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Mark Scheme (Results)

Summer 2013

Principal Learning
Engineering (EG208/01)

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Summer 2013
Publications Code DP035798

Question Number	Answer	Mark
1(a)	Design	**(1)**

Question Number	Answer	Mark
1(b)	Trademark / Trade mark	**(1)**

Question Number	Answer	Mark
1(c)	Two from the following answers • Online database of registered designs (1) • Check by design number (1) • Check by product name (1) • Check by owner/proprietor (1) • Check by design class (1) • Request a Formal design search (1) Accept any reasonable response (2 x 1)	**(2)**

Question Number	Answer	Mark
1(d)	Four of the following answers • Books/novels (1) • Instruction manuals (1) • SolRsurf maintenance document (1) • Computer programs (1) • Song lyrics (1) • Newspaper/magazine articles (1) • Poems (1) • Essays/creative writing (1) • Advertisements (1) • Movies (1) • Photographs (1) • Pictures (1) • Drawings (1) • Sculptures (1) • Artwork (1) • Websites/ Internet (1) • Sounds (1) • Spoken word (1) • Performances (1) Accept any reasonable response (4 x 1)	**(4)**

Question Number	Answer	Mark
1(e)	If you use someone else's IP without permission (1) legal action can be taken against you (1) (1 x 2)	**(2)**

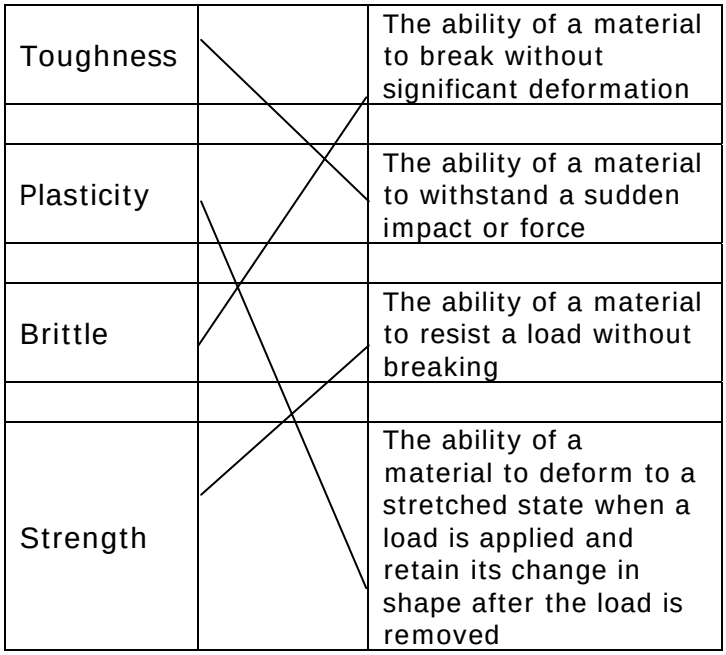
Question Number	Answer	Mark
1(f)	Two of the following answers • Copying an established trademark (1) • If using identical/similar name (1) • If identical/similar trademark causes confusion to deceive public (1) Accept any reasonable response (1 x 2) (2 x 1)	**(2)**

Question Number	Answer	Mark
2(a)	One mark for each correct answer – max 2 marks • The user does not get an electric shock (1) • The fan is operating smoothly (1) • The user does not get burns from resting on lap (1) • Ensure vents are correctly positioned for use (1) • Assess the product for sharp edges (1) Accept any reasonable statement (2 x 1) (1 x 2)	**(2)**

Question Number	Answer	Mark
2(b)	One mark for identifying method One mark for describing method x 2 (max 4) Pure/basic/fundamental research (1) – to increase understanding of a fundamental principle. Activities that add to scientific knowledge/ use of prototypes (1) and may or may not have any immediate commercial application (1) Primary/field research (1) - involves the collection of data that doesn't already exist (1) interviews, questionnaires and surveys. (1) Applied research (1) – using elements of your research to develop a technique/process for a specific purpose (1). Directed towards a specific commercial objective (1) Secondary research (1) – the collation/synthesis of data that has already been collected by other sources (1) Qualitative research (1) – interviews /focus groups / observations (1) Quantitative research (1) –field work / questionnaires/surveys (1) Do not accept 'use of the internet' without explanation. (2 x 2)	**(4)**

Question Number	Answer	Mark
2(c)(i)	1 mark for identifying, 1 mark for description (max 2) • Little or no interest rates (1) which will reduce costs (1) • Longer repayment period (1) reducing financial strain (1) • Lower monthly payments (1) maximising profits (1) • Not a secured loan (1) reducing personal risks (1) • Profits stay within a small circle (1) greater individual profits (1) Accept any reasonable answer (1 x 2)	**(2)**

Question Number	Answer	Mark
2(c)(ii)	1 mark for identifying, 1 mark for description (max 2) • Difficulty in sharing profits(1) informality creates financial problems (1) • Problems if business fails(1) creates family animosity (1) • Limited to how much you can borrow (1) due to constraints of family/friends wealth (1) Accept any reasonable answer (1 x 2)	**(2)**

Question Number	Answer	Mark
3(a)	One mark for each correct line **Property** **Description**  No mark for any description linked to more than one property. (4 x 1)	**(4)**

Question Number	Answer	Mark
3(b)	Any two of the following answers • Square bar • Round bar • Angle/L • Channel • I section • U section • T section • RSJ • Rod • Square tube • Round tube • Hexagon bar • Sheet • Wire • Plate • Billet • Threaded • Pellets • Granules Accept any other appropriate response. Do not accept 'rectangular bar' as this is the same as 'flat bar' which is used in the stem of this question. (2 x 1)	**(2)**

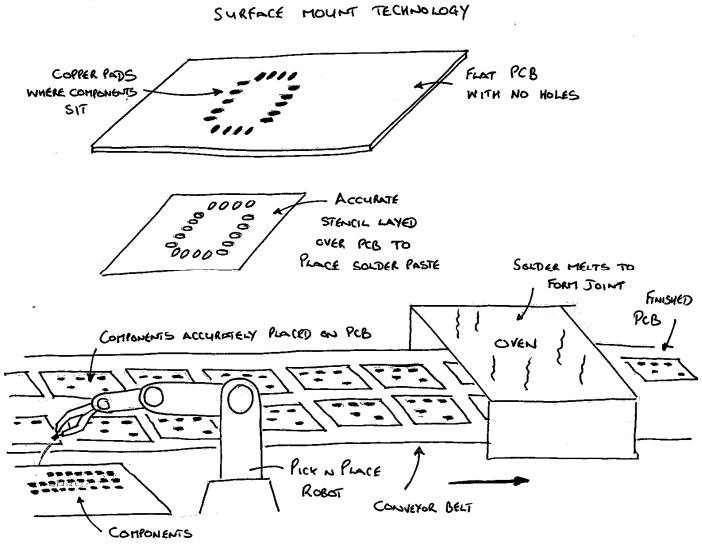
Question Number	Answer	Mark
3(c)(i)	A metal that does not contain iron (1)	**(1)**

Question Number	Answer	Mark
3(c)(ii)	Any of the following examples • aluminium • brass • copper • tin • zinc • magnesium • lead • tungsten • gold • silver • titanium • phosphor bronze • nickel Any appropriate metal that does not contain iron (1 x 1)	**(1)**

Question Number	Answer	Mark
3(d)	Up to 2 marks for a description • A polymer that can stretch and return to its original state (1) without deformation (1) • Has some cross linking (1) to allow it to stretch and return to its original shape (1) Any appropriate answer (2 x 1)	**(2)**

Question Number	Answer	Mark
4(a)	One mark for identification and one mark for description x 2 Wind Power (1) the conversion of energy from the wind into electrical power (1) through the use of rotating blades (1) connected via a shaft that turns a generator to create electricity (1). Geothermal (1) produced from naturally occurring steam or hot water from under the earth's surface (1). The steam rotates a turbine (1) which in turn powers an electric generator to produce electricity (1). Biomass (1) this is produced from organic material (1) which comes either directly from plants or indirectly from industrial, commercial, domestic or agricultural products (1). Usually produced as a form of fuel that can be burned to produce energy (1). Hydropower (1) using the power of a moving water source to generate electricity (1) by allowing water to flow and rotate large turbine blades (1) which in turn are connected to a generator to produce electricity (1). Accept any other appropriate response (2 x 1) (1 x 2)	**(4)**

Question Number	Answer	Mark
4(b)	Any four of the following • Appropriate draft angles (1) • Consistent wall/material thickness (1) • Appropriate surface finish (1) • Size of fillets/radii (1) • Ejector pin positioning (1) • Sprue position (1) • Location/thickness of webs (1) • Number per mould (1) • Material characteristics (1) • Quantity to be produced (1) Accept any other appropriate response (4 x 1)	**(4)**

Question Number	Answer	Mark
5	 Description of process. Maximum of 5 marks. • method for constructing electronic circuits (1) • components are mounted directly onto the surface of printed circuit boards (PCBs) (1) • Electronic devices so made are called surface-mount devices or SMDs (1) • In the industry it has largely replaced fitting components with wire leads into holes in the circuit board (1) • the printed circuit board has flat, usually tin-lead, silver, or gold plated or copper pads without holes (1) • a sticky mixture of flux and tiny solder particles pick and place machines where they are placed on a conveyor belt (1) • reflow soldering (1) • After soldering, the boards may be washed to remove flux residues and any stray solder balls (1) • the boards are visually inspected for missing or misaligned components and solder bridging (1) Advantages. Maximum of 5 marks. • Smaller components (1) • Much higher number of components and many more connections per component (1) • Fewer holes need to be drilled through abrasive boards (1) • Simpler automated assembly (1) • Small errors in component placement are	**(8)**

	corrected automatically (1) • Components can be placed on both sides of the circuit board (1) • Lower resistance and inductance at the connection (1) • Better mechanical performance (1) • SMT parts generally cost less than through-hole parts (1) • Fewer unwanted RF signal effects (1) • Faster assembly (1) • Safer working practice (1) Example: The PCB has a flat surface without holes (1), that has copper pads positioned where the components are to go (1). Fewer holes to be drilled through abrasive boards (1) A solder paste is applied to the copper pads using an accurate stencil (1) so that it goes in the correct place (1). A pick and place robot positions the components (1) on both sides of the board (1) which means faster assembly (1). The PCB goes through an oven where the solder melts and joins the components to the circuit board (1) giving better mechanical performance (1).	

<table>
<tr><th colspan="2">Question Number</th><th>Indicative Content</th></tr>
<tr><td colspan="2">6(a)</td><td>Impacts
Plastic protective packaging is non biodegradable
Packaging ends up in landfill
Documentation is often discarded
Trees are used to make documentation
Packaging adds to transportation, producing more pollution
Some product documentation goes into landfill instead of recycling
Reductions
Use less packaging
Reduce packaging to a minimum
Used recycled card or paper for packaging
Use virtual, online or electronic instruction manuals
Design intuitive/innovative products that need little or no instructions
Purchase new packaging from sustainable sources
Example
Packaging is often plastic and can be more expensive to produce than the product itself (e.g. food) therefore reduce the packaging to a minimum. Some of this is difficult to recycle and non bio-degradable plastic ends up in landfill sites and could injure wildlife so it is better to use recyclable materials or even eliminate documentation and use online or electronic manuals</td></tr>
<tr><th>Level</th><th>Mark</th><th>Descriptor</th></tr>
<tr><td></td><td>0</td><td>No rewardable material</td></tr>
<tr><td>1</td><td>1-2</td><td>Identification of at least two impacts or identification of one impact with an appropriate reduction. Brief description of one impact with no reference to reduction.</td></tr>
<tr><td>2</td><td>3-4</td><td>Brief description of at least two impacts and one reduction or detailed description of two or more impacts with no reference to reduction.</td></tr>
<tr><td>3</td><td>5-6</td><td>Detailed description of two or more impacts and reductions.</td></tr>
</table>

Question Number	Indicative Content

<table>
<tr><td colspan="2">6(b)</td><td>Impacts
Extra transport cost to move packaging
Transport produces pollution and increases global warming
Increased use of fossil fuels
Damage caused by transportation networks
Congestion
National distribution centres
Reductions
Less distribution
Use of ‘green’ transport
Minimise movement of goods
Explore other forms of transport
Explore other renewable fuel sources
Consider small production centres
Example
Increased transport causes pollution and congestion on transport networks which could be minimised by using green transport with renewable fuel sources with distribution from smaller local centres. Congestion can be reduced by using other transport methods such as the rail networks which could also reduce the use of fossil fuels.</td></tr>
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Rewarding Learning