X211/301

NATIONAL QUALIFICATIONS 2008

THURSDAY, 29 MAY 1.00 PM – 3.00 PM

PRODUCT DESIGN HIGHER

70 marks are allocated to this paper.

PB X211/301 6/8370

Attempt ALL questions.

SECTION A

1.

Shelter A

Cycle Shelter A

- Shelters are made from 60 mm × 60 mm × 3 mm galvanised mild steel tube.
- Steel cycle racks and stands are manufactured from 50 mm × 3·2 mm wall thickness galvanised mild steel tube.
- Bolts are internally fixed using captive nuts to eliminate unsightly and potentially hazardous external nuts and threads.
- Windows and canopies are made with 5 mm clear polycarbonate.
- All fixing straps are aluminium and all bolts and fixings are either aluminium or stainless steel.
- All ground fixing anchors have tamper-proof security heads.

Shelter B

Cycle Shelter B

- Made from top grade Finnish redwood from sustainable forests.
- Available in heavy duty log roll or tongue and groove finishes with felt tiled roof.
- All timber products have an expected lifespan of 25–30 years when maintained appropriately.
- Bolts are internally fixed using captive nuts to eliminate unsightly and potentially hazardous external nuts and threads.

Fig 1*a*

An alternative wood/metal option is shown as a detail in Fig 1*a*.

Prices for each shelter depend upon design and size.

Marks

1. (continued)

(*a*) Write a product specification for the design of **one** of the cycle shelters. **6**

(*b*) Justify the choice of materials used to produce **both** shelters. **6**

(*c*) Describe **and** justify the production methods that would be used to manufacture **one** of the bike shelters. **6**

(*d*) For **both** Shelter A and Shelter B describe the quality assurance issues that would affect:

(i) the manufacturer;

(ii) the consumer. **4**

(*e*) For **each** of the shelters shown, describe a situation where their use would be appropriate and justify your answer. **4**

(*f*) Describe the health, safety and environmental issues associated with the cycle shelters during the **manufacture** of the component parts. **4**

Total for Section A (30)

[Turn over

Marks

SECTION B

2. The model car shown below has been manufactured using the process of die-casting.

(*a*) Explain why die-casting is a suitable process for this type of product. **2**

(*b*) There are a number of metals suitable for the manufacture of this product. State the name of **one** suitable metal and explain why it is appropriate for the manufacture of the model car. **2**

(4)

Marks

3. The range of tableware shown below has been designed for children aged between 1 and 3 years old.

(*a*) Explain how the designer would identify the needs of the user group before developing the product range. **2**

(*b*) Explain how the following factors would influence the design of the accessories:

(i) function; **2**

(ii) material choice. **2**

(6)

[Turn over

Marks

4.

The guitar shown above is manufactured as a one piece graphite composite with a high gloss lacquer, phenolic fingerboard and black hardware.

(*a*) Explain the advantages of using composite materials. **3**

(*b*) Explain the benefits of using computerised systems in the design and manufacture of modern products. **4**

(7)

Marks

5. The plastic table shown below has been mass produced by the process of rotational moulding.

Dimensions:
Height 570 mm
Diameter 460 mm

Available in white or black.

(*a*) Explain why rotational moulding is a suitable process for the manufacture of the table. **2**

(*b*) Discuss the issues surrounding this product with regard to:

(i) aesthetics; **2**

(ii) durability. **2**

Before production, a model was made using the rapid prototyping technique, selective laser sintering (SLS).

(*c*) Explain the advantages of rapid prototyping for the designer at this stage of the design. **2**

(8)

[Turn over

Marks

6. An evaluation report has to be produced for the electric kettle shown below. Performance and durability are two of the major design issues to be evaluated.

(*a*) Select and justify an appropriate method of evaluating the kettle for:

(i) performance; **3**

(ii) durability. **3**

The company decided to use their factory for assembly purposes only. It was decided that the manufacture of the component parts for the product would be sub-contracted.

(*b*) Describe the issues that would arise because of this decision. **3**

(9)

Marks

7. A cordless drill is shown below. During the development of the drill, the designer had to give careful consideration to ergonomics. Describe the ergonomic issues that are relevant for the product shown. **(6)**

Total for Section B (40)

[*END OF QUESTION PAPER*]

ACKNOWLEDGEMENTS

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Section A Question 2—Picture of A-bike assembled. Reproduced by kind permission of Sinclair Research Ltd.

Section B Question 2—Picture of Die Cast model car. Permission is being sought from Maisto International Inc.

Section B Question 3—Pictures of Tableware. Reproduced by kind permission of IKEA.

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Section B Question 5—Pictures of plastic tables. Permission is being sought from Modernseed. Unable to trace copyright holder.

Section B Question 6—Picture of Tefal Vitesse Electric Kettle. Reproduced by kind permission of Tefal.

Section B Question 7—Picture of Dewalt cordless drill. Reproduced by kind permission of Black and Decker.

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