1145-520 MARCH 2018
Level 2 Technical Certificate in Engineering (360)

Friday 2 March 2018
13:30 – 15:30

If provided, stick your candidate barcode label here.

Candidate name (first, last)
First
Last
Candidate enrolment number
Date of birth (DDMMYYYY)
Gender (M/F)
Assessment date (DDMMYYYY)
Centre number
Candidate signature and declaration*

• If any additional answer sheets are used, enter the additional number of pages in this box.
• Please ensure that you staple additional answer sheets to the back of this answer booklet, clearly labelling them with your full name, enrolment number, centre number and qualification number in BLOCK CAPITALS.
• All candidates need to use a black/blue pen. Do not use a pencil or gel pen.
• If provided with source documents, these documents will not be returned to City & Guilds, and will be shredded. Do not write on the source documents.

*I declare that I had no prior knowledge of the questions in this assessment and that I will not divulge to any person any information about the questions.

You should have the following for this examination
• non-programmable scientific calculator
1  a) Name two pieces of health and safety legislation that apply in an engineering workplace. (2 marks)

b) Other than Health and Safety, state three things that should be considered when planning an activity in an engineering workshop. (3 marks)

(Total marks 5)

2  a) State the purpose of a surface plate when marking out a component. (1 mark)

b) Name two tools that can be used to tighten a nut onto a bolt. (2 marks)

(Total marks 3)

3  State two types of defect or quality issues in a machined part that can be identified by a visual inspection. (2 marks)

(Total marks 2)
4  a) State the meaning of the following symbol on a drawing of a mechanical component.  

   [Diagram of a rectangular opening]

   (1 mark)

b) State the meaning of the following Geometric Dimensioning and Tolerancing symbol.  

   [Diagram of parallel lines]

   (1 mark)

c) Identify the electrical component represented by the following symbol.  

   [Diagram of three connected electrical symbols]

   (1 mark)

(Total marks 3)
5 a) Describe how a Gantt chart is used in an engineering business. (2 marks)

b) A small, local engineering company has been bought by a large multinational company. It will continue with its current manufacturing activities, but now work as a division of the large company. Explain how this may change how the local company is organised. (3 marks)

6 Explain one benefit and one limitation of using a general assembly drawing when manufacturing a product. (4 marks)
A company needs to manufacture a one-off replacement part for an inspection cover. This cover is part of the hull for a speedboat. It will be attached to the hull using bolts. The part design is shown in Figure 1. The maximum dimensions of the part are 300 mm x 200 mm, with a thickness of 6 mm. This will be made as a one-off using a material chosen by the company.

Figure 1

Suggest a suitable material to make the part. Give reasons for your suggestion and describe how the part will be made. (6 marks)

(Total marks 6)
8  a) State the definition of the scientific term ‘force’.  

b) State the mechanical property that means the ability of a material to be deformed without rupturing.  

c) State the mechanical property that means the ability of a material to resist wear, abrasion and scratches.  

d) Name two types of corrosion that occur in engineering materials.  

(Total marks 5)
9 a) For each of the following types of mechanical testing, state the material property that it measures. Complete the table below with your responses. (4 marks)

<table>
<thead>
<tr>
<th>Mechanical test</th>
<th>Property measured</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brinell</td>
<td></td>
</tr>
<tr>
<td>Charpy</td>
<td></td>
</tr>
<tr>
<td>Wohler</td>
<td></td>
</tr>
<tr>
<td>Tensile</td>
<td></td>
</tr>
</tbody>
</table>

b) Explain how annealing changes the properties of a metal. (4 marks)
10 a) The following part needs to be marked out:

![Figure 2 – NOT TO SCALE](image)

Calculate the length of side A

b) Solve x and y in the following simultaneous equations.

\[ x + 4y = 26 \]
\[ 2x + 3y = 27 \]

(Total marks 6)
11 Figure 3 shows two resistors arranged in parallel.

You may find the following formula useful: \( \frac{1}{R_T} = \frac{1}{R_1} + \frac{1}{R_2} \)

a) Calculate the total resistance offered by this arrangement. (2 marks)

b) The current in the circuit was measured as 0.006 amps. Calculate the voltage between A and B. (2 marks)

(Total marks 4)
12 Discuss how the number of products to be made influences the design and manufacture of a product.

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(9 marks)