



1145-502 MARCH 2022
Level 2 Technical Award in Engineering
 Level 2 Engineering – Theory exam (1)

If provided, stick your candidate barcode label here.

Monday 21 March 2022
09:30 – 11:30

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 additional answer sheets are used, enter the additional number of pages in this box.
- Before taking the examination, **all candidates** must check that their barcode label is in the appropriate box. Incorrectly placed barcodes may cause delays in the marking process.
- Please ensure that you staple additional answer sheets to the **back** of this answer booklet, clearly labelling these 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, unless otherwise instructed.
- 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 examination and that I will not divulge to any person any information about the questions.**

General instructions

- Use black or blue ballpoint pen. Use pencil for drawing only.
- Any pencil drawings **must** be bold and clear for scanning purposes.
- The marks for questions are shown in brackets.
- Answer **all** questions.
- Write **all** of your working out and answers in this booklet.
- Answer the questions in the spaces provided.
- Answers written in margins or on blank pages **cannot** be marked.
- Cross through any work you do **not** want to be marked.



- 1 a) State the purpose of **each** of the following types of engineering drawing:
- i) general arrangement (GA) (1 mark)

- ii) assembly (1 mark)

- iii) detail drawing. (1 mark)

- b) The title block on an engineering drawing contains the title of the drawing. State **three other** items of information that are typically found in the title block of an engineering drawing. (3 marks)

- c) Explain **one** advantage and **one** disadvantage of using CAD to produce engineering drawings over manual methods. (4 marks)

- d) Give **two** examples of tools within CAD software that are used to create a 3D parametric model. (2 marks)

- 2 a) State the purpose of **each** of the electrical and electronic components in the table below.

For **each**, describe a typical application of its use.

An example has been completed for you.

(9 marks)

Component	Purpose		Typical application	
<i>Light dependent resistor</i>	<i>To detect changes in light level</i>		<i>As a sensor to detect an opening of a door in an alarm system</i>	
Toggle switch		1 mark		2 marks
Thermistor		1 mark		2 marks
Motor		1 mark		2 marks

b) Explain the difference between a 555 monostable and a 555 astable. (2 marks)

c) Explain why countersinking is used. (3 marks)

3 a) State the SI unit in which **each** of the following is measured:
i) area (1 mark)

ii) power (1 mark)

iii) capacitance. (1 mark)

b) State the meaning of the term derived unit. (1 mark)

c) i) Describe the purpose of Vernier callipers. (2 marks)

ii) Give **two** examples of the typical use of Vernier callipers. (2 marks)

4 a) Name **two** common forms of supply for graphene. (2 marks)

b) Explain the difference between a thermoplastic polymer and a thermosetting polymer. (2 marks)

c) Figure 1 shows a racing bicycle.



Racing Bicycle – Posted Anonymously – www.performancebike.com

Figure 1

i) Identify a suitable material type for the frame of the bicycle. (1 mark)

ii) Explain **two** reasons why this material type is suitable for this application. (4 marks)

5 a) State **two** different welding techniques. (2 marks)

b) State **two** different soldering techniques used with electrical components. (2 marks)

c) Explain the advantages of using epoxy resin to join materials together. (4 marks)

6 Describe the **main** steps in the sand-casting process.

(6 marks)

7 a) Give **two** examples of rapid prototyping processes. (2 marks)

b) Explain **two** reasons why designers use virtual modelling rather than making a physical model of a design. (4 marks)

c) State the purpose of rendering a block model of a product. (1 mark)

d) Explain **two** reasons why modular kits are used to model electrical circuits. (4 marks)
