

351/01

DESIGN AND TECHNOLOGY AS

PRODUCT DESIGN DT1

A.M. TUESDAY, 10 January 2006

(2½ Hours)

ADDITIONAL MATERIALS

In addition to this examination paper, you will need a 12 page answer book.

INSTRUCTIONS TO CANDIDATES

Answer **six** questions from Section A.

Answer **one** question from Section B.

INFORMATION FOR CANDIDATES

When and where appropriate, answers should be amplified and illustrated with sketches and/or diagrams.

Section A answers should be no more than half a page. This section is designed to demonstrate your **breadth** of knowledge in Product Design.

Your **Section B** answer should be substantial and demonstrate your **depth** of knowledge in Product Design.

You are reminded of the necessity for good English and orderly presentation in your answers.

SECTION A

*Answer **six** questions from this section.*

*The maximum length of each answer should be no more than about 150 words.
This section is designed to demonstrate your **breadth** of knowledge in Product Design.*

Each question carries 8 marks.

1. Materials may be classified into the following categories:

- natural;
- synthetic;
- regenerated.

For any **two** of the categories name a specific material, and describe its particular properties and application. 2 × [4]

2. Describe the preparation stages and the application of **two** *finishing* techniques that may be applied to named materials:

- (a) for aesthetic reasons; 2 × [2]
- (b) in order to improve the physical characteristics of a material. 2 × [2]

3. Pre-production prototyping is a key process in the design and manufacturing of products.

- (a) Explain what is meant by the term prototyping. [2]
- (b) Describe **three** areas where prototyping helps the manufacturing process. 3 × [2]

4. Describe the **features** and **benefits** of the following Intellectual Property rights to the owner:

- (a) trade mark; [4]
- (b) patent. [4]

5. *Aesthetic appeal* and *function* are two potential areas of research designers undertake when developing new and improved products.

Identify **two** research strategies and indicate the information a designer would gain in **each** area. 2 × [4]

6. *Ergonomic considerations* and *anthropometric data* have to be used effectively by designers in order for products to be successful.

Describe **two** situations where:

- (a) ergonomics are important within environments; [4]
 (b) anthropometrics are important within products. [4]

7. The tensile and compressive strength of materials is exploited by designers in the development of products.

- (a) Name a specific material and describe how its *tensile strength* has been utilised in a particular product or situation. [4]
 (b) Name a specific material and describe how its *compressive strength* has been utilised in a particular product or situation. [4]

8. *Casting, fabrication, injection moulding* and *laser cutting* are manufacturing processes used when forming, shaping, combining or manipulating materials.

- (a) Describe any **two** of these manufacturing methods. $2 \times [3]$
 (b) For the **two** methods, name an appropriate material to which the process can be applied. [2]

9. Manufacturing industry uses an increasing number of standard part-assembled or bought-in components in the manufacturing process.

- (a) Describe **two** advantages to the **manufacturer** of using standard part-assembled or bought-in components. $2 \times [2]$
 (b) Describe **two** disadvantages to the **workforce** of using standard part-assembled or bought-in components. $2 \times [2]$

10. Explain the following terms with examples of **two** different products produced by **each** method:

- (a) batch or modular production; [4]
 (b) mass or continuous production. [4]

SECTION B

Answer **one** question from this section.

Your answer should be substantial and show the **depth** of your knowledge in Product Design.

Each question carries 22 marks, 2 of which are for clarity of communication.

- 11.** Designers and manufacturers have to take account of *manufacturing methods, maintenance, product life* and *environmental factors* when designing.

Discuss these **four** areas in relation to a product or range of products. [22]

- 12.** *'Design involves a process of evaluation through the exploration of product requirements..... this process continues throughout the development stages towards a new improved product.'*

Discuss this statement in relation to a specific product. [22]

- 13.** (a) Explain the principles of JIT (Just in Time) in manufacturing. [10]

(b) Describe the implications of JIT to the supplier, manufacturer and consumer. [10]

Clarity of communication. [2]