Version 1.0: 08/08

ASSESSMENT and QUALIFICATIONS ALLIANCE

General Certificate of Secondary Education

Design and Technology (Electronic Products) 3541/3551 Full or Short Course

Paper 3541 Foundation

Mark Scheme

2007 examination - June series

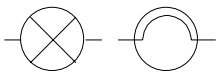
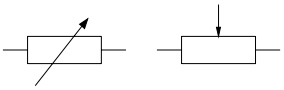
Mark schemes are prepared by the Principal Examiner and considered, together with the relevant questions, by a panel of subject teachers. This mark scheme includes any amendments made at the standardisation meeting attended by all examiners and is the scheme which was used by them in this examination. The standardisation meeting ensures that the mark scheme covers the candidates' responses to questions and that every examiner understands and applies it in the same correct way. As preparation for the standardisation meeting each examiner analyses a number of candidates' scripts: alternative answers not already covered by the mark scheme are discussed at the meeting and legislated for. If, after this meeting, examiners encounter unusual answers which have not been discussed at the meeting they are required to refer these to the Principal Examiner.

It must be stressed that a mark scheme is a working document, in many cases further developed and expanded on the basis of candidates' reactions to a particular paper. Assumptions about future mark schemes on the basis of one year's document should be avoided; whilst the guiding principles of assessment remain constant, details will change, depending on the content of a particular examination paper.

Set and published by the Assessment and Qualifications Alliance.

The Assessment and Qualifications Alliance (AQA) is a company limited by guarantee registered in England and Wales (company number 3644723) and a registered charity (registered charity number 1073334).
Registered address: AQA, Devas Street, Manchester M15 6EX *Dr Michael Cresswell Director General*

Question 1

a	(i)	Recognisable symbol for diode	1 mark	
	(ii)	Resistor(Fixed) Correct symbol for fixed resistor	1 mark 1 mark	
	(iii)	Bulb or Lamp Correct symbol for lamp (Accept signal or filament symbol)	1 mark 1 mark	
				
	(iv)	Recognisable symbol for PTM switch	1 mark	
	(v)	Capacitor Correct symbol for capacitor (Plates must be of equal length)	1 mark 1 mark	
	(vi)	Loudspeaker / speaker	1 mark	
	(vii)	Variable resistor or potentiometer Either symbol as below	1 mark 1 mark	
				
	(viii)	Recognisable symbol LDR	1 mark	
		All the only correct answers		12 marks
b	(i)	Non polarised	1 mark	
	(ii)	Non polarised	1 mark	
	(iii)	Polarised	1 mark	
	(iv)	Polarised	1 mark	
	(v)	Polarised	1 mark	
	(vi)	Non polarised	1 mark	
	(vii)	Polarised	1 mark	
		All the only correct answers		7 marks
			Total	**19 marks**

Question 2

a		Output	1 mark	
		Input	1 mark	
		Process	1 mark	
		Only correct answers		3 marks
b	(i)	Switches power to the circuit	1 mark	
	(ii)	Battery provides power/electricity/energy for the circuit	1 mark	
	(iii)	Transistor switches on the output device	1 mark	
	(iv)	Diode prevents damage to the transistor/C (any mention of protection)	1 mark	
	(v)	Buzzer provides audible / sound output	1 mark	
				5 marks
c	(i)	Capacitor added	1 mark	
		• Stores electric charge or creates time delay	1 mark	
		• Keeps transistor switched on after contacts open or buzzer stays on	1 mark	
				3 marks
	(ii)	Transistor added/Darlington pair	1 mark	
		• Greater current or amplification	1 mark	
		• Greater sensitivity or faster switching	1 mark	
				3 marks
		(i) and (ii) can be reversed but these are the only changes acceptable		
			Total	**14 marks**

Question 3

a		Examples of methods: Questionnaire of end users Survey of existing products Testing products Internet Catalogues/books/magazines		
		Clear/qualified response (must include appropriate detail	2 x 2 marks	
		Simple response	2 x 1 mark	
				4 marks
b		Valid and appropriate question, e.g. • Should it be hand held? • What type of output required? • What age range is it aimed at? • Cost? • Lifespan? • Power source?	3 x 1 mark	
		Appropriate reason – this must match the question	3 x 1 mark	
				6 marks
c		Safety – for children Portable – can be used anywhere		
		Qualified response	2 x 2 marks	
		Basic reason	2 x 1 mark	
				4 marks
d		One qualified response, e.g. • Cuts out landfill/reduces pollution • Can be used numerous times therefore do not need to replace often • Cost effective	2 marks	
		Two Simple responses	2 x 1 mark	
				2 marks
e	(i)	Recycling or other description of appropriate disposal		1 mark

(ii) Qualified reason, e.g.

- Chemicals contained in the battery are potentially toxic
- Chemicals may leak from the battery and pollute the water supply
- Increased use of landfill sites
- Potential hazard to wildlife — 2 x 2 marks

Basic Statement, e.g.

- Pollution
- Landfill — 2 x 1 mark

4 marks

Total 21 marks

Question 4

a	(i)	Anode ***Only correct answer***		1 mark
	(ii)	Indicate Cathode side of the case ***Only correct answer***		1 mark
b	(i)	R = V / I or V = I x R R = 7V / 20mA R = 350 Ohms (Ω) or R ***Only correct answers***	1 mark 1 mark 1 mark for answer / 1 for units	4 marks
	(ii)	330R ***Only correct answer***		1 mark
c		330 1st digit - 3 2nd digit - 3 3rd digit - 0 If a candidate does state units it must be R or Ω – any other unit means a lost mark for 3rd digit	3 marks or 1 mark 1 mark 1 mark	3 marks
			Total	**14 marks**

Question 5

5	a	(i)	Resistor connected pins 6&7	1 mark	
			Capacitor connected to pins 6&7	1 mark	
			Correct position + connection: Resistor to 9V (R1) capacitor to OV (R2)	1 mark	
			Only correct answers		3 marks
		(ii)	Resistor connected between pin 2 and 9V line	1 mark	
			10k or greater	1 mark	
			PTM switch symbol or correct label	1 mark	
			Connected between pin 2 and 0V line	1 mark	
			Only correct answers		4 marks
		QoD	Symbols recognisable and in proportion	1 mark	
			Clear connections and neat lines (No need for + on capacitor)	1 mark	2 marks
	b	(i)	Red LED on	1 mark	
			Green LED off	1 mark	
			Only correct answers		2 marks
		(ii)	Green LED on, red LED off	1 mark	
			End of time constant, green off & red on	1 mark	2 marks
	c		Correct buzzer symbol	1 mark	
			Correct connections to pin 3 and 0V line	1 mark	
			Only correct answers		2 marks
				Total	**15 marks**

Question 6

a		Track – copper – must be conductor Wand – copper – must be conductor Handle – any suitable specific material	1 mark 1 mark 1 mark	3 marks
b		Three improvements describe, e.g. • Change of shape • Rounded corners • Sloping sides • Securing wires and track, etc.	3 x 1 mark	3 marks
c	(i)	Specific material – HIPS, polystyrene Generic material – plastic, wood	2 marks 1 mark	2 marks
	(ii)	**Quality of response answer** **4 to 6 marks** Detailed design and description of suitable improvements, e.g. Change of shape Change of track Change handle/wand Detail of construction Security of wires and track Interchangeable tracks **1 to 3 marks** Simple description or not appropriate changes		6 marks
	(iii)	Two LED's in visible position		1 mark
	(iv)	Sound holes in neat pattern		1 mark
	(v)	Appropriate switch in logical position Switch type unclear/poor position	2 marks 1 mark	2 marks
	QoD	Quality of response answer • Well drawn, clear and detailed with appropriate notes and annotation • Clear design but lacking detail or notes • Basic sketches lacking clarity and presentation	3 marks 2 marks 1 mark	3 marks

d **Quality of response answer**

4 to 6 marks
Detailed and qualified explanation referring to specification points and features shown in their design and matching to a suitable production process such as vacuum forming or using jigs and fixtures

1 to 3 marks
Simple response/unqualified only relating to one or two aspects of the design. Limited or no reference to a production method

6 marks

Total **27 marks**

Question 7

7	a		Astable / Pulse generator ***Only acceptable answers***		1 mark
	b	(i)	AND / AND Gate (ignore case) ***Only acceptable answers***		1 mark
		(ii)	0 0 0 1 ***Only acceptable answers***	1 mark 1 mark 1 mark 1 mark	4 marks
				Total	**6 marks**

Question 8

a Detailed description of named product type with features that have changed,
e.g. games used to be available only on the pc and had very poor quality displays. High quality games now available on very small hand held devices such as the mobile phone. 3 marks

Less detail given – lack reference to past product 2 marks

Simple statement 1 mark

3 marks

b (i) One qualified statement, e.g.
- Radiation given off from small portable electronic devices is thought to be potentially dangerous
- Lack of exercise coursing obesity
- Eyesight can be damaged 2 marks

Two simple statements 2 x 1 mark

2 marks

(ii) One qualified statement, e.g.
- Reduced personal contact
- Growing tendency not to interact with people 2 marks

Two simple statements 2 x 1 mark

2 marks

c (i) Detailed description advantages.
e.g. Launch of new product can create great interest from the public. Can utilise advances in technology. Able to make greater profit. 3 marks

Less detail given 2 marks

Simple statement 1 mark

3 marks

(ii)	Detailed description of disadvantages, e.g. Technology becomes outdated, requiring need for constant investment. Raw materials and pollution an increasing problem. Cost of research and development, re-training of staff, recycling of obsolete stock	3 marks	
	Less detail given	2 marks	
	Simple statement	1 mark	
			3 marks
		Total	**6 marks**
		Total for the Paper	**125 marks**