AQA

ASSESSMENT and
QUALIFICATIONS
ALLIANCE

General Certificate of Secondary Education

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

Paper 3541 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.

Question 1

a   Examples of methods:
- Questionnaire of end users
- Survey of existing products
- Testing products
- Internet
- Catalogues/books/magazines

Clear/qualified response (must include
appoppriate 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   1 mark
           disposal

(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 2

2	a	(i)	Resistor connected pins 6&7	1 mark	
			Capacitor connected to pins 6&7	1 mark	
			Correct position + connection:	1 mark	
			Resistor to 9V (R1) capacitor to OV (R2)		3 marks
			Only correct answers		
		(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	1 mark	
			(No need for + on capacitor)		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
				Total	**13 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	
	Only correct answers		5 marks
b	Correct buzzer symbol	1 mark	
	Correct connection to pin 3 and OV line	1 mark	
	Only correct answers		2 marks
c	Increasing the value of either the resistance or the capacitance	1 mark	
	By 100% or doubling the value	1 mark	
			2 marks
d	R2 – a variable resistor is added in series with the fixed resistor	2 marks	
	R2 can be replaced by a variable resistor or variable capacitor for C1	1 mark	
			2 marks
		Total	**11 marks**

Question 4

a   *Examples show type of response to earn marks. Qualified sentence can also earn the two marks.*

    (i)   Creates a time delay   1 mark

            Debounces the input   1 mark

                                    2 marks

    (ii)   Is a pulse generator   1 mark

            Sending digital Signals (ON-OFF Pulses)

            into the logic gate   1 mark

                                      2 marks

    (iii)   The pulse from the monostable advances

            the counter output by one on each pulse   2 marks

            Counts the pulses   1 mark

                                      2 marks

    (iv)   Combines two signals   1 mark

            From different sources   1 mark

                                      2 marks

    (v)   Amplifies output current from logic gate   1 mark

            To make buzzer work   1 mark

                                      2 marks

b   (i)   AND

                      Only acceptable answer   1 mark

    (ii)   0   1 mark

            0   1 mark

            0   1 mark

            1   1 mark

                 Only acceptable answers   4 marks

                                  Total   **15 marks**

Question 5

a   Track – copper – must be conductor   1 mark
     Wand – copper – must be conductor   1 mark
     Handle – any suitable specific material   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 2 marks
     Generic material – plastic, wood   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) Three LED's in visible position   1 mark

 (iv) Sound holes in neat pattern   1 mark

 (v) Appropriate switch in logical position 2 marks
    Switch type unclear/poor position   1 mark
                            2 marks

 QoD Quality of response answer
     • Well drawn, clear and detailed with
      appropriate notes and annotation 3 marks
     • Clear design but lacking detail or notes 2 marks
     • Basic sketches lacking clarity and
      presentation   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 6

This mark scheme applies to the aspects that should be included for each part irrespective of the software used.

a   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
              Decision on input   1 mark
              Feedback waiting for input   1 mark
              Output 2 (LED3) high/on   1 mark

                                                                   9 marks

b   Correct command (e.g. wait 2)   1 mark

          Correct position   3 x 1 marks
          (either before or after each Output/LED on)

                                                                   4 marks

c   If Output 2 high/on   1 mark
          Then Output 3 (buzzer) high/on   1 mark
          For 0.25s   1 mark
          Then Output 3 (buzzer) low/off   1 mark
          For 0.25s   1 mark
          Repeat 3 times   1 mark

                                                                   6 marks

d   Reset after buzzer repeat   1 mark
          All outputs low/off   1 mark
          Return to start   1 mark

                                                                   3 marks

                                                           Total   22 marks

Question 7

Quality of response answer
4 to 6 marks
Detailed and qualified response which considers both methods.

1 to 3 marks
Limited detail or only one method considered

Examples of points are:
Vacuum Forming Advantages
- Easy to produce a mould
- Cheap machine
- Cheap mould
- Economic for small number of production
- High quality of product

Vacuum Forming Disadvantages
- Significant finishing required after moulding
- Lot of work

Injection Moulding Advantages:
- High quality finish to the product
- Replacing machine parts
- Wide range of material
- Little waste – recycling trimmings

Injection Moulding Disadvantages:
- High cost of producing mould
- High energy cost
- 24hr production line

Total   6 marks

Question 8

Quality of response answer

7 to 10 marks
Detailed and comprehensive answer which considers both advantages and disadvantages of communication technology in both the work and leisure environment

4 to 6 marks
Detail lacking about one or more aspect

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

Total   10 marks

Total for the Paper   125 marks