

**GENERAL CERTIFICATE OF SECONDARY EDUCATION
ENGINEERING (DOUBLE AWARD)**

4868

UNIT 3: Application of Technology
TUESDAY 5 JUNE 2007

Afternoon

Time: 1 hour 30 minutes

Candidates answer on the question paper.
No additional materials are required.



Candidate
Name

Centre
Number

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Candidate
Number

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INSTRUCTIONS TO CANDIDATES

- Write your name, Centre number and Candidate number in the boxes above.
- Answer **all** the questions.
- Show all working for calculations.
- Use blue or black ink. Pencil may be used for graphs and diagrams only.
- Read each question carefully and make sure you know what you have to do before starting your answer.
- Do **not** write in the bar code.
- Do **not** write outside the box bordering each page.
- WRITE YOUR ANSWER TO EACH QUESTION IN THE SPACE PROVIDED. ANSWERS WRITTEN ELSEWHERE WILL NOT BE MARKED.

INFORMATION FOR CANDIDATES

- The number of marks for each question is given in brackets [] at the end of each question or part question.
- Marks will be awarded for the use of correct conventions.
- The total number of marks for this paper is **100**.
- Dimensions are in mm unless stated otherwise.
- Please note that the instruction 'discuss' denotes that you should:
 - identify **three** relevant issues/points raised by the question;
 - explain why you consider **two** of these issues to be relevant; and
 - use **one** specific example or piece of evidence to support your answer.

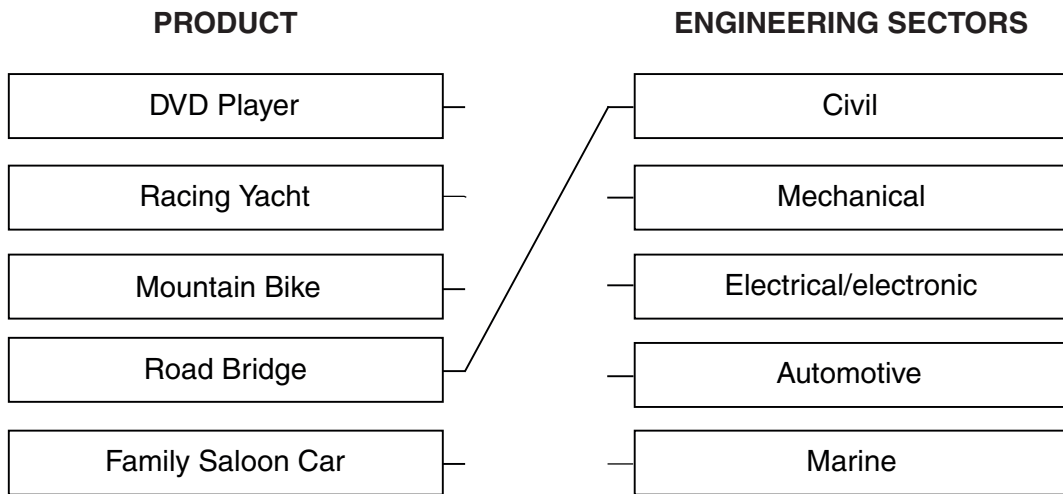
FOR EXAMINER'S USE	
Question 1	
Question 2	
Question 3	
Question 4	
Question 5	
Question 6	
Question 7	
Question 8	
TOTAL	

This document consists of **15** printed pages and **1** blank page.

1 (a) Engineering sectors produce different products.

Complete the links below to identify the sector which makes the products listed.

One has been done for you.



[4]

- (b) For **three** of the products listed in part (a) identify:
- a modern technology used by each product; and
 - the technology it replaces.

An example has been done for you.

Product	Modern Technology	Technology Replaced
DVD Player	Digital Technology	Magnetic video tape
	[1]	[1]
	[1]	[1]
	[1]	[1]

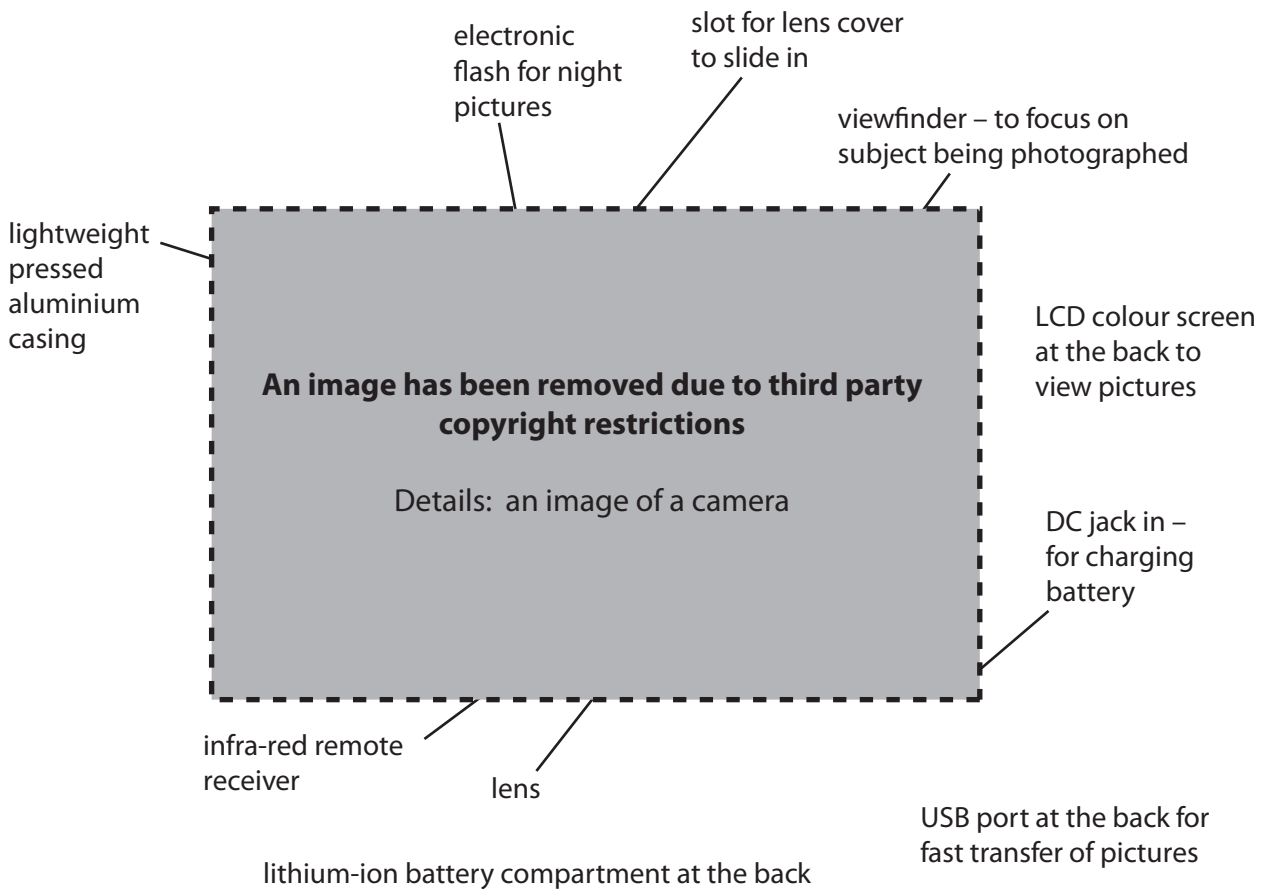
- (c) Complete the table below for **one** of the modern technologies you gave in part (b).

Modern Technology	Advantage of using the Modern Technology

[2]

- 2 The sketch and notes below explain how technology and materials are used in the design and manufacture of a digital camera.

Example product: Digital Camera



Choose a different product and use sketches and notes to explain how technology and materials are used in its design and manufacture.

Your answer must include:

- the technologies used;
- how materials/components are used; and
- the structure and form of the product.

[4]

[4]

[4]

Use the example of the digital camera to help plan your answer.

Marks will NOT be given for information copied from the example or for repetition of points.

Your chosen product for **Question 2**

3 Modern technology has improved many products.

The use of modern technology can:

- reduce the weight of a product;
- make a product stronger;
- make a product easier to use; or
- make a product safer.

(a) State **one** example of a product that uses modern technology to reduce its **weight** and name the modern technology used.

Product[1]

Modern technology[1]

(b) State **one** example of a product that uses modern technology to make it **stronger** and name the modern technology used.

Product[1]

Modern technology[1]

(c) State **one** example of a product that uses modern technology to make it **easier to use** and name the modern technology used.

Product[1]

Modern technology[1]

(d) State **one** example of a product that uses modern technology to make it **safer** and name the modern technology used.

Product[1]

Modern technology[1]

(e) Describe **two** benefits for a company's workforce of using modern technology.

Benefit 1

.....

.....[2]

Benefit 2

.....

.....[2]

4 In engineering, robotics can be used in the processing, assembly, finishing and packaging of products.

(a) Explain **three** advantages for an engineering company when **using** robotics.

Advantage 1
.....
.....[2]

Advantage 2
.....
.....[2]

Advantage 3
.....
.....[2]

(b) Explain **two** disadvantages for an engineering company when **introducing** robotics.

Disadvantage 1
.....[2]

Disadvantage 2
.....[2]

(c) Explain how robotics are used in packaging products.

.....
.....
.....[2]

(d) After the products are made they are packaged and dispatched to the customer.

Explain how ICT is used in the tracking of dispatched goods.

.....
.....
.....[2]

5 (a) Engineering materials are classified in the following groups:

- Ferrous metals;
- Non-ferrous metals;
- Alloys;
- Polymers;
- Ceramics; and
- Composites.

Complete the table below by giving **one** specific engineering material for each of the materials groups listed.

The first one has been done for you.

Material Groups	Specific Engineering Material
Ferrous metals	Medium carbon steel
Non-ferrous metals	[1]
Alloys	[1]
Polymers	[1]
Ceramics	[1]
Composites	[1]

(b) Complete the table below for **two** of the specific engineering materials named in part (a).

Specific Engineering Material	Example of Use	Reasons for Use
		Reason 1 [1]
		Reason 2 [1]
		Reason 1 [1]
		Reason 2 [1]

(c) Waste materials are often produced when making engineered products.

Explain the difficulties with recycling or disposal of engineering materials.

.....

.....

.....

.....[3]

- 6 From the following list of engineering processes choose [✓] **one** which you have carried out during your course.

Engineering Processes	✓
Milling	
Drilling	
Soldering	
Bending	
Brazing	
Surface finishing	

- (a) Complete the table below for the engineering process you have chosen.

	Description
Tools and equipment and machinery used	[3]
Safety precautions taken during the engineering process	[3]
Alternative process which could be used to get a similar effect	[2]

(b) From the following list of engineering processes choose [✓] **two** with which you are most familiar.

Engineering Processes	✓
Turning	
Forming	
Adhesion	
Etching	
Annealing	

Complete the table below for the **two** engineering processes you have chosen.

	Description of the Process
Engineering Process 1	[2]
	Description of the Process
Engineering Process 2	[2]

7 Modern and Smart Materials are increasingly being used in products.
 Many materials have a coating applied to them.

(a) (i) Give **one** example of a material and the modern applied coating.

.....[1]

(ii) Explain why a coating might be applied to a material.

.....

[2]

(b) From the modern materials listed below choose **two** materials with which you are familiar.

Modern Materials	✓
Shape memory alloy	
Carbon Fibre	
Epoxy Resin	
Motion control gel	
Thermochromic ink	
Polycarbonate polymer	

Complete the table below for the **two** modern materials you have chosen.

Modern Material 1	Description of the Properties and Uses
	[3]
Modern Material 2	Description of the Properties and Uses
	[3]

(c) Liquid Crystal Displays (LCD) are increasingly being used in modern products.
 Explain the properties and possible uses of LCDs.

.....

.....

.....

.....[3]

15
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