



General Certificate of Secondary Education  
January 2015

**Engineering**  
Paper 1  
Assessment Unit 3  
*assessing*  
Engineering Technology  
**[GEE31]**



GEE31

**THURSDAY 8 JANUARY, AFTERNOON**

**TIME**

1 hour.

**INSTRUCTIONS TO CANDIDATES**

Write your Centre Number and Candidate Number in the spaces provided at the top of this page.  
Write your answers in the spaces provided in this question paper.  
Answer **all ten** questions.

**INFORMATION FOR CANDIDATES**

The total mark for this paper is 80.  
Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.

Centre Number

71	
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Candidate Number

--

For Examiner's use only	
Question Number	Marks
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
<b>Total Marks</b>	

Answer **all** questions

Examiner Only

Marks Remark

1 (a) All the products below belong to a manufacturing sector.

Circle **two** products shown below that belong to the mechanical fabrication sector.

You **must** only circle **two** products. If you make a mistake you must clearly show which two products you have chosen.



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[2]

(b) All the products below belong to a manufacturing sector.

Circle **two** products shown below that belong to the engineering fabrication sector.

You **must** only circle **two** products. If you make a mistake you must clearly show which two products you have chosen.



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[2]

Examiner Only	
Marks	Remark

2 Answer all parts of this question.



Examiner Only

Marks Remark

Question	Answer
<p>(a) Name a suitable material to make the blade of the chisel marked <b>A</b> and give <b>one</b> reason for your choice of material.</p>  <p style="text-align: right;"><small>© Thinkstock</small></p>	<p>Name of material</p> <hr/> <p>Reason</p> <hr/> <hr/>
<p>(b) Name the engineering item shown below and state a suitable metal that could be used to manufacture it.</p>  <p style="text-align: right;"><small>© Thinkstock</small></p>	<p>Name of item</p> <hr/> <p>Suitable metal</p> <hr/> <hr/>

[2]

[2]

Question	Answer
<p><b>(c)</b> Name the tool shown below and state a use for it.</p>  <p>© Thinkstock</p>	<p>Name of tool</p> <hr/> <p>Use</p> <hr/> <hr/>
<p><b>(d)</b> Suggest a suitable finish for the hanging basket bracket and give a reason for your choice.</p>  <p>© Thinkstock</p>	<p>Suitable finish</p> <hr/> <p>Reason</p> <hr/> <hr/>

[2]

[2]

Examiner Only	
Marks	Remark

3 All resistant materials have physical and mechanical properties that make them ideally suited for particular products. The properties required of a product are usually detailed in the design specification which will inform the choice of materials for a design.

(a) (i) Describe what is meant by the term 'physical properties of a material'.

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_ [2]

(ii) State **two** examples of physical properties of a material.

1. \_\_\_\_\_ [1]

2. \_\_\_\_\_ [1]

(b) (i) Describe what is meant by the term 'mechanical properties of a material'.

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_ [2]

(ii) State **two** examples of mechanical properties of a material.

1. \_\_\_\_\_ [1]

2. \_\_\_\_\_ [1]

(c) In recent years manufacturers have designed and brought to market modern and smart materials. Manufacturing these types of materials has enhanced the characteristics and the way in which products are made.

(i) Describe the difference between modern and smart materials.

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_ [4]

Examiner Only	
Marks	Remark

(ii) State **two** examples of modern materials and **two** examples of smart materials.

Modern materials

1. \_\_\_\_\_ [1]

2. \_\_\_\_\_ [1]

Smart materials

1. \_\_\_\_\_ [1]

2. \_\_\_\_\_ [1]

Examiner Only	
Marks	Remark

- 4 The use of robotic welding has increased steadily over the last number of years and now accounts for a high percentage of all industrial robotic applications.



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The picture above shows a robotic welder in a factory situation.

- (i) Name **two** types of welding suitable for robotic control.

1. \_\_\_\_\_ [1]

2. \_\_\_\_\_ [1]

- (ii) Identify **one** other industrial process that can be controlled by robotic techniques.

\_\_\_\_\_ [1]

- (iii) Quality control involves testing, usually at a set rate, to ensure that the specified standards are being maintained during manufacture. When a working drawing is produced, it will include tolerances enabling manufacture to proceed.

Describe what is meant by the term 'tolerance'.

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_ [2]

Examiner Only

Marks

Remark



**(iv)** Robotic based inspection systems are widely used in engineering companies to detect flaws on particular items being manufactured and to ensure that tolerances are being adhered to.

Give **two** examples of how robots can be used to ensure that a product is made to a set standard throughout its manufacture.

1. \_\_\_\_\_

\_\_\_\_\_ [1]

2. \_\_\_\_\_

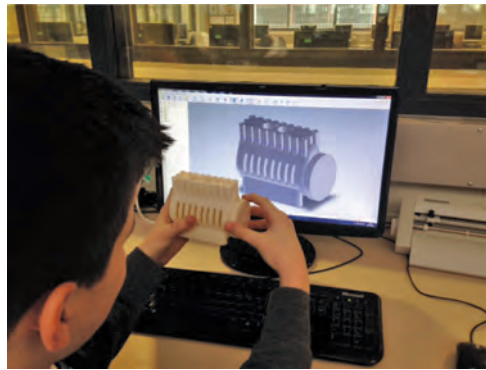
\_\_\_\_\_ [1]

Examiner Only

Marks

Remark

- 5 The majority of engineering companies use CAD to design the products they intend to manufacture.



Source: Chief Examiner

The picture above shows a designer holding the actual product he has designed using a CAD software package.

- (a) (i) State **two** benefits for an engineering company of using CAD.

1. \_\_\_\_\_  
 \_\_\_\_\_ [1]

2. \_\_\_\_\_  
 \_\_\_\_\_ [1]

- (ii) Describe, giving **one** example, how CAD can have a negative impact on product manufacture in an engineering company.

\_\_\_\_\_  
 \_\_\_\_\_ [2]

- (b) Computer Aided Design (CAD) and Computer Aided Manufacture (CAM) are both used by manufacturers of engineered products.

Describe, giving **one** example, how CAM can be used to manufacture products in the engineering sector. (Your example stated must specifically relate to the engineering sector.)

\_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_ [2]

Examiner Only	
Marks	Remark

6 The properties of some metals can be altered by heat treatments.

Examiner Only

Marks Remark

(a) Explain what is meant by the term 'heat treatment'.

\_\_\_\_\_ [2]  
\_\_\_\_\_

(b) (i) Explain what is meant by the term 'annealing'.

\_\_\_\_\_ [2]  
\_\_\_\_\_

(ii) Outline **one** safety precaution that needs to be observed when annealing.

\_\_\_\_\_ [1]  
\_\_\_\_\_

(c) State **two** other heat treatment processes.

1. \_\_\_\_\_ [1]  
2. \_\_\_\_\_ [1]

- 7 The manually operated lathe shown below is used when manufacturing products in the engineering sector. Safety precautions such as the appropriate clothing and eye protection must be adhered to when using this machine.



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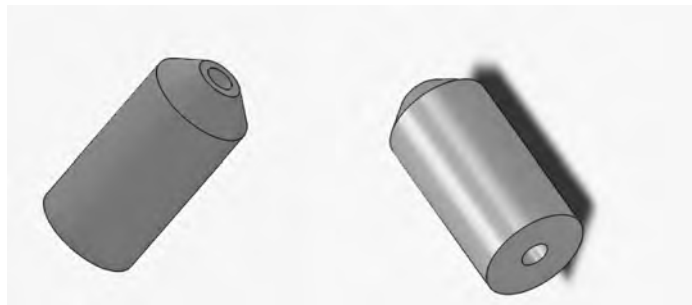
Marks Remark

- (a) State **two** other safety precautions that must be carried out before using a lathe.

1. \_\_\_\_\_ [1]

2. \_\_\_\_\_ [1]

- (b) The picture below shows a piece of aluminium which has to be manufactured using a lathe. Outline the **three** manufacturing stages required to manufacture this item on a lathe.



1. \_\_\_\_\_ [1]

2. \_\_\_\_\_ [1]

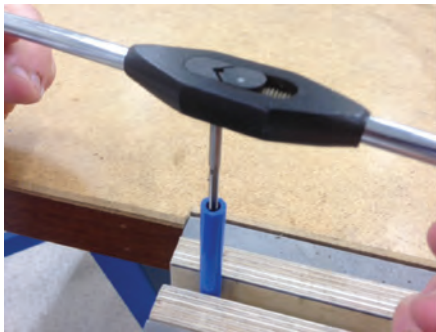
3. \_\_\_\_\_ [1]

(c) State **one** other manufacturing process that can be carried out on a lathe.

\_\_\_\_\_

\_\_\_\_\_ [1]

(d) Name the manufacturing processes shown in the pictures below.



**Picture A**



**Picture B**

*Source: Chief Examiner*

Picture A \_\_\_\_\_ [1]

Picture B \_\_\_\_\_ [1]

Examiner Only	
Marks	Remark

8 New technology is used extensively in and by engineering companies. It has enabled continuous operation throughout the manufacture of products, improved reproducibility of products, and increased speed with regards to how quickly products are manufactured.

(a) Describe, giving **one** example for each, how new technology has influenced each of the manufacturing stages stated above. (Your responses must highlight different new technologies relevant to each stage.)

Continuous operation

\_\_\_\_\_  
 \_\_\_\_\_ [2]

Improved reproducibility

\_\_\_\_\_  
 \_\_\_\_\_ [2]

Increased speed

\_\_\_\_\_  
 \_\_\_\_\_ [2]

(b) Describe, giving **two** examples, how new technologies have impacted on the marketing of products.

1. \_\_\_\_\_  
 \_\_\_\_\_ [2]

2. \_\_\_\_\_  
 \_\_\_\_\_ [2]

Examiner Only	
Marks	Remark

- 9 (a) The use of modern technologies has made great changes in the way engineering companies operate. Depending upon whether you manage a company or work for a company, these changes can be seen as either good or bad.

Identify and explain the changes in each of the following as a result of the introduction of modern technologies into a company.

The size of the workforce

\_\_\_\_\_ [1]

Explanation

\_\_\_\_\_  
 \_\_\_\_\_ [2]

Buying raw materials

\_\_\_\_\_ [1]

Explanation

\_\_\_\_\_  
 \_\_\_\_\_ [2]

- (b) Describe **one** positive and **one** negative effect on society arising from the use of modern technology.

Positive effect

\_\_\_\_\_ [2]

Negative effect

\_\_\_\_\_  
 \_\_\_\_\_ [2]

Examiner Only	
Marks	Remark

10 Explain, giving **two** examples, how an engineering company can contribute to a responsible system of recycling and waste management.

1. \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_ [2]

2. \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_ [2]

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Marks

Remark

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**THIS IS THE END OF THE QUESTION PAPER**

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