

GCSE 2004

June Series



Mark Scheme

Design and Technology: Electronic Products *(3541 – Full Course Higher)*

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.

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The answers given in the following mark schemes are neither exhaustive nor exclusive. Candidates whose answers do not appear directly on the mark scheme, but who have demonstrated knowledge, understanding or skills relevant to the question will receive appropriate credit for their answers.

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ASSESSMENT AND QUALIFICATIONS ALLIANCE
GENERAL CERTIFICATE OF SECONDARY EDUCATION

Summer Examination 2004

Design and Technology: Electronic Products

Full Course: Higher Tier

Question 1

- (a) Monostable. (1 mark)
- (b) (i) Electrolytic capacitor, Capacitor, C1 or Polarised Capacitors
LED.
IC. (3 marks)
- (ii) Feature x 3 (3 marks)
Orientation x 3 (3 marks)
e.g. LED. Feature – Short leg
Flat side
Large flag
Orientation – to 0V
Electrolytic capacitor – band on outside of casing marked –
leg nearest to 0V or short leg.
LED - short leg or flat side of case to 0V.
- long leg or rounded case to +V.
IC - dimple or dot or notch on left edge of casing.
- pin 1 next to dimple or dot or notch.
Accept – Battery snap – Red / Black leads / Red to +V (6 marks)
- (c) R1 and C1 must be R1 but capacitor will do (2 marks)
- (d) SW1 – to start the time delay or time period. (1 mark)
- (e) R1 x C or 470,000 x 100/1000000 or similar (1 mark)
Substitution of values. (1 mark)
Correct units – 47 secs. (1 mark)
Or allow R x C x 1.1 (1 mark)
Substitution of values (1 mark)
Correct answer 51.7 sec (1 mark)
- (f) Tolerance of capacitor +/- 25% or 20% therefore it was the most likely variable. Cap has large tolerance. (2 marks)
Mention of inaccuracy, leakage (1 mark)
- (g) (i) No units or correct units 6 - 9V (1 mark)
(ii) 0V 0 (1 mark)
- Total 20 marks**

Question 2

(a)	Detailed designs showing materials and suitable construction methods with appropriate location of switches and LED.	7 – 9 marks	
	Designs which show and suggest materials and construction methods for each case. Maximum 4 marks for single complete design	4 – 6 marks	
	Basic design which shows materials and construction method for at least one case.	1 – 3 marks	(9 marks)
	Quality of drawings:		
	Detailed and accurate drawings using appropriate techniques.	(3 marks)	
	Well drawn and clearly recognisable designs	(2 marks)	
	A basic drawing without detail or lacking any element of accuracy.	(1 mark)	
	Unrecognisable as a design for a container	(0 marks)	(3 marks)
(b)	• Specific material		(1 mark)
	• Identify appropriate construction method	(1 mark)	
	Explanation / suitability of form	(1 mark)	(2 marks)
	• Some dimensions added	(1 mark)	
	Large enough to hold circuit, battery and components	(2 marks)	(2 marks)
	• Basic indication of access, e.g. battery panel	(1 mark)	
	Greater detail for both circuit and battery	(2 marks)	
	Full detail of access	(3 marks)	(3 marks)
	Link to construction method each component appropriately located	(1 x 3)	(3 marks)
	Detailed and accurate drawings using appropriate techniques.	(3 marks)	(3 marks)
	Well drawn and clearly recognisable design with some additional detail.	(2 marks)	
	A basic drawing lacking detail.	(1 mark)	
			Total 26 marks

Question 3

- (a) Suitable commands for lights and time delay. X 5 – 1 mark each
 E.g. Green Lamp ON - Switch on 8, output 8, on 8.
 For 0.2 sec - For 0.2, Delay 0.2, Wait 0.2 Red
 and Blue ON - Switch on 3, output 3, on 3
 or reference to 1, 2
- Look for possible binary (5 marks)
 No commands but use of 8, 4, 1, 2 (1 mark)
- (b) (i) The output from the PIC is only 100mA and the lamps
 require 500mA, the lamps will not light.
 Simple response (e.g. not enough power) (1 mark)
 not enough current
 Qualified response (2 marks) (2 marks)
- (ii) Qualified response
 e.g. Provides a **higher current** output or **amplify the
 output** current of PIC/chip. (2 marks)
 Increases output to turn on the bulb
 Simple response 1 mark – increase output

Total 9 marksQuestion 4

- (a) Pins 8 and 16 (2 marks)
 2nd life to pin 2 (1 mark)
 3rd life to pin 4 (1 mark)
 4th & 5th life to pins 7 & 10 (1 mark)
 Correct sequence but one pin out (1 mark)
 Suitable switch (1 mark)
 Switch between pin 15 and +V (1 mark)
 Pin 1 to 15 (1 mark)
 Straight lines. Clear lines drawn (1 mark)
 Quality of symbol for switch (1 mark)
- (b) (i) Switch bounce, as the wires touch the count will vary unless
 only one clear touch is made. (1 mark)
- (ii) Schmitt Trigger, Digital Input, De-bounce Circuit. Any
 one. (1 mark)

Total 12 marks

Question 5

- (a) (i) Thermistor (1 mark)
- (ii) Op-amp / 741 (1 mark)

- (b) To amplify / or compare / differential (1 mark)
- To amplify voltage (1 mark)
- To amplify voltage difference between pins 2 and 3 (1 mark)
- To create high output when voltage at pin 3 is higher than voltage at pin 2 (3 marks)

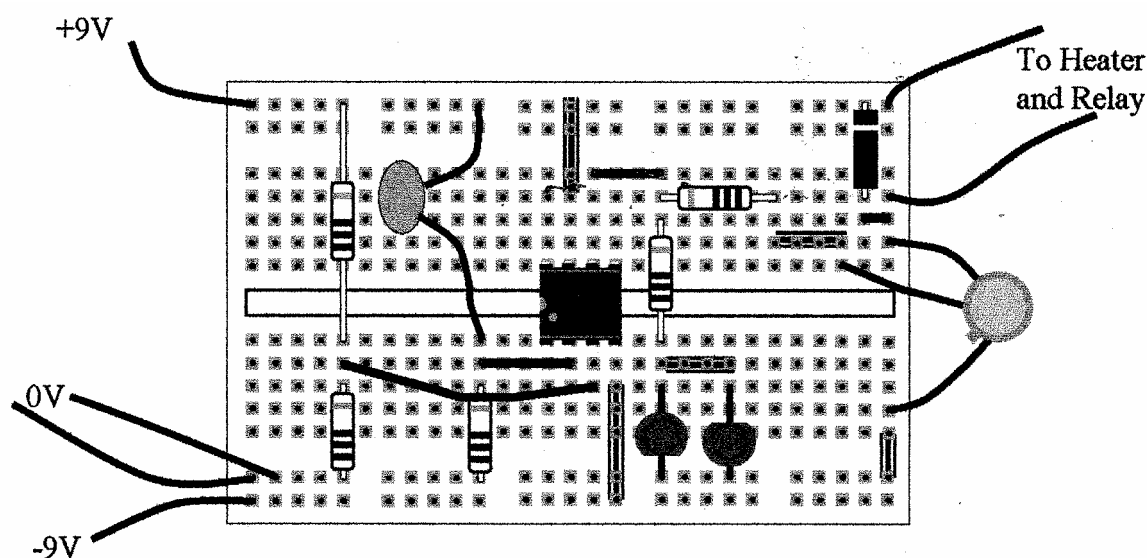
- (c) 2 – Inverting Input (1 mark)
- 3 – non inverting Input (1 mark)
- 6 – Output (1 mark)

- (d) To prevent damage from back emf. (1 mark)
- To protect the transistor (1 mark)

- (e) (i) Red (1 mark)
- (ii) Set voltage or Reference at non-inverting or Pin 3 (1 mark)
- Changing or Variable voltage at Pin 2 or inverting (1 mark)
- Voltage difference is positive or +V (1 mark)
- Output High / Positive / LED on (1 mark)

* If GREEN given in (1) check for response in (2) as understanding could be there.

(f)



- Pin 4 to -V pad (1 mark)
- Resistor to green LED (1 mark)
- Tr to 0V (1 mark)
- Resistor to Base of Tr (1 mark)
- Pin 7 to +V (1 mark)
- Single connection in holes (1 mark)

Total 21 marks

Question 6

- (a) (i) Any 3 suitable answers
e.g. Tracks thicker, end of tracks joined closer to pads/other tracks. No cross tracks, smaller circuit, pad same / track same (3 marks)
Any three
- (ii) All correct stages / sequences identified
e.g. Left click/select tools/properties etc.
Left click/select –menu.
Select change required.
Press ‘enter’ or left click ‘OK’.
Correct sequence
- | | | |
|----------------------------|-----------|-----------|
| Most stages identified | (3 marks) | |
| Some stages identified | (2 marks) | |
| Limited response to change | (1 mark) | (4 marks) |
- (b) Activity undertaken during making vero, CAM or Photo etch (1 mark)
Tools and equipment suitable for activity. (1 mark)
Health and safety linked to activity. (1 mark)
Quality Issue linked to activity. (1 mark)
- Activity undertaken during making vero, CAM or Photo etch (1 mark)
Tools and equipment suitable for activity. (1 mark)
Health and safety linked to activity. (1 mark)
Quality Issue linked to activity. (1 mark)
- Total 15 marks**

Question 7

(a)	Suitably qualified response		(3 marks)
	Limited response	(1 mark)	
	e.g. It can be recycled.	(1 mark)	
	People more likely to recycle it.	(2 marks)	
	More recycled less fuels used less pollution		
	etc.	(3 marks)	
(b)	(i)	To protect – prevent damage to product from impact, moisture etc To inform – provide instructions as to use information To market – attractive packaging to help promote.	
		Any two x 2	(4 marks)
	(ii)	e.g. Lack of landfill sites, pollution, long term breakdown of materials etc.	(3 marks)
		Limited response	(1 mark)
		Suitably qualified response	(3 marks)
(c)	(i)	Society (Advantage)	(1 mark)
		e.g. greater communication, speedy transactions	
		Partial Explanation	(1 mark)
		Full Explanation	(2 marks)
			(3 marks)
		Society (Disadvantage)	(1 mark)
		e.g. less face to face interaction, noise pollution, accidents	(1 mark)
		Partial Explanation	(1 mark)
		Full Explanation	(2 marks)
			(3 marks)
	(ii)	Environment (Advantage)	(1 mark)
		e.g. less need for cables, phones boxes	
		Partial Explanation	(1 mark)
		Full Explanation	(2 marks)
			(3 marks)
		Environment (Disadvantage)	(1 mark)
		e.g. masts, health, problems with disposal.	
		Partial Explanation	(1 mark)
		Full Explanation	(2 marks)
			(3 marks)
			Total 22 marks