OCR
RECOGNISING ACHIEVEMENT

GCSE

Design and Technology

General Certificate of Secondary Education

Unit **A512** Electronics and Control Systems: Sustainable Design

Mark Scheme for June 2011

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All Examiners are instructed that alternative correct answers and unexpected approaches in candidates' scripts must be given marks that fairly reflect the relevant knowledge and skills demonstrated.

Mark schemes should be read in conjunction with the published question papers and the Report on the Examination.

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SECTION A

Question		Expected Answers	Marks	Additional Guidance
1		(b)	**[1]**	
2		(c)	**[1]**	
3		(d)	**[1]**	
4		(a)	**[1]**	
5		(a)	**[1]**	
6		Restriction of Hazardous Substances, allow misspelling so long as meaning is clear	**[1]**	No variations
7		Means that trees are not used to produce new product	**[1]**	
8		Lead is poisonous / harmful to humans / a cumulative poison /hazardous	**[1]**	Do not accept dangerous
9		Ergonomics or anthropometrics	**[1]**	No variations
10		Recycled, reused or repaired/WEE directive	**[1]**	Accept valid disposal suggestions
11		False	**[1]**	
12		False	**[1]**	
13		True	**[1]**	
14		True	**[1]**	
15		True	**[1]**	
		Section A Total	**[15]**	

SECTION B

Question			Expected Answers	Marks	Additional Guidance
16	**(a)**		Any 4 of: Small (or compact, not both), must provide red light, flash, clip for attaching to bike (and/or person), universal fitting, battery powered, on/off switch/push button, different beam width per LED/light/ use LEDs for reliability and economic power usage, weather/waterproof, must allow for replacement of cells/batteries, bright lights, lightweight, refelctor.	**[4]**	Must relate to the design of the bike light, do not allow 'cheap'.
	(b)	**(i)**	Injection moulding	**[1]**	
		(ii)	Reuse, allow recycle.	**[1]**	
		(iii)	Any two of: add solar panels, fit with a rechargeable cell, power off a dynamo/hand crank generator/bike driven dynamo, use LEDs in place of filament bulbs, longer lasting batteries, powered by cyclist, flash to save power.	**[2]**	Must relate to 'during life of product'. Not 'dim the lights'.
	(c)		Looking for an awareness of how electronics can/has make/made things better, from both a users' point of view and from environmental point of view (such as the benefits of power saving LEDs). Anything from a heart pacemaker, worldwide communications, personal entertainment, computing. 2x2 or 4x1	**[4]**	Not 'Electrical' related. Allow reference to CAD, not CAM unless embodied in the design process, e.g. prototyping.
	(d)	**(i)**	The contribution (allow financial or otherwise) towards reducing the impact an individual or companies carbon footprint has on the environment.	**[1]**	
		(ii)	Investment in any renewable energy, (wind, tidal, save, solar (electric and heat), carbon absorption by planting trees/crops, anaerobic digestion of waste and investment / trading in carbon credits.	**[2]**	Not energy saving or renewable energy
			Total Question 16	**[15]**	

Question			Expected Answers	Marks	Additional Guidance
17	(a)	(i)	Does not use any trees or new material or saves energy in making, no need to make new cardboard	[1]	Not 'can be recycled'.
		(ii)	Reduce or Rethink.	[1]	
		(iii)	Any two of: uses less materials/paper in making product, potential purchaser can see if it is within their capabilities, less space needed in box, so transport costs are reduced, will user be able to assemble, less likely to lose instructions.	[2]	
	(b)	(i)	Taken to a battery bank / "batteryback" container / battery container / back to shop where bought / council waste facility for "recycling".	[1]	No "recycling" alone
		(ii)	Repair, do not allow reuse.	[1]	
		(iii)	To help stop cadmium from non-recycled cells entering landfill sites, cadmium is poison/harmful to life.	[1]	Needs to focus on poison, toxic to environment/human
	(c)		Points relating to how the object can be reduced to its component parts quickly and easily without recourse to tools so that they can be re-used or recycled, especially removal of circuitry and/or cell and separation of plastic parts from each other/circuitry. No tools required in this case. Repair circuit or replace cell	[3]	Repair, reuse and recycle ONLY if justified or explained.
	(d)		Reuse, do not allow repair.	[1]	
	(e)		Sketches and notes, ergonomic shape and/or grip/switch placement/type or modification e.g. slide switch, slimmer / longer / rounder shape to suit the human hand, carrying strap, more aesthetically pleasing . Features or features and justification, internal circuitry or additional functions. 4*1 or 2*2.	[4]	Must IMPROVE aspects of the existing boxy design / red / white only. Watch for duplicate sketch and description.
			Total Question 17	[15]	

Question			Expected Answers	Marks	Additional Guidance
18	(a)	(i)	For indoor use only/inside the house ONLY.	[1]	
		(ii)	No language barrier/no need for language/universally understood.	[1]	
	(b)	(i)	Electrical.	[1]	
		(ii)	Any reference to heat.	[1]	Do not accept warm/warmth
	(c)		Actions in the home that save energy such as: switch things off when not in use, do not leave televisions/radios/PCs on standby, turn out lights, replace all incandescent bulbs with CFL/energy saving/LED bulbs, do not leave appliances on standby, purchase energy efficient appliances, turn the room thermostat down, shower in place of a bath any relevant insulation/conservation must contribute to saving energy. 3x1	[3]	No mark for 'wear extra clothing' or shower alone. Application of energy monitor and timers. Watch for repetition, (e.g. turn off lights, turn off TV only 1 mark). Not 'insulate' alone.
	(d)		Long service life (accept less maintenance), reliable, low energy (consumed) so less heat produced, more/increased efficiency.	[1] [1]	
	(e)		Answers should have information showing some relevant knowledge of likely impact wind farms could have on the UK, quoting realistic figures for % contribution (1-20%), possible locations, not just "hilly" or "windy" places" – needs justification. Impact on environment should mention visual, wildlife hazard, migrating birds, noise of blades, visual disturbance strobe effect, loss of visual amenity for residents, NIMBYism. NOMFDS, benefits of offshore/onshore, large amounts of concrete needed, capital cost, offset consumption of fossil fuel, less CO2 emission. Embodied in: **Level 1 (0-2 marks)** Basic description, showing some understanding of the likely impact wind farms could have on the UK. There will be little or no use of specialist terms. Answers may be ambiguous or disorganised or 'list like'. Errors of grammar, punctuation and spelling may be intrusive.	[2]	

Question			Expected Answers	Marks	Additional Guidance
			Level 2 (3-4 marks) Adequate description, showing an understanding of the likely impact wind farms could have on the UK. There will be some use of specialist terms, although these may not always be used appropriately. The information will be presented for the most part in a structured format. There may be occasional errors in spelling, grammar and punctuation. **Level 3 (5-6 marks)** Thorough description, showing a clear understanding of the likely impact wind farms could have on the UK. There will be three or more clearly identified and explained points. Specialist terms will be used appropriately and correctly. The information will be presented in a structured format. The candidate will demonstrate the accurate use of spelling, punctuation and grammar.	**[4]** **[6]**	
			Total Question 18	**[15]**	
			Total Section B	**[45]**	
			Total Paper	**[60]**	

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