

Mark Scheme (Results) Summer 2008

GCSE

GCSE Design & Technology: Systems & Control Technology (3974) Paper 2H



3974 2H Mark Scheme

Question Number	Answer	Mark
1 (a)	Three each of the following, one under each heading:	
	Specification points Reasons	
	(i) Market	
	 Point: It must be cost effective/cheap Reason: So that more people buy them 	
	 Point: It must have a LED indicator Reason: To give confidence that it is working 	
	 Point: It must be easy to test Reason: Safety/make sure it is working 	
	 Point: It must have a quick release screw Reason: Easy to change the batteries 	(2)
	(ii) Quality	
	 Point: The battery must last a long time Reason: To keep the alarm working 	
	 Point: Must keep going during a fire/fireproof Reason: To alert if fire is close to the alarm 	
	 Point: It must be easy to change the batteries Reason: Fitted to the ceiling/hands above head 	
	 Point: It must have a smoke vent Reason: So it can detect smoke quickly 	(2)
	 (iii) Environment Point: It must be made from recyclable materials Reason: To conserve the earth's resources 	
	 Point: It must be discrete in the home Reason: So it fits the surroundings 	
	 Point: It must be made from white plastic Reason: White goes with any colour scheme 	(2)
	Some flexibility should be given as some points may cross over descriptions.	

1 (b)(i)	Two reasons given:		
	• Light (1)		
	• Rigid (1)		
	• Does not rust (1)		
	Non-magnetic (1)		
	• Easily shaped / die caste (1)		
	• Easy to recycle (1)		
		(2 x 1)	(2)
1 (b)(ii)	Two reasons given:		
	• The bracket can be the same colour as the case (1)		
	• It is a low temperature process (1)		
	• Plastic layer protects - sharp edges - scraping ceiling (1)		
	• It is a self finishing process (1)		
		(2 x 1)	(2)
1 (c)	Two properties given with two reasons:		
	Property: Good conductor of electricity		
	Reason: Small power loss		
	Property: Is malleable		
	Reason: Easy to produce/ can bend without breaking		
	Property: Not magnetic		
	Reason: Will not be affected by electro-magnetic devices		
	Property: Does not corrode easily		
	Reason: Long component life/ long product durability		
	Property: Ductile		
	Reason: Can be drawn into a wire		
	Property: Low temperature coefficient		
	Reason: Allows components to be soldered to it		
		(2 x 1)	
		(2 x 1)	(4)
1 (d)	Two electronic quality control checks named:		
	Detection to activation time/working check (1)		
	Test button function ease (1)		
	PCB continuity check (1)		
	Battery to PCB check (1)		
	• LED function check (1)		
	Speaker/buzzer loudness check (1)	(2 , 4)	(2)
		(2 x 1)	(2)

1 (e)	One way described:	
	 The tracks are close together making it the only viable method Complicated PCB needs to fit into small space Tracks may be laid at 45 degrees to save space 	(2)
1 (f)(i) & (ii)	 (i) The alarm sound must be clearly heard. A loud buzzer/siren sounds which is loud enough to be heard all over the house. When smoke is detected an electronic timing circuit drives a high frequency buzzer The vent in the case allows a loud sound to be emitted (ii) Have a means of fixing to a ceiling. An aluminium ceiling bracket has two slots which screws go through to fix to the ceiling The case slots onto the ceiling bracket and is held in place by the quick release screw 	(2)
	Total for question	22

Question	Answer	Mark
Number		
2 (a)(i)	One gate named:	
		(4)
	Nand	(1)
	(Only acceptable answer)	
2(z)(z)	One of the following:	
2 (a)(ii)	One of the following:	
	Astables, FFF times (DIC (Coupled two sisters / legis gates / On such	(1)
	 Astables: 555 timer/PIC/Coupled transistors / logic gates / Op-amp 	(1)
(2)(3)(3)(3)(3)(3)(3)(3)(3)(3)(3)(3)(3)(3)	One of the following:	
2 (a)(iii)	one of the following.	
	Transducer Driver: Transister / Darlington pair/EET/Driver L/C / On	(1)
	Transducer Driver: Transistor / Darlington pair/FET/Driver I/C / Op-	
	amp	
2 (b)	Two ways described:	
Z (D)	Two ways described.	
	• A breadboard/prototype board could be used with real components	
	• Kits could be used with pre-made circuit blocks	
	• Veroboard / pinboard may be used with components soldered to them	
	• A computer program/Croc clips/Livewire may be used to simulate the	
	system	
	(accept any named electronics program)	
	(2 x 1) (2 x 1)	
	(2 x 1)	(4)
2 (c)	Four main stages given:	
2 (C)	ו טמו וומווו גנמצכג צויכוו.	
	2. Expose / put into UV box (1)	
	3. Develop / sodium dioxide / sodium hydroxide (1)	
	5. Etch / ferric chloride / chemically remove copper (1)	
	7. Drill holes (1)	
	(Only acceptable answers and must be in correct order)	
	(4×1)	(4)
	(1 × ד)	(ד)
	Total for question	11
		• •

Question Number	Answer	Mark
3 (a) (i)	For one mark • 1v or • 0.5v • 0.05v • 0.005v	
	For two marks • 5V	(2)
3 (a)(ii)	 One way explained: The resistance of the thermistor goes down therefore the voltage across it is less The potential difference between the thermistor and VR2 changes. 	(2)
3 (a)(iii)	 The action explained: The relay coil is operated therefore the contacts will switch (only acceptable answer) 	(2)
3 (a)(iv)	The action stated: It will reverse its direction/go backwards/go the other way (1) (only acceptable answer) (1 x 1) 	(1)

