



## **General Certificate of Secondary Education**

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

**Paper 3551 Higher**

## **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.

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**Question 1**

a	<p>Examples of methods:</p> <ul style="list-style-type: none"> <li>• Questionnaire of end users</li> <li>• survey of existing products</li> <li>• testing products</li> </ul>		
	Clear/qualified response	2 x 2 marks	
	Simple response	2 x 1 mark	4 marks
b	<p>Valid and appropriate question e.g.</p> <ul style="list-style-type: none"> <li>• Should it be hand held?</li> <li>• What type of output required?</li> <li>• What age range is it aimed at?</li> <li>• Cost?</li> <li>• Lifespan?</li> </ul>	3 x 1 mark	
	Appropriate reason – this must match the question	3 x 1 mark	6 marks
c	<p>Qualified response</p> <p>Basic reason</p>	<p>2 x 2 marks</p> <p>2 x 1 mark</p>	4 marks
d	(i) Qualified response e.g. <ul style="list-style-type: none"> <li>• Output device requires high current;</li> <li>• Can be used numerous times therefore do not need to replace often.</li> </ul>	2 marks	
	Simple response	1 mark	2 marks
e	(i) Recycling or other suitable description.		1 mark
	(ii) Qualified reason e.g. <ul style="list-style-type: none"> <li>• Chemicals contained in the battery are potentially toxic</li> <li>• Chemicals may leak from the battery and pollute the water supply</li> <li>• Increased use of landfill sites</li> <li>• Potential hazard to wildlife</li> </ul>	2 x 2 marks	
	Basic Statement e.g. <ul style="list-style-type: none"> <li>• Pollution</li> <li>• landfill</li> </ul>	2 x 1 mark	4 marks
		<b>Total</b>	<b>21 marks</b>

**Question 2**

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

c

**Quality of response answer**

**4 to 5 marks**

Detailed consideration of both methods which includes some of the following points.

**1 to 3 marks**

Limited consideration of both methods or just considering one of them

CAD:

Easy to store

Easy to share

Quick to change/edit

Can't destroy component

Need a PC & software

Not real only simulation

Breadboard:

Real

Uses actual components

Cheap

Can be done anywhere

Fiddly

Difficult concept

**1 to 3 marks**

Limited consideration of both methods or just considering one of them

5 marks

**Total 18 marks**

**Question 3**

a	Correct formula	1 mark	
	Correct substitution	1 mark	
	Correct use of units/values	1 mark	
	Correct answer = 6.86, accept 7	1 mark	
	Correct final units = Hz or Hertz or cycles per second	1 mark	5 marks
	<b>Only correct answers</b>		
b	One side of buzzer to pin 3	1 mark	
	Other side of buzzer to 0V line	1 mark	
	<b>Only correct answers</b>		2 marks
	<b>Total</b>		<b>7 marks</b>

**Question 4**

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. <ul style="list-style-type: none"> <li>• Change of shape</li> <li>• Rounded corners</li> <li>• Sloping sides</li> <li>• Securing wires and track, etc.</li> </ul>	3 x 1 mark	3 marks
c	(i) Specific material – HIPS, polystyrene Generic material – plastic, wood	2 marks 1 mark	2 marks
	(ii) <b>Quality of response answer</b>		
	<b>4 to 6 marks</b> 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		
	<b>1 to 3 marks</b> 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 <ul style="list-style-type: none"> <li>• Well drawn, clear and detailed with appropriate notes and annotation</li> <li>• Clear design but lacking detail or notes</li> <li>• Basic sketches lacking clarity and presentation</li> </ul>	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 5**

a	Clear start to the programme	1 mark	
	Decision on input	1 mark	
	Feedback waiting for input	1 mark	
	Output 0 (LED1) high/on	1 mark	
	Decision on input	1 mark	
	Feedback waiting for input	1 mark	
	Output 1 (LED2) high/on	1 mark	7 marks
b	Correct command eg Wait	1 mark	
	Correct time – 2s	1 mark	
	Correct 1 <sup>st</sup> position	1 mark	
	Correct 2 <sup>nd</sup> position	1 mark	
	(Either before or after Output/LED on)		4 marks
c	If Output 1(LED2) high/ on - sequence	1 mark	
	Then Output 2 high/on	1 mark	
	Delay/Wait for 10s	1 mark	3 marks
d	Reset after buzzer delay	1 mark	
	All outputs low/off	1 mark	
	Return to start	1 mark	3 marks
		<b>Total</b>	<b>17 marks</b>

**Question 6**

**a Quality of response answer**

**4 to 6 marks**

Detailed answer which considers both advantages and disadvantages of communication technology in both the work and leisure environment.

**1 to 3 marks**

Limited or basic response

Examples of points which might be covered:

- Ease of contact
- Cost of technology
- Lack of personal contact
- Health risks
- Dependency on the technology
- Must have culture
- Emergency contact
- Street crime
- Phones are more than phones!
- Invasion of privacy
- Satellite navigation
- MP3 player

6 marks

- b (i) One qualifies sentence about one reason 2 marks**

Two simple statements

e.g.

- promotes the product
- protects the product
- identifies with the brand
- instructions on use

2 x 1 mark

2 marks

(ii) One qualifies sentence about one reason 2 marks

Two simple statements

e.g.

- packaging thrown away
- causes litter
- could harm environment or wildlife
- increased landfill
- often not re-cycled

2 x 1 mark

2 marks

**Total 10 marks**

**Total for the Paper 100 marks**