



**1145-502 MARCH 2018**  
**Level 2 Technical Award in Engineering**  
 Level 2 Engineering – Theory exam (1)

If provided, stick your candidate barcode label here.

**Wednesday 14 March 2018**  
**13:30 – 15:30**

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.**

**General instructions**

- Use black or blue ballpoint pen.
- The marks for questions are shown in brackets.
- There are **six questions** in this examination paper. Answer **all** questions.
- Answer the questions in the spaces provided. Answers written in margins will **not** be marked.
- Cross through any work you do **not** want to be marked.
- Write **all** of your working out and answers in this booklet.
- If extra space is required, then the blank pages at the back of the pack should be used, clearly identifying the question.



1 a) State the meaning of the abbreviation AF on an engineering drawing. (1 mark)

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b) Explain the purpose of a countersink on an engineered product. (2 marks)

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c) Explain the purpose of knurls and how these are produced on a component. (3 marks)

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d) Give **three** reasons why a designer may choose to design a 3D virtual model of an assembly rather than a physical model. (3 marks)

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- e) A designer has used the following different types of line on an orthographic drawing as shown in Figure 1.



Figure 1

State which of the lines represents the

- i) centre line

(1 mark)

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- ii) hidden detail.

(1 mark)

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- f) Describe where the value of the dimension should be placed on the dimension line in Figure 2.

(2 marks)

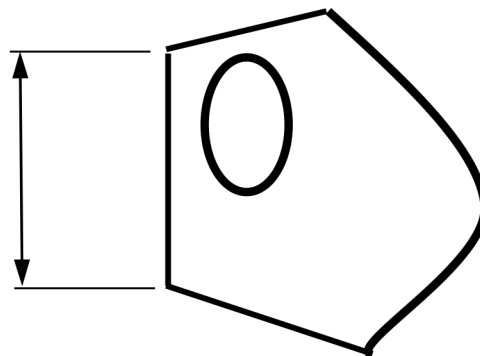


Figure 2

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(Total marks 13)

2 a) Define **each** of the following material properties.

i) Compressive strength.

(1 mark)

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ii) Toughness.

(1 mark)

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b) Name the process shown in Figure 3.

(1 mark)



**Figure 3**

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c) Give **two** safety precautions that should be taken when milling a flat surface on a block of stainless steel and say what benefit **each** provide.

(4 marks)

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- 3 a) Explain the purpose of using flux when soldering electrical components to a printed circuit board. (3 marks)

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- b) An electrical resistor has a specification of 330 ohms with a tolerance of +/- 10%. What are the possible **minimum** and **maximum** values of the resistor? (2 marks)

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- c) State the purpose of **each** of the following components and give for **each** an example of a typical application in a circuit. (2 marks)
- i) Capacitor.

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- ii) Diode. (2 marks)

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- d) Explain the difference between how a voltmeter and an ammeter are used. (2 marks)

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- 4 a) What is the accuracy of the steel rule shown in Figure 4? (1 mark)



Figure 4

- b) State the units in which **each** of following are measured. (1 mark)
- i) Volume.

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- ii) Area. (1 mark)

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- iii) Power. (1 mark)

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- c) State **three** different properties or characteristics that can be measured by a multimeter. (3 marks)

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- d) Describe the procedure for taking a reading using a manual micrometer. (3 marks)

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(Total marks 10)





- c) The component shown in Figure 5 is made using sand casting. Explain why this technique would be used rather than conventional machining processes.

(4 marks)



**Figure 5**

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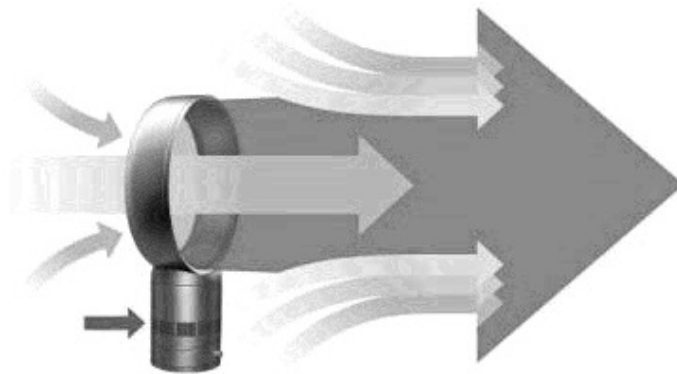
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(Total marks 12)

6 Figures 6, 7 and 8 show different types of electric desk fans.



**Figure 6 – Fan A**



**Figure 7 – Fan B**



**Figure 8 – Fan C**









