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# Mark Scheme (Results)

## Summer 2015

## Principal Learning Engineering (EG208/01)

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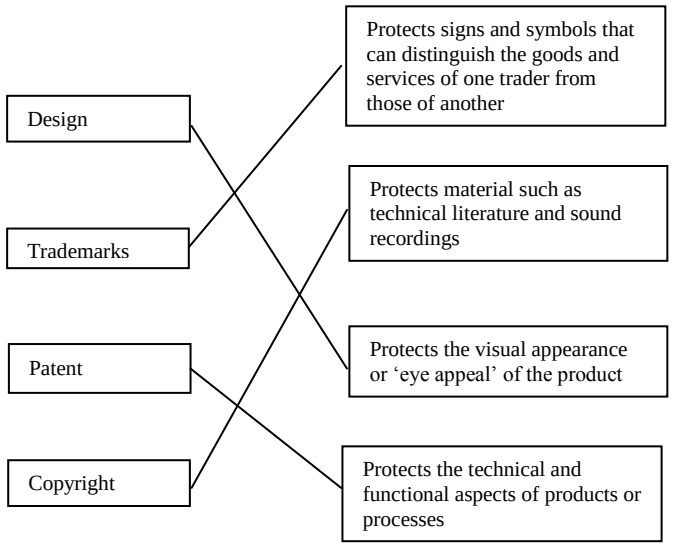
Summer 2015
Publications Code xxxxxxxx*

**General Marking Guidance**

- All candidates must receive the same treatment. Examiners must mark the first candidate in exactly the same way as they mark the last.
- Mark schemes should be applied positively. Candidates must be rewarded for what they have shown they can do rather than penalised for omissions.
- Examiners should mark according to the mark scheme not according to their perception of where the grade boundaries may lie.
- There is no ceiling on achievement. All marks on the mark scheme should be used appropriately.
- All the marks on the mark scheme are designed to be awarded. Examiners should always award full marks if deserved, i.e. if the answer matches the mark scheme. Examiners should also be prepared to award zero marks if the candidate's response is not worthy of credit according to the mark scheme.
- Where some judgement is required, mark schemes will provide the principles by which marks will be awarded and exemplification may be limited.
- When examiners are in doubt regarding the application of the mark scheme to a candidate's response, the team leader must be consulted.
- Crossed out work should be marked UNLESS the candidate has replaced it with an alternative response.

| Question Number | Answer | Mark |
|---|---|---|
| **1(a)** | One mark for each correct line<br>  <br><br>No mark for any description linked to more than one type.<br>(4 x1) | **(4)** |

| Question Number | Answer | Mark |
|---|---|---|
| **1(b)** | • Design<br>• Registered Design<br>• Reg design<br>• Design rights<br>(1 x 1) | **(1)** |

| Question Number | Answer | Mark |
|---|---|---|
| **1(c)** | One mark for each correct answer – max 4 marks<br>• Write it down (1)<br>• Record it (1)<br>• Post it to yourself (1)<br>• Lodge it with a solicitor (1)<br>• Lodge it with a bank (1)<br>• Independent witness (1)<br>• Register claim (1)<br>• Show original designs/developments (1)<br>Accept any reasonable statement<br>(4 x1) | **(4)** |

| Question Number | Answer | Mark |
|---|---|---|
| **1(d)** | One mark for each correct answer – max 3 marks | |

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| | Trademarks are not registerable if they:<br>• Describe goods/services/any characteristics e.g. marks which show the quality/purpose/quantity/value or geographical origin of goods or services<br>• Have become customary in your line of trade<br>• Are 3D shapes<br>• Are specially protected emblems e.g. hallmarks or armorial bearings<br>• Are offensive/vulgarity/inappropriate<br>• Are against the law e.g. promoting illegal drugs<br>• Are deceptive ie leading the public to think the goods or services have a quality that they do not<br>• Already exists/not unique<br><br>Accept any reasonable response<br><br>Do not accept 'it is not distinctive' as this is in the stem of the question.<br>(3 x 1) | **(3)** |

| Question Number | Answer | Mark |
|---|---|---|
| **2(a)(i)** | • Bank/Building Society (1)<br>• Sponsor/sponsorship (1)<br><br>Must be in this order<br>Accept any reasonable spelling (phonetic) of these answers<br>(2 x 1) | **(2)** |

| Question Number | Answer | Mark |
|---|---|---|
| **2(a)(ii)** | One mark for advantage<br>One mark for how<br><br>• Lower monthly repayments compared to unsecured loans (1) as property acts as collateral (1)<br>• Larger amounts of money can be borrowed (1) and paid over longer periods of time (1)<br>• You can insure your payments (1) so you don't have to worry if you lose your job through sickness or ill health (1)<br>• Generally lower interest rates (1) meaning higher potential to invest in business/increased profits (1) | **(2)** |

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| | • Set payment period/amount (1) allowing budgets to be calculated accordingly (1)<br><br>Accept any reasonable response<br>(1 x 2) | |

| Question Number | Answer | Mark |
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| **2(b)** | Accept any four of the following answers<br><br>• Find out who will buy the BreezeLite (1)<br>• Find out what customers will pay (1)<br>• Find out what other products are available (1)<br>• Find out what similar products will cost (1)<br>• Find out where similar products are sold (1)<br>• To determine how much demand there is for the product (1)<br>• To establish if similar products are successful (1)<br>• To find out what materials similar products are made from (1)<br>• To determine what manufacturing techniques have been used with similar products (1)<br>• To check how far can the product be distributed profitably (1)<br>• To carry out trial testing with a group of customers (1)<br><br>Example<br>Market research is undertaken to determine who will purchase the BreezeLite (1). This can be achieved through trial testing (1) or a questionnaire/survey (1) with a focus group of customers (1). Market research offers Ben the chance to see what similar products are available (1) therefore providing an insight to the material (1) and manufacturing processes/requirements (1) of the product.<br><br>Accept any reasonable market research activity<br><br>(4 x 1)<br>(1 x 4) | **(4)** |

| Question Number | Answer | Mark |
|---|---|---|
| **2(c)** | One mark for identification and one mark for description, max 4 marks | **(4)** |

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| | • Prototypes can be shown to customers (1) to see what designs are preferred (1)<br>• Prototypes can be used to test ideas (1) to evaluate viability of concepts (1)<br>• To save on manufacturing/material costs (1) preventing inaccurate mass production of products (1)<br>• Only need to produce one (1) saving manufacturing time (1)<br>• To test product functionality (1) ensuring product meets the customer requirements/specification (1)<br>• Easy to make modifications/edit/change (1) as prototypes are generally quicker to produce (1)<br><br>*Low response (1) or 2 low responses (1) e.g. its quicker and more accurate – only one mark or detailed response (2)*<br>*Do not accept 'easier' without explanation*<br>(2 x 1)<br>(2 x 1) | |

| Question Number | Answer | Mark |
|---|---|---|
| **3(a)(i)** | Any one of the following answers<br><br>• Polycarbonate/PC<br>• Poly Vinyl Chloride/PVC/UPVC<br>• Acrylic/EMMA/PMMA<br>• Acrynitrile Butadiene Styrene/ABS<br>• Polystyrene/HIPS<br>• Polythene/LDPE/HDPE/PET<br><br>Accept any reasonable response.<br>Do not accept 'plastic' or 'thermoset' on their own.<br>(1 x 1) | **(1)** |

| Question Number | Answer | Mark |
|---|---|---|
| **3(a)(ii)** | Any two of the following answers<br><br>• Transparent (1)<br>• Lightweight (1)<br>• Strong (1)<br>• Corrosion / weather resistant (1)<br>• Easily shaped/moulded (1)<br>• Impact resistant/toughness (1) | **(2)** |

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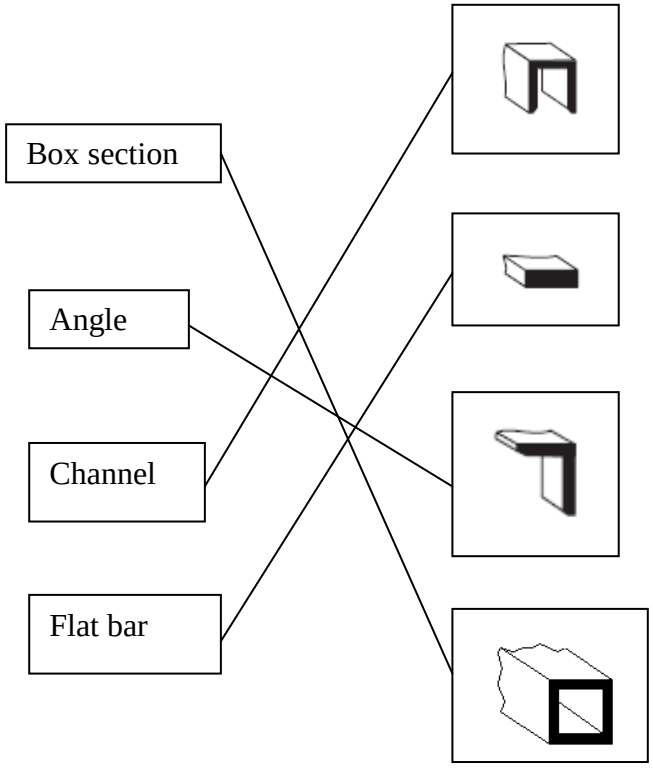
| | • Flexible (1)<br><br>Accept any reasonable response.<br>Do not accept 'hard'.<br><br>If material named in 3(a)(i) is incorrect no marks awarded for 3(a)(ii)<br>(2 x 1) | |

| Question Number | Answer | Mark |
|---|---|---|
| **3(b)(i)** | Up to 2 marks for a definition<br><br>• A mixture of two or more metals (1) or a metal and other elements (1) to produce a metal with enhanced properties (1)<br><br>Low response – 1 mark<br>Detailed response – 2 marks<br>(1 x 2) | **(2)** |

| Question Number | Answer | Mark |
|---|---|---|
| **3(b)(ii)** | Any one of the following answers<br><br>▪ Steel<br>▪ Mild steel<br>▪ Low carbon steel<br>▪ Stainless steel<br>▪ High carbon steel<br>▪ Medium carbon steel<br>▪ Aluminium alloy<br>▪ Brass<br>▪ Duralumin<br>▪ Silver steel<br>▪ Phosphur bronze/bronze<br>▪ Titanium alloy<br>▪ Nickel alloy<br><br>Accept any reasonable response.<br>Do not accept 'aluminium' or pure metals on their own.<br>(1 x 1) | **(1)** |

| Question Number | Answer | Mark |
|---|---|---|
| **3(c)** | **Form of Supply** **Image**<br>  <br><br>No mark for any form of supply linked to more than one image.<br>(4 x1) | **(4)** |

| Question Number | Answer | Mark |
|---|---|---|
| **4(a)** | One mark for each renewable energy source identified, max 2 marks<br><br>• Solar<br>• Tidal /Hydroelectricity<br>• Wave / Hydroelectricity<br>• Geo-thermal<br>• Bio fuels/Biomass<br>• Fuel cells<br><br>Accept any reasonable answer<br>Do not accept 'water' on its own.<br>Where 'tidal' or 'wave' given as a response do not accept hydroelectricity as a second response.<br>(2 x 1) | **(2)** |

| Question Number | Answer | Mark |
|---|---|---|
| **4(b)** | Any four of the following responses:<br><br>• Wind to spin the turbine<br>• Wind created from forward movement of bike<br>• Turbine connected to miniature generator via shaft<br>• Shaft spins to generate electricity<br>• Electricity connected to circuit to power light<br><br>Accept any reasonable answer<br>(4 x 1) | **(4)** |

| Question Number | Answer | Mark |
|---|---|---|
| **5** | A description that makes reference to any of the following points or sketches<br><br>Description of processes max 5 marks<br><br>• Consists of a split die/mould (1)<br>• Die/mould housed between two plates (1)<br>• Granules/plastic poured/fed into hopper (1)<br>• Archimedian screw feeds material to the mould (1)<br>• Plastic is heated whilst moving along the screw until molten (1)<br>• Plastic forced/injected into closed mould cavity (1)<br>• Plastic allowed to cool in shape or desired component (1)<br>• Mould opens (1)<br>• Product ejected from the mould using ejector pins (1) | **(8)** |

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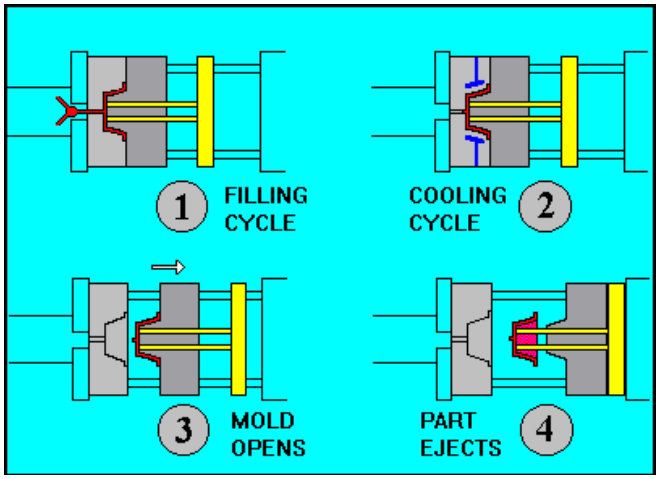
| | Description of Key Features max 5 marks<br>• Lightweight products can be made (1)<br>• Low cost per unit produced (1)<br>• Excellent consistent quality products made (1)<br>• Excellent mechanical properties (1)<br>• Intricate/detailed component production (1)<br>• Fast production method (1)<br><br>  <br><br><br>Example<br>A moulding procedure whereby granules of plastic (1) are fed into a hopper (1). The plastic then travels along an archimedian screw (1) where it is heated until molten (1). The molten plastic is then injected in to the closed mould cavity (1) where it is allowed to cool (1) and create the desired component shape (1) before the mould opens (1) and the component is then ejected (1) from the cavity.<br><br>Up to a maximum of 8<br><br>(1 x 8) | |

| Question Number | Indicative Content |
|---|---|
| **6(a)** | Businesses need to think about their products during the manufacturing stages. This means that at the production planning stages, some consideration needs to have been made about the production techniques to be used as poor techniques can produce waste products. This waste may go into landfill sites releasing further greenhouse gases into our atmosphere. The need to recycle rejected products is essential to minimising waste disposal. Also many of the parts that are produced could be biodegradable so that when sent to landfill they will break up and |

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| | | not harm the environment. Standard components could also be used where applicable so that they can be reused on other products when the BreezeLite has completed its anticipated life cycle. Also businesses need to consider the importance of designing products with recycling in mind. There is also the added consideration of not having to purchase batteries for the light to function.<br><br>Answer must relate to the manufacture of the breezelite and not its operation. |
| **Level** | **Mark** | **Descriptor** |
| | **0** | No rewardable material |
| **1** | **1–2** | Some acknowledgment that the issue of waste disposal should be considered during the manufacturing stages. |
| **2** | **3–4** | Some justification of including waste disposal techniques, such as recycling and reusing, during the manufacturing stage and through the design principles should be presented and acknowledged. |
| **3** | **5–6** | There should be a full understanding and appreciation of how waste disposal techniques, such as recycling and reusing materials, should be considered during the whole manufacturing process, from design to sales. |

| Question Number | | Indicative Content |
|---|---|---|
| **6(b)** | | Manufacturing businesses need to consider how machinery and equipment will be powered. Many of the processes involved with making the BreezeLite require electrical energy. This energy usually comes from non-renewable sources such as coal, gas and oil so the more energy is used the more the resources are depleted. This type of energy production is costly in terms of production efficiency and carries a heavy carbon footprint. Heavy carbon footprints are bad for the environment. Manufacturers need to consider sustainable ways of producing energy such as wind or solar power. These are green forms of energy harnessing natural sources such as wind and sunlight. However, these sources, at the moment, are not always cost effective.<br><br>Answer must relate to the manufacture of the breezelite and not its operation. |
| **Level** | **Mark** | **Descriptor** |
| | **0** | No rewardable material |
| **1** | **1–2** | Some acknowledgment that energy efficiency should be considered during the manufacturing stages. |
| **2** | **3–4** | Some justification of energy efficiency and impact on the environment during the manufacturing stages should be presented and acknowledged. |
| **3** | **5–6** | There should be a full understanding and appreciation of why and how energy efficiency and the impact on the environment should be considered during the manufacturing stages of a project such as using renewable sources of energy to power machinery and equipment. |