ASSESSMENT and QUALIFICATIONS ALLIANCE

Mark scheme June 2003

GCSE

Design and Technology Electronic Products

3541 (Full Course)

Foundation

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Design and Technology: Electronic Products

Full Course: Foundation Tier

Question 1

(a)	series		(1 mark)
(b)	(i)	10	(1 mark)
		00	(1 mark)
		1K 1000R 1000Ω	(1 mark)
	(ii)	equation	(1 mark)
		Manipulation/calc	(1 mark)
		Answer 1K	(1 mark)
(c)	can be +/- %		(1 mark)
	all resistors not exact value		(1 mark)
	5% below or above		
			Total 9 marks

Question 2

(a)	(i)	**INPUT –** Thermistor/**Temperature Sensor**	(1 mark)
		Transistor – Control/Process potential divider	(1 mark)
	(ii)	Open loop	(1 mark)
(b)	(i)	Variable resistor/Potentiometer	(1 mark)
	(ii)	Thermistor	(1 mark)
	(iii)	Transistor	(1 mark)
	(iv)	Relay	(1 mark)
	(v)	Diode	(1 mark)
(c)	(i)	Thermistor and VR/Potentiometer OR A & B	(2 marks)
	(ii)	Resistance lowers	(1 mark)
	(iii)	Alter the level a which the heater turns on	(2 marks)
	(iv)	Goes low/Reduces	(1 mark)
	(v)	0.6/0.7V	(1 mark)
(d)	V to heater		(1 mark)
	V to relay		(1 mark)
	Relay to heater		(1 mark)
			Total 18 marks

Question 3

(a) Astable (1 mark)

(b) Pin 3 (1 mark)

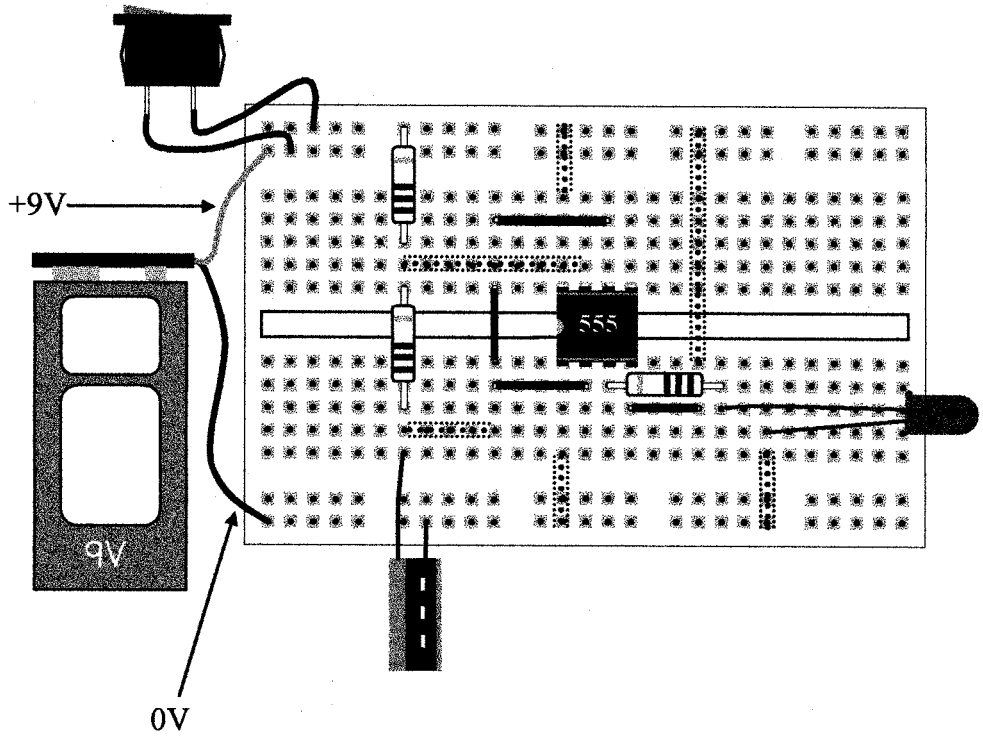
(c) Capacitor or C (1 mark)

(d) (i) To protect the LED from damage (1 mark)
To protect the LED from too high a current (1 mark)
Controls the amount of electricity to LED

(ii) Formula (1 mark)
7-2 =5 (1 mark)
R=5/0.02 (1 mark)
Answer 250Ω (1 mark)

(e) Pin 1 to 0V (1 mark)
LED to 0V (1 mark)
Pin 4 to +V (1 mark)
Pin 8 to +V (1 mark)
Pin 7 to PD (1 mark)
Pin 2 to C (1 mark)
Penalise only 1 mark for shared holes

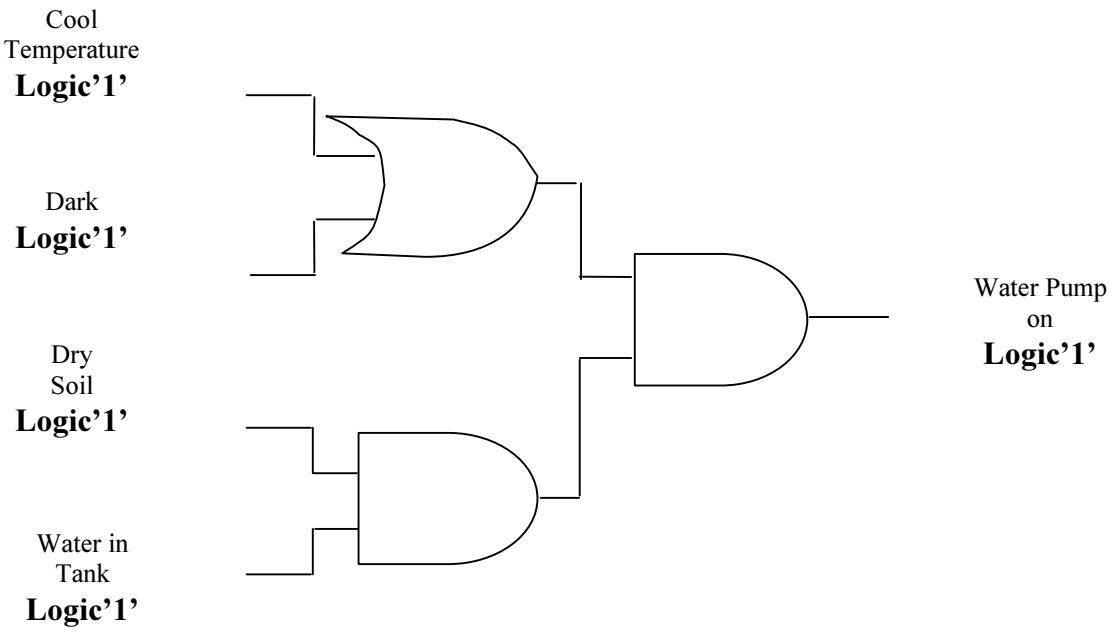
Total 15 marks



Question 4

(a)	(i)	AND	(1 mark)
		OR	(1 mark)
	(ii)	0	(1 mark)
		0	(1 mark)
		1	(1 mark)
		1	(1 mark)
		Truth label correct for symbol/name	

(b)	Temp and Dark to OR gate	(1 mark)
	Correct symbol (OR)	(1 mark)
	Output of AND and OR to AND	(1 mark)
	Correct Symbol (AND)	(1 mark)
	AND gate correctly linked to water pump	(1 mark)
	Quality of drawing, straight lines, symbols good	(1 mark)



(c) Size of circuit board reduced
Can be programmed to perform varied tasks
Can be tested and modified before use, set exactly
Can replace a complicated circuit any other suitable response (2 marks)
any 2

(d)

C	1 correct	(1 mark)
D	2 correct	(2 marks)
A	3 correct/all correct	(3 marks)
B		

Total 17 marks

Question 5

(a) (i) LDR (1 mark)
To detect differing light levels/resistance levels
To determine the switching levels
any 1 (2 marks)

(ii) Variable resistor/Potentiometer (1 mark)
To set the light level at which the light comes on
To adjust light levels when light comes on.
any 1 (2 marks)

(iii) op amp (1 mark)
to calculate the difference between pins 2/3
to amplify the difference between pins 2/3 for the output
to connect analogue input to digital output
any 1 (2 marks)

(b) (i) e.g. No damage to components, values changed easily
Simulation possible, link to CAM any 1 (1 mark)

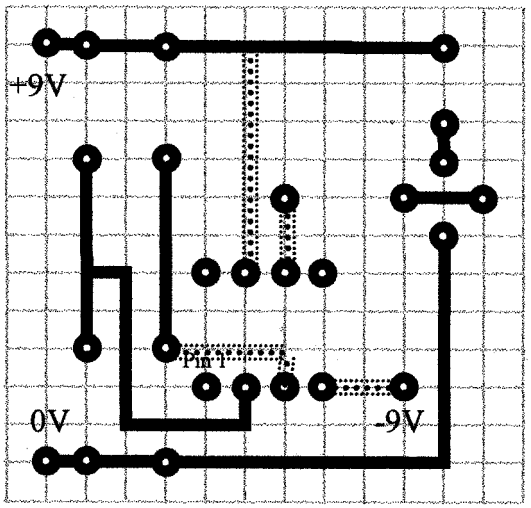
(ii) Component library readily available, sizes/spacings accurate. Different views available, zoom, easy to change
(Accept any two advantages) any 2 (2 marks)

(c) (i) Pin 7 to + rail (1 mark)

(ii) Pin 6 to resistor (1 mark)

(iii) Pin 3 to potential divider (1 mark)

(iv) Pin 4 to –V pad (1 mark)



viewed from the component side.

(d) Clean track with wire wool
Heat both leg and track
Apply solder when track and legs hot
Apply correct amount of solder
Keep tip of iron clean, wipe on sponge any 2 (2 marks)

(e) Hot iron – keep in holder
Fumes - ventilation
Lead – wash hands any 2 (4 marks)

Total 22 marks

Question 6

(a) No sharp edges to catch on skin
All parts must be larger than the size set by BST
No loose parts that might fall off Qualify
Non toxic paint/finish
Material that will not splinter etc 3 x 2
Design considerations relating young children

1 mark simple answer
1 mark to qualify answer
(One word unqualified maximum 1 x 3 marks) (6 marks)

(b) Colours that are attractive to children etc size, shape
High level response { Safety requirements – law etc
Visits to nursery interview staff, etc
observations of children at play

1 mark basic
Qualify 2 marks (6 marks)

(c) (i) Suitable material – 1 mark
Basic reasoning – 1 mark
Suitable material (1 mark) or basic reasoning – 1 mark (3 marks)

(ii) 2 detailed or 2 individual
Suitable shape for overall construction for appropriate material/s stated in chosen.

E.g. Vac Form, rounded corners/draft angle or details of any jointing. (2 marks)

A recognised construction method but not fully suited to material (1 mark)

Detailed sequence of construction related to material (3 marks)
Detail of construction method (2 marks)
Brief reference to construction method (1 mark)

Detailed provision of the housing for the blocks suitable for the material stated. (2 marks)

Some provision of the housing for the blocks (1 mark)

Detail of block housing (2 marks)
Brief reference to block housing (1 mark)

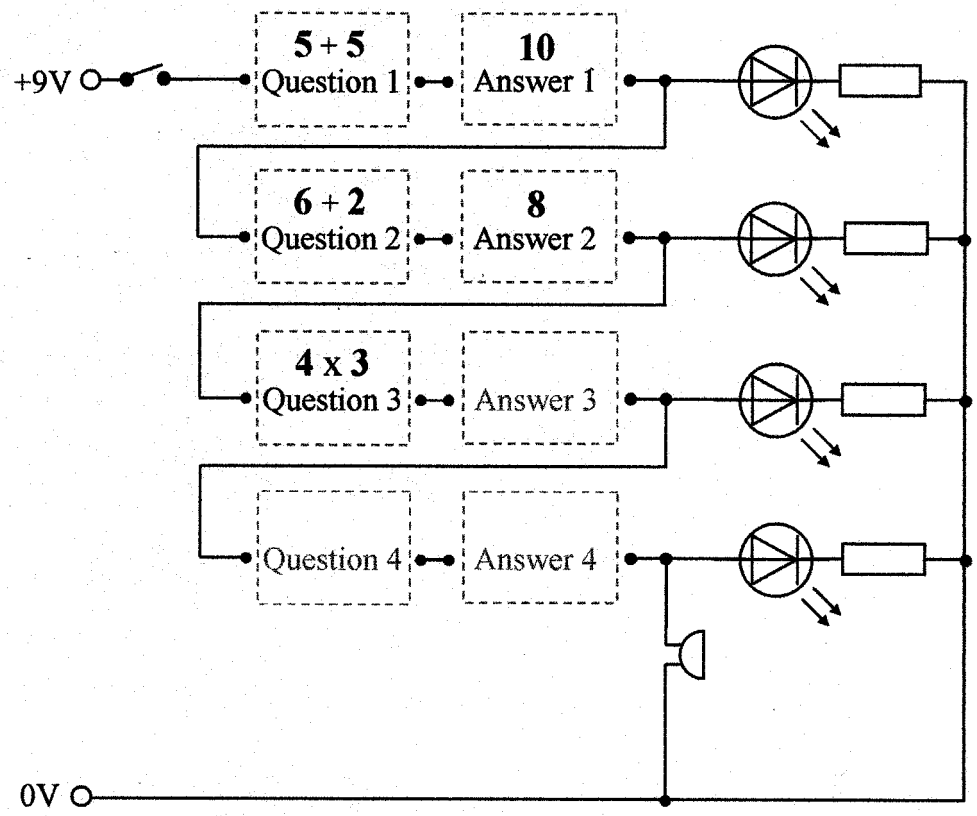
Clear 3D drawing with or without rendering (2 marks)

Drawing that can be interpreted (1 mark)

Clear sketches with notes (2 marks)

(iii) Circuit fixed neatly in place (2 marks)
Circuit held in place (1 mark)
Clear 3D/side/plan/ technical drawing (2 marks)
Understood but lacking in quality/detail (1 mark)

(d)



(i) Correct symbol (1 mark)

Parallel with last LED. (1 mark)

(ii) Reed Switch, Push to make, basic contacts, copper tape (1 mark)

Push switch Pressure Pad, LDR etc.
Any other suitable response 1 mark each = 2 marks (1 mark)

(e) To use it as market research, testing the market,
Testing the product in use Any 2 (2 marks)

(f) (i) Greater profit margins, long production runs, less staff required, built in QC, etc any 2
Some qualification required (2 marks)

(ii) quality, wider range, competition so better prices etc
any 2 some qualification required (2 marks)

(g) Any suitable testing procedure/method but to be related to evaluation (2 marks)

Total 38 marks

Question 7

Workers' conditions, waste disposal, air, noise pollution
Pollution of atmosphere, use of energy (2 marks)
Energy when being used, pollutants emitted during use
Air, noise pollution, (2 marks)
Lack of landfill, pollution of earth, atmosphere,
Public health (2 marks)

Total 6 marks

Total marks for paper 125