

Design and Technology

General Certificate of Secondary Education **1957/02**

Systems and Control Technology Core Paper 2 (Higher Tier)

Mark Scheme for June 2010

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Question Number			Expected Answers	Mark	Additional Guidance
1	(a)		Any reason relating to safety (1)	[1]	
	(b)		– turn the direction of motion (through 90 degrees) (1) – changes/reduce the speed (of rotation) (1) – increase the torque (1) Any two	[2]	
	(c)		Axle bent (1) Axle not tightly fitted to gear (1) Axle diameter too large (1) Holes not aligned/not lined up /too small (1) Gears do not mesh (1) Gears not attached correctly (1) Position of motor incorrect (not lined up) (1) [do not allow any other problems relating to the motor] Too much friction/needs lubrication (1) Any two	[2]	
	(d)		Editing /altered quickly/ faster process (1) 3-D viewing Calculations can be done automatically (1) Sharing/transfer i.e can be E-mailed Money/ time / materials [not wasted] Safer if qualified i.e. 'No components can be damaged' Do not allow less errors/ less human error Don't allow one word answer i.e just 'faster/ quicker/ cheaper'	[2]	

	(e)	(i)	Any related issue e.g. some parts not recyclable (1) e.g. need to separate the materials/ take it apart (1) e.g some parts do not bio-degrade (1) e.g. toxic waste (1) e.g. components are made from different materials (1) Any one (1)	[1]	
		(ii)	Different plastics have different symbols (1) (WHAT INFORMATION) Symbols are moulded into the component /stuck on/labelled/ etched (HOW INFORMATION IS SHOWN) (1)	[2]	
			Total	[10]	

Question Number			Expected Answers	Mark	Additional Guidance
2	(a)	(i)	lathe	[1]	
	(a)	(ii)	Faster/ Faster process/ quicker process/ saves time / works 24-7 /less errors/ lower costs/ lower labour costs	[1]	
	(a)	(iii)	<ul style="list-style-type: none"> Does not rust (1) Means it is easy to remove the stud (1) 	[2]	
	(b)	(i)	injection moulding	[1]	
		(ii)	allows moulding direct onto metal screw (1) better/finer detail (1) solid moulding (1) [do not allow consistency]	[1]	
	(c)		Answer must be relating to a specific check Thread is correctly formed [length/all way down] Thread is correctly aligned/ not bent/ at an angle Any given dimensional check e.g. Diameter of stud is correct e.g. Length of thread is correct Do not allow 'must be correct dimension/ size' Metal and plastic are joined Full forming of the stud Check for smooth moulding/ no cracks Not 'correct shape/ right shape/ correct size etc.]	[2]	

	(d)		Less risk of damage to stud (1)		
			Less risk of tampering with the stud (1)		
			Easier/ Quicker/ faster to remove [in sentence, do not allow one word answers] (1)		
			More compact/ portable (1)		
			More ergonomic/ more comfortable/ fits hand better (1)		
			Safety (qualified) (1)		
			Less chance of slippage/better grip (1)		
				[2]	
			Total	[10]	

Question Number			Expected Answers	Mark	Additional Guidance
3	(a)		<div><div>INPUT</div><div>CAR</div><div>PROCESSING</div><div>ELECTRONIC CIRCUIT</div><div>OUTPUT</div><div>LED</div></div>	[3]	
	(b)		<div><div>chemical</div><div>ELECTRICIAL</div><div>LIGHT</div></div>	[2]	
	(c)		transistor	[1]	
	(d)		$\frac{9 - 2}{0.02} = 350$ (one mark for substitution, one mark for correct numerical answer)	[2]	
	(e)		<div><div>Component</div><div>Bulb/lamp</div><div>and buzzer</div><div>or speaker</div><div><div><div>Symbol</div><div><div><div><div></div></div></div><div><div></div></div><div><div></div></div></div><div>(1+1)</div></div></div></div>		
			Total	[10]	

Question Number			Expected Answers	Mark	Additional Guidance
4	(a)		ANTIClockwise 	[1]	
	(b)		$\frac{10}{40} \times 60$ [correct numerical substitution] = 15 [correct numerical answer] (1)	[2]	
	(c)		smaller top pulley drawn [must be smaller or no mark] (1) pulley is <u>half the diameter</u> or <u>ratio stated</u> [labelled/stated as half (1) e.g pulley generally looks $\frac{1}{2}$ diameter = no marks e.g. labelled as 20mm bottom pulley and 10mm top pulley = 1 mark belt drawn (1) belt labelled (1)	[4]	
	(d)		heat plastic (1) diamond decision box (1) feedback arm including Y/N (1)	[3]	
			Total	[10]	

Question Number			Expected Answers	Mark	Additional Guidance
5	(a)	(i)	attachment using angled brackets or extension of the shown gearbox case or base between sides drawn infilled (1) nut + bolt/pop rivet/ self tapper for attachment to chassis [drawn] (1) quality of sketches (1)	[3]	
		(ii)	attachment showing support for one front axle [do not allow a single axle across the front or hoop fastening alone]	[1]	
		(iii)	aluminium/steel/ acrylic/Perspex / nylon nut and bolt pop rivet self tapping screw [any two]	[2]	
	(b)	(i)	two switches drawn one for each motor (1) forward / reverse stated in a note/ label (1) stop explained (1) e.g. two push switches for each motor [four in total] and a note/label/diagram details to show that one switch operates forward movement and one reverse. note explaining that the push switches cause the robot to remain stopped if they are not pressed at all. e.g. one rocker switch/ toggle/ joy stick for each motor [two in total] a note/ label to show that the rocker switch can be in three positions to allow movement forwards and reverse labelling (1)	[3]	
		(ii)	shaped to the hand in width/depth/suitably curved or suitable spacing of switches drawn	[1]	
			Total	[10]	

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