



GENERAL CERTIFICATE OF SECONDARY EDUCATION ENGINEERING

Unit 3: Application of Technology

4868

Candidates answer on the Question Paper

OCR Supplied Materials:

None

Other Materials Required:

None

**Monday 17 May 2010
Afternoon**

Duration: 1 hour 30 minutes



Candidate Forename		Candidate Surname	
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Centre Number						Candidate Number				
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INSTRUCTIONS TO CANDIDATES

- Write your name clearly in capital letters, your Centre Number and Candidate Number in the boxes above.
- Use black ink. Pencil may be used for graphs and diagrams only.
- Read each question carefully and make sure that you know what you have to do before starting your answer.
- Answer **all** the questions.
- Do **not** write in the bar codes.
- Write your answer to each question in the space provided. Additional paper may be used if necessary but you must clearly show your Candidate Number, Centre Number and question number(s).

INFORMATION FOR CANDIDATES

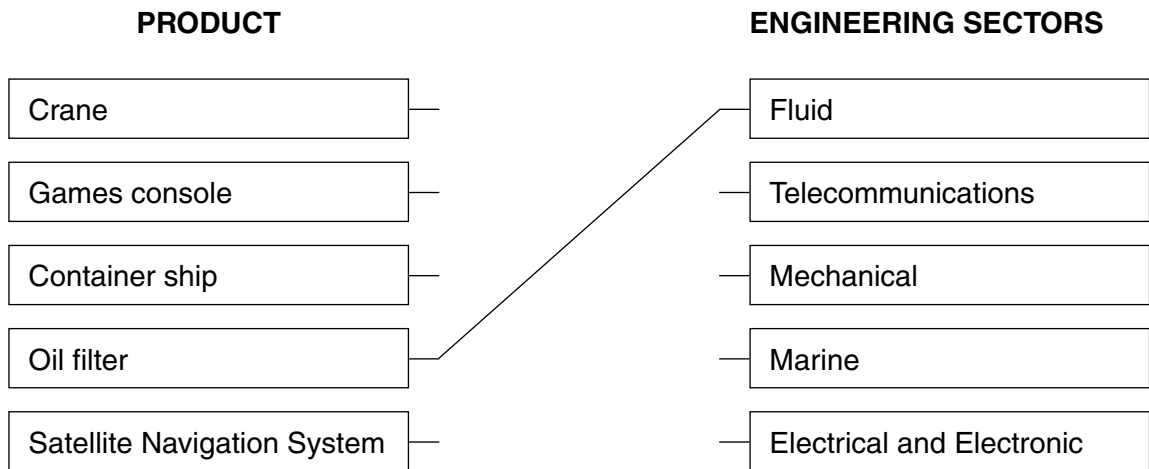
- The number of marks for each question is given in brackets [] at the end of each question or part question.
- Marks will be awarded for the use of correct conventions.
- The total number of marks for this paper is **100**.
- Dimensions are in mm unless stated otherwise.
- Please note that the instruction '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;
 - use **one** specific example or piece of evidence to support your answer.
- This document consists of **16** pages. Any blank pages are indicated.

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1 Engineering sectors produce different products.

- (a) Complete the links below to identify which engineering sector makes the products listed. One has been done for you.



[4]

- (b) For **three** of the products listed in part (a), complete the table to show:

- **one** example of technology used in each product;
- **one** benefit of using that technology in the product.

An example has been done for you.

Product	Technology used	Benefit
Oil filter	Nanofibres	Remove very small particles
	[1]	[1]
	[1]	[1]
	[1]	[1]

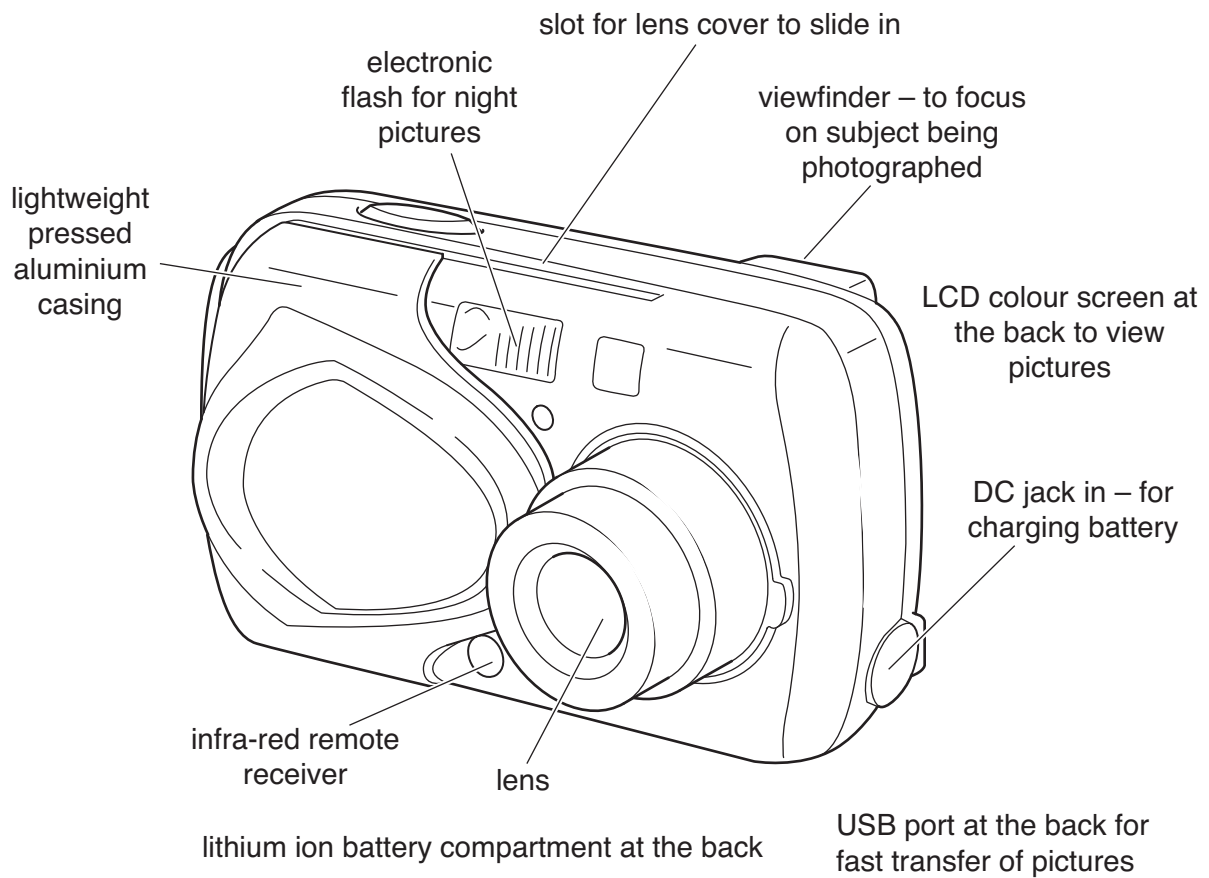
- (c) State **two** engineering sectors different from those given above.

1 [1]

2 [1]

- 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; [4]
- how materials/components are used; and [4]
- the structure and form of the product. [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 repeated points.

Your chosen product for **Question 2**

3 A list of engineering processes is shown below.

- Etching a printed circuit board (pcb)
- Powder coating
- Soldering
- Turning
- Welding
- Riveting

Choose **two** engineering processes from the list above. For each process complete the tables by:

- naming **two** tools or items of equipment used;
- describing how to carry out the process safely; and
- describing how to ensure quality.

Chosen Engineering Process
Tools/equipment used: 1 [1] 2 [1]
How to carry out the process safely [2]
How to ensure quality [2]

Chosen Engineering Process

.....

Tools/equipment used:

1 [1]

2 [1]

How to carry out the process **safely**

.....

.....

.....

.....

..... [2]

How to ensure **quality**

.....

.....

.....

.....

..... [2]

4 The use of modern materials has improved many products.

Examples of types of improvement are:

- reduced weight;
- ease of use;
- improved product safety; and
- reduced impact on the environment.

- (a) State **one** example of a product that uses a modern material to **reduce its weight**. Name the material used.

Product [1]

Material [1]

- (b) State **one** example of a product that uses a modern material to make it **easier to use**. Name the material used.

Product [1]

Material [1]

- (c) State **one** example of a product that uses a modern material to make it **safer for the end user**. Name the material used.

Product [1]

Material [1]

- (d) State **one** example of a product that uses a **different** modern material to make it **safer for the workforce making it**. Name the material used.

Product [1]

Material [1]

- (e) Explain, using **one** example, the benefits of using a smart material.

.....

 [3]

- (f) Explain how reducing the weight of a product has affected its **impact on the environment**.

.....

 [3]

- 5 Equipment costs are considered when Computer Aided Design (CAD) is introduced into an engineering company.

(a) Give **two** examples of other costs when introducing **CAD**.

1 [1]

2 [1]

(b) (i) Describe **two** benefits to an engineering company of using **CAD**.

1

.....

..... [2]

2

.....

..... [2]

(ii) Describe **one** benefit to the end-user when **CAD** is used for an engineered product.

.....

.....

..... [2]

(c) (i) Describe **two** benefits to an engineering company of using Computer Aided Manufacture (**CAM**).

1

.....

..... [2]

2

.....

..... [2]

(ii) Describe **one** reason why an engineering company might use CAM in **one-off** production.

.....

.....

..... [2]

6 Benefits of using robotics technology in engineering production include:

- improved reproducibility;
- increased rate of production; and
- reduced waste.

(a) Explain, using examples, how robotics technology can achieve each of these benefits.

Marks will not be given for repeated points.

(i) Improved reproducibility

.....

.....

.....

..... [3]

(ii) Increased rate of production

.....

.....

.....

..... [3]

(iii) Reduced waste

.....

.....

.....

..... [3]

(b) Explain why robotics technology is **not** used for some engineering production processes.

.....

.....

.....

..... [3]

7 Engineering components include:

Capacitors	Diodes
Filters	Gear trains
Reservoirs	Resistors
Machine screws	Springs

- (a) Select **one** mechanical component and **one** electronic component from the list above.

Complete the tables to show the main function and **one** example of use for each component selected.

<p>Mechanical component</p> <p>..... [1]</p>
<p>Main function</p> <p>.....</p> <p>..... [2]</p>
<p>Example of use</p> <p>.....</p> <p>..... [1]</p>

<p>Electronic component</p> <p>..... [1]</p>
<p>Main function</p> <p>.....</p> <p>..... [2]</p>
<p>Example of use</p> <p>.....</p> <p>..... [1]</p>

- (b) Give **one** example of a **standard** pneumatic/hydraulic component from the list given at the start of question 7 on page 11.

..... [1]

- (c) Explain why standard components are used in engineered products.

.....

.....

.....

..... [3]

8 Please note that the instruction 'discuss' means that you should:

- identify **three** relevant issues/points raised by the question;
- explain why you consider **two** of these issues to be relevant;
- use **one** specific example or piece of evidence to support your answer.

(a) Discuss the impact of automated production on the quality of engineered products.

..... [6]

(b) Discuss the financial implications for an engineering company of introducing automated production.

..... [6]

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