor.

A The plastic case.[1]

B The transistor legs.[1]

C The semiconductor.[1]

(ii) Give the reason that makes polystyrene unsuitable for making the transistor case.

.....
[1]

[Total: 10]

2 (a) Traditional **60/40** solder used in electronics is being replaced by **lead free** solder.

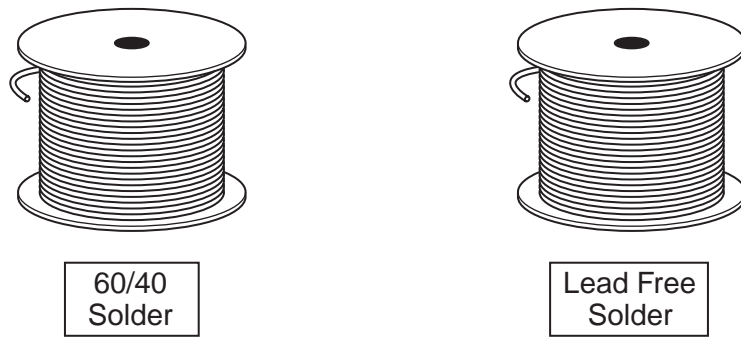


Fig. 3

- (i) State the name of the metal alloyed with lead to make traditional 60/40 solder.
.....[1]
- (ii) State which type of solder is safer to use.
.....[1]
- (iii) Give **one** reason for it being safer.
.....
.....[1]
- (iv) State the name of the material in 'cored solder' that can produce harmful fumes during soldering.
.....[1]
- (v) Describe **one** method used to reduce the harmful fumes present during soldering.
.....
.....[1]

(b) Fig. 4 shows a range of soldering irons.

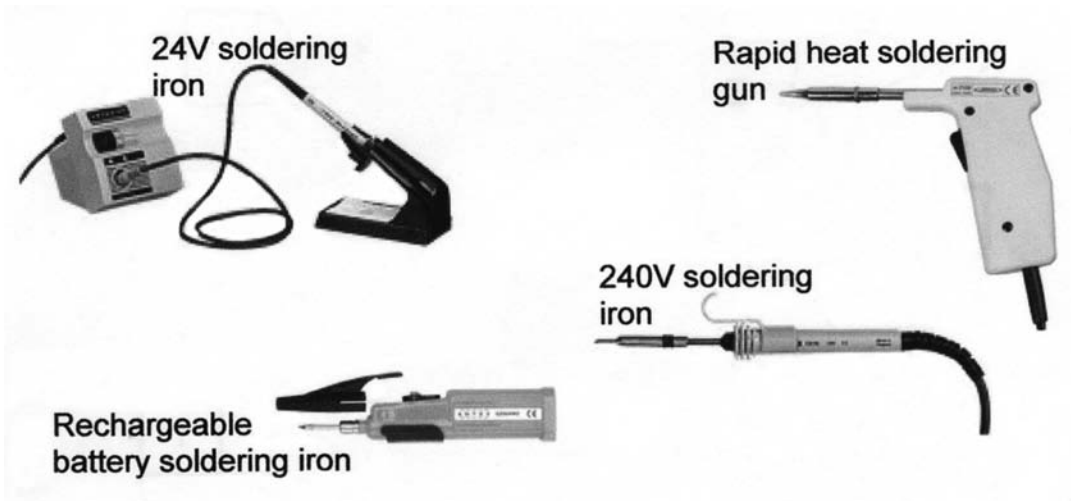


Fig. 4

(i) Soldering irons are rated by their power output.

Calculate the power rating for a 12V soldering iron drawing 1.5A.
Use the formula $P = V \times I$.

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

(ii) Give the reason for using 24V soldering irons in preference to 240V soldering irons.

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

(iii) Give **one** disadvantage of using 24V soldering irons.

.....[1]

(iv) Portable soldering irons are often powered by rechargeable batteries.

State one other energy source that could be used to power portable soldering irons.

.....[1]

[Total: 10]

- 3 (a) Fig. 5 shows two logic gates and partly completed truth tables.

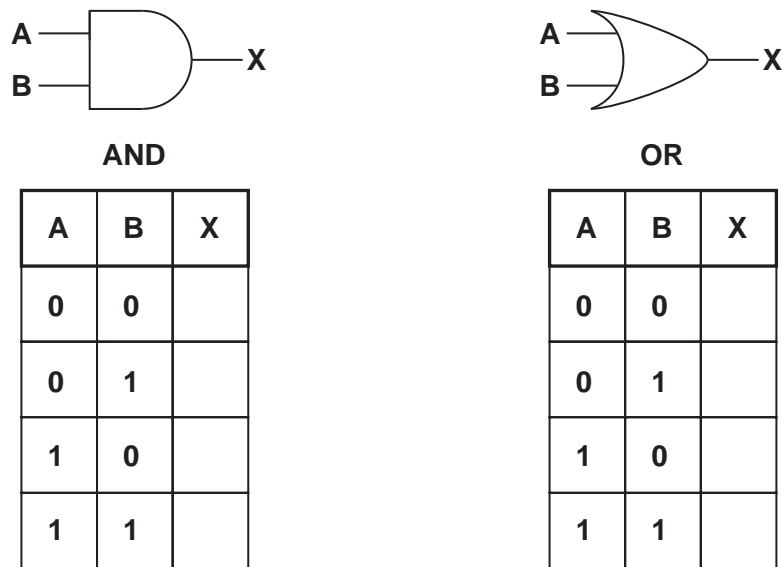


Fig. 5

- (i) Complete the truth tables for the logic gates shown in Fig. 5. [2]
- (ii) Fig. 6a uses push to make (PTM) switches and a bulb to create an AND gate arrangement. Complete the circuit shown in Fig. 6b to create an OR gate arrangement.

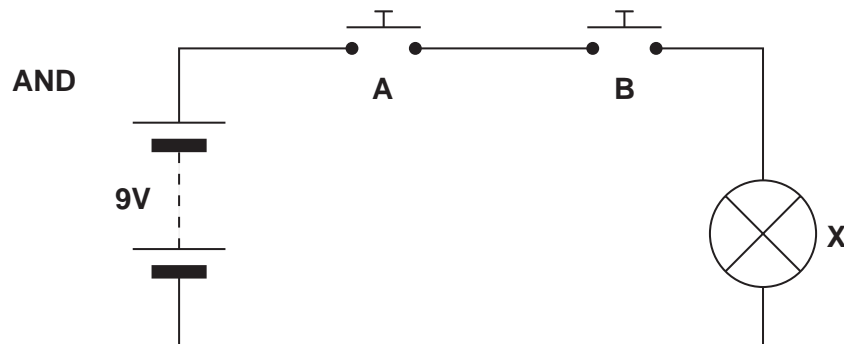


Fig. 6a

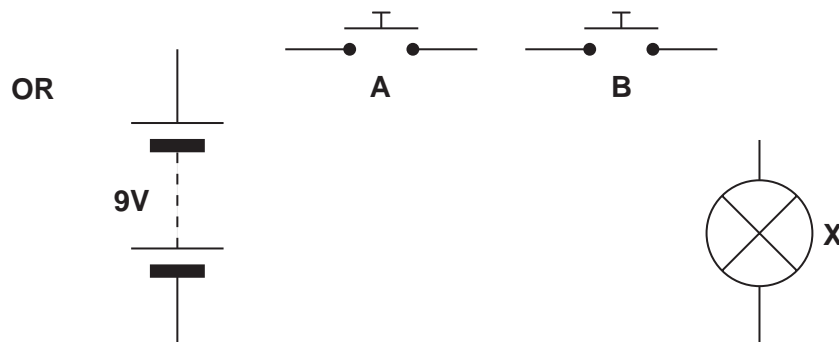


Fig. 6b

[2]

(b) Fig. 7 shows a logic gate and its truth table.

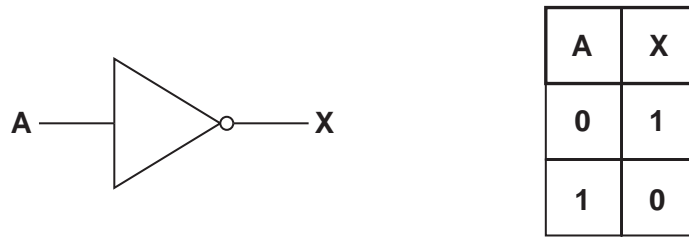


Fig. 7

(i) State the **two** names by which the logic gate shown in Fig. 7 is known.

1[1]

2[1]

(ii) Complete Fig. 8 to create the logic gate arrangement shown by inserting switch **B**.

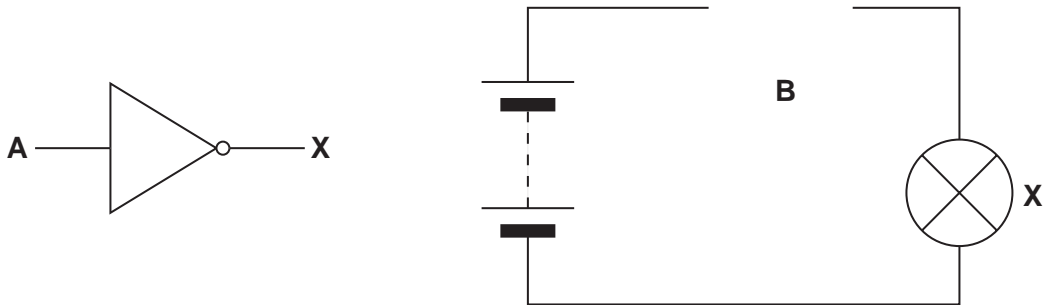


Fig. 8

[1]

(iii) State the name of a suitable switch for use at **B**.

.....[1]

(iv) The logic gate shown in Fig. 7 can be made using a **NAND** gate.

Draw a **NAND** gate to operate like the gate shown in Fig. 7.

[2]

[Total: 10]

4 (a) Electronic products rely extensively on the use of plastics for their manufacture.

(i) Give **one** property of a thermoplastic.

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

(ii) Give **one** property of a thermoset plastic.

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

Fig. 9 shows symbols found on plastic packaging products as an aid to recycling.

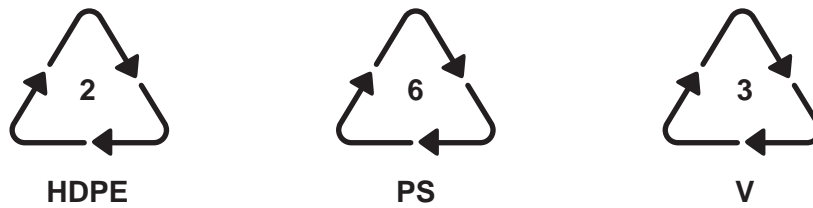


Fig. 9

(iii) State the reason for the letters under each symbol.

.....[1]

(iv) State **two** environmental benefits of recycling plastic.

1[1]

2[1]

(b) (i) Complete the table in Fig. 10 using the list of plastics and production processes shown.

<p style="text-align: center;"><u>Plastics</u></p> <p>Acrylic PVC (polyvinyl chloride) Phenol formaldehyde</p>		<p style="text-align: center;"><u>Production processes</u></p> <p>Extrusion moulding Vacuum forming Injection moulding</p>
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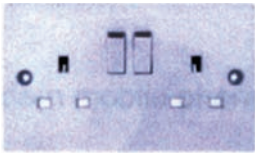


Product	Suitable plastic	Production process
 13A mains socket		<i>Compression moulding</i>
 Multimeter case	<i>HIPS</i> (high impact polystyrene)	
 Insulation sleeving		

Fig. 10

[4]

(ii) State **one** reason that makes all the products shown in Fig. 10 unsuitable for batch production.

.....

.....

.....[1]

[Total: 10]

5 Product Evaluation Question.

Mobile phones first appeared in the 1980's and are now widely used.



(a) (i) Modern mobile phones provide a variety of communication methods.

State **two** methods of communication, other than voice, available with mobile phones.

1[1]

2[1]

(ii) When carried in a bag or pocket mobile phones could be activated by accident.

Give **two** ways in which mobile phone design has overcome this.

1[1]

2[1]

(b) (i) Early analogue mobile phones had a number of security weaknesses.

State **two** security weaknesses of early analogue mobile phones.

1[1]

2[1]

(ii) The available radio spectrum became inadequate to meet the needs of increasing numbers of analogue mobile phone users in the 1980's. This led to the introduction of the GSM system we use today.

State the main change introduced with GSM to accommodate greater numbers of mobile phone users.

.....[1]

(iii) Geostationary satellite phones are used in remote areas.

Describe **one** problem experienced by geostationary satellite phone users.

.....

.....[1]

(c) (i) State **one** possible health risk associated with mobile phones.

.....[1]

(ii) Describe **one** negative social impact of mobile phones.

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

[Total: 10]

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