Surname		Other Names	
Centre Number			Candidate Number	
Candidate Signature			

Leave blank

General Certificate of Secondary Education
June 2006

ENGINEERING (DOUBLE AWARD) **3870/3**
Unit 3 Application of Technology

Tuesday 6 June 2006 1.30 pm to 3.00 pm

You will need no other materials

Time allowed: 1 hour 30 minutes

Instructions
- Use blue or black ink or ball-point pen.
- Fill in the boxes at the top of this page.
- Answer **all** questions.
- Answer the questions in the spaces provided.
- Do all rough work in this book. Cross through any work you do not want marked.

Information
- The maximum mark for this paper is 100.
- The marks for questions are shown in brackets.

For Examiner's Use			
Number	Mark	Number	Mark
1		5	
2		6	
3			
4			
Total (Column 1) →			
Total (Column 2) →			
TOTAL			
Examiner's Initials			

LEAVE MARGIN BLANK

Answer **all** questions in the spaces provided.

1 This question is about Engineering Sectors.

Identify **one** sector of engineering in which the following are manufactured.

(i) garden machinery .....
(1 mark)

(ii) electric cable .....
(1 mark)

(iii) engine lubricating oil .....
(1 mark)

3

2 This question is about investigating products.

A photograph of a traditional lawnmower is shown below.

(a) Label the **five** main parts of the lawnmower.

Figure 1

A ..... **B** ..... **C** .....

D ..... **E** .....

Reproduced with the permission of Atco – Qualcast Ltd (Bosch Group)

(5 marks)

(b) State the purpose of the labelled parts **B**, **C** and **E**.

Part **B** .....

.....

Part **C** .....

.....

Part **E** .....

.....

(6 marks)

Turn over ▶

(c) The petrol engine is a major component of this type of lawnmower.

(i) State **one** advantage and **one** disadvantage of this type of lawnmower.

Advantage .....

.....

Disadvantage .....

.....

(4 marks)

(ii) Using notes and sketches, briefly explain how the rotating cutter is powered.

.....

.....

.....

.....

sketch

Marks will be awarded for:
labels - *(1 mark)*
information conveyed - *(4 marks)*
quality of sketch - *(2 marks)*

(d) Most of the components of the lawnmower on page 3 are made from low carbon steel (mild steel). Give **two** reasons why this material is suitable.

1 .....

.....

2 .....

.....

(4 marks)

3 This question is about investigating technology and materials within products.

New technology has enabled different types of lawnmowers to be developed. Figure 2 shows a lawnmower which uses new technology.

Figure 2

Photograph of hover mower, not shown due to copyright restrictions.

(a) Identify **two** ways in which new technology is used in products of this type.

1 .....

.....

2 .....

.....

(4 marks)

(b) Many of the materials used for the casings are plastics materials.

(i) State a suitable plastics material that could be used for the main body.

.....

(1 mark)

(ii) Give **two** reasons why the material you have identified is suitable for the main body.

1 .....

2 .....

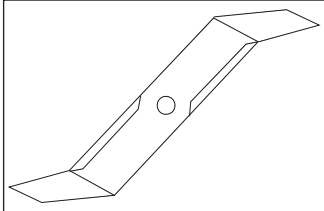
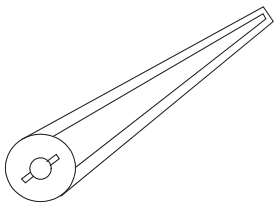
(2 marks)

(iii) State a suitable covering material to prevent the steel handle from corroding.

.....

(1 mark)

(c) This type of lawnmower can be fitted with different types of cutting blades as shown below. Describe **one** advantage, with the reason, for the use of **each** type of blade.

blade	advantage	reason
 metal blade		
 plastics blade		

Note: drawings are not to scale

(4 marks)

(d) Different types of cutting blades can be used in a rotary lawnmower. Describe in detail **one** benefit to the **manufacturer** of producing plastics blades.

.....

.....

.....

.....

(2 marks)

14

4 This question is about the stages in the engineering manufacture of a product.

(a) Identify **four** main stages in the manufacture of a lawnmower.

1 .....

2 .....

3 .....

4 .....

(4 marks)

(b) Describe **how** a lawnmower would be manufactured by referring to what happens in **each** of the stages.

.....

.....

.....

.....

.....

.....

.....

.....

(8 marks)

(c) Explain how modern technology is used in **one** of these stages during the manufacture of a lawnmower.

.....

.....

.....

(3 marks)

15

5 This question is about the impact of technology on manufacturing.

(a) Computers are widely used in modern manufacturing. Describe how each of the following tasks could be achieved using computer software.

(i) store details of suppliers of materials and components

.....

.....

(2 marks)

(ii) show the weekly production of lawnmowers

.....

.....

(2 marks)

(iii) find new suppliers of a particular material

.....

.....

(2 marks)

(b) Many stages in the manufacture of lawnmowers use computerised control systems.

(i) Identify **one** situation where a computer is used to control a production activity.

.....

(1 mark)

(ii) Describe how the computer is used in this situation.

.....

.....

.....

(3 marks)

(c) (i) Briefly describe the Computer Aided Design (CAD) process.

.....

.....

(2 marks)

(ii) Briefly describe the Computer Aided Manufacturing (CAM) process.

.....

.....

(2 marks)

(d) Explain how 'CAD' and 'CAM' are used within a 'Computer Integrated Manufacturing' (CIM) system to manufacture lawnmowers.

.....

.....

.....

.....

(4 marks)

18

Turn over for the next question

6 This question is about new products involving modern materials and components.

A robot lawnmower is battery powered. It returns to a docking station when it needs recharging. It "grazes" randomly over a preset area which is bordered by a wire buried in the edge of the lawn. It continuously cuts the grass using multiple cutting blades.

(a) Identify **three** ways in which modern technology is used in this robot.

1 .....

.....

2 .....

.....

3 .....

.....

(6 marks)

(b) The efficiency of the robot lawnmower depends upon a number of factors.

(i) Explain how advances in battery technology would affect the performance of the robot.

.....

.....

(2 marks)

(ii) Explain how using a solar panel could affect the efficiency of the robot.

.....

.....

(2 marks)

(c) Explain, using notes and sketches, how microelectronics could be used to control the robot.

Marks will be awarded for:
notes - (*4 marks)*
information contained in sketches - (*2 marks)*
quality of drawing - (*1 mark)*

Question 6 continues on the next page

(d) The robot lawnmower senses the edge of the lawn by detecting a wire buried in the edge of the lawn. Explain, using notes and sketches, **one** technique which could be used to make this work.

Marks will be awarded for:
notes - (*4 marks)*
information contained in sketches - (*2 marks)*
quality of drawing - (*1 mark)*

END OF QUESTIONS

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