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GCSE 2004
June Series

ASSESSMENT and QUALIFICATIONS ALLIANCE

Mark Scheme

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

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: Foundation Tier

Question 1

(a)	(i)	Light Dependant Resistor/LDR	(1 mark)
	(ii)	Variable Resistor or Potentiometer, Preset Resistor	(1 mark)
	(iii)	Resistor	(1 mark)
	(iv)	Transistor.	(1 mark)
(b)	Input - VR and LDR or A and B. (relate to (a)(i) + (a)(ii))		(2 marks)
	Process- Resistor and transistor or C and D. (relate (a)(iii) & (a)(iv))		(2 marks)
	Output - Lamp/Bulb		(1 mark)
(c)	Rises.		(1 mark)
(d)	To detect light change, to control the switching of the transistor. To act as part of the potential divider, resistance changes when it gets dark and this acts with the VR to change the base voltage or any other appropriate response. (1 mark each)		(2 marks)
(e)	Collector, base, emitter.		(3 marks)
(f)	(i)	Double throw. (1 mark each)	(2 marks)
	(ii)	1 mark for simple responses, 2 marks for qualified reason. e.g. The lamp will not drain the battery / as RL once switched will require less current.	(2 marks)

Total 19 marks

Question 2

(a)	Monostable.				(1 mark)
(b)	e.g.	LED	Feature 1 mark, Orientation 1 mark		
			Short leg or flat side	(1 mark)	
			to 0V	(1 mark)	(2 marks)
	e.g.	IC	Dimple or dot	(1 mark)	
			Indicates Pin 1	(1 mark)	(2 marks)
(c)	C1 / Capacitor / Polarised or Electrolytic Capacitor				(1 mark)
(d)	T = R1 x C or 470,000 x 100/1000000 or similar.				(1 mark)
	Substituting correct values				(1 mark)
	Answer with correct units – 47 secs				(1 mark)
(e)	Multimeter, avometer etc.				(1 mark)
(f)	(i)	9V or 9			(1 mark)
	(ii)	0 ohms or 0			(1 mark)

Total 12 marks

Question 3

(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.	4 – 6 marks	
	Maximum 4 marks for single complete design		
	Basic designs which show 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)
	• Identifying the 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	(1 mark)	(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)
	• Each component appropriately located	1 mark each	(3 marks)
	Quality of drawing:		
	Detailed and accurate drawings using appropriate techniques.	(3 marks)	
	Well drawn and clearly recognisable design with some additional detail.	(2 marks)	
	A basic drawing lacking detail.	(1 mark)	(3 marks)

Total 26 marks

Question 4

(a) Suitable commands for light and time delay 1 mark each

e.g. Switch on 8
Switch on 4
Wait 0.1 or .1
Switch on 3 or similar reference to 1 and 2
Wait 0.2 or .2 (5 marks)

(b) (i) Simple response – 1 mark e.g. not enough power
Qualified response – 2 marks
e.g. The output from the PIC is only 100mA and the lamps require 500mA, the lamps will not light. (2 marks)

(ii) Simple response - 1 mark
Qualified` response – 2 marks
e.g. The transistors will amplify the output current.
Current at a suitable level. (2 marks)

Total 9 marks

Question 5

(a) (i) Conductor (1 mark)
(ii) Insulator (1 mark)
(iii) Hand Loop – Copper, Steel Wire, or Metal (1 mark)
Handle or hand loop – Wood, Plastic or specific type. (1 mark)

(b) Integrated. (1 mark)
Circuit. (1 mark)

(c) (i) 14 (1 mark)

(ii)
- Pin 16 to +V (1 mark)
  Pin 8 to 0V (1 mark) (2 marks)

- Suitable switch (1 mark)
  Connected to Pin 15 and +V (1 mark) (2 marks)

- *It is regretted that there was an error on the third bullet point on Q5(c)(ii) on the paper. This refers to the connections to the "*2nd and 3rd LEDs*", which should have read "*3rd and 4th LEDs*". As a result many possible answers were available, consequently the following marking strategy is to be adopted.*

  3rd life LED connected to pin 4
  (or 4th life LED to pin 7) (4 marks)

  3rd life LED connected to pin 7
  (or 4th life LED to pin 10) (3 marks)

  3rd life LED or 4th life LED connected to any
  output pin (2 marks) (4 marks)

Any changes to the 2nd life LED connection, which is shown correctly in the question, do not affect the marks available, as they are determined primarily by the 3rd life LED connection.

Quality of drawing:

Clear lines (1 mark)
Straight vertical / horizontal (1 mark)
Correct switch symbol (1 mark) (3 marks)

(iii) Simple response e.g. switch bounce (1 mark)
Qualified response e.g. multiple input (2 marks)
non-digital
need clear input to chip (2 marks)

Total 20 marks

Question 6

(a)	(i)	Printed circuit board.	(1 mark)
	(ii)	Computer Aided Design.	(1 mark)
(b)	(i)	Track. Pad (1 mark each)	(2 marks)
	(ii)	Tracks thicker, end of tracks joined closer to pads/other tracks; No cross tracks, smaller circuit, some pads/tracks too close; strain holds Larger pads/ thicker line; Add text to identify components or other valid response (1 mark each)	(3 marks)
(c)		Single statement – 1 mark	
		Qualified statement or 2 single statements – 2 marks	(2 marks)
	e.g.	Activity undertaken during making vero, CAM or Photo etch	(2 marks)
		Tools and equipment suitable for activity.	(2 marks)
		Health and safety linked to activity.	(2 marks)
		Quality Issues linked to activity.	(2 marks)
	e.g.	Avoid heated parts, soldering iron/stand. Replace iron to stand when not in use. Work in ventilated area. Wash hands after use. Reasons appropriate to process.	
	e.g.	Keep iron tip clean. Warm both components and track. Avoid excessive heat. Avoid excessive use of solder.	(2 marks)

Total 19 marks

Question 7

(a) The material can be recycled. (1 mark)

(b) (i) Plastic – disposal of waste, pollution during manufacture, non renewable energy used during manufacture, or any other appropriate response

Any one (1 mark)

(ii) Metal - disposal of waste as recycled values fluctuate, cost of recycling energy used during manufacture, or any other appropriate response

Any one (1 mark)

(c) To protect – prevent damage to product.
To inform – provide instructions as to use.
To market – attractive packaging to help promote.

Any two (2 marks)

(d) (i) Smaller sizes, lighterweight, many functions, other suitable developments.

Any three (3 marks)

(ii)

1	Consumer	–	more attractive to thieves, used more, expensive bills, possible health risk.	(2 marks)
2	Society	–	noise, intrusion, anti social, crime.	(2 marks)
3	Environment	–	disposal, batteries/cases, masts.	(2 marks)

One word (1 x 3 marks)
Some clarification (2 x 3 marks)

(e) Developments e.g. Smaller, lighter, other functions, games, interactive games, video, camera live transmissions. (3 marks)

Explanations. (3 marks)

Total 20 marks