SEC37/c1.26m

L-Università ta' Malta

MATRICULATION AND SECONDARY EDUCATION CERTIFICATE EXAMINATIONS BOARD

SECONDARY EDUCATION CERTIFICATE LEVEL
2026 MAIN SESSION

SUBJECT:	**Engineering Technology**
PAPER NUMBER:	Controlled – Unit 1
DATE:	10th May 2024
TIME:	10:00 a.m. to 11:35 a.m.

THIS PAPER SHOULD BE RETURNED TO THE INVIGILATOR AFTER THE EXAMINATION.

Name of candidate _____

I.D. number _____

School _____

Class _____

Answer **ALL** questions in the space provided.

Scenario

- Alfred works in a water treatment plant.
- This plant employs a number of technicians of different knowledge and skills.
- Each technician is responsible for different aspects of the water generating plant.
- Alfred is responsible for the maintenance of all the water piping system.
- At the plant Health and Safety is given top priority considering the risks involved.

Question 1 **K-2 (4 marks)**

Safety signs are distributed throughout the plant to remind employees of potential hazards and to promote a safe working environment.

a) Match the purpose of each safety sign with its respective colour using a line to connect the sign with the matching colour.

Warning sign	Red
First aid sign	Green
Danger sign	Yellow
Mandatory sign	Blue

(1)

b) Table 1 shows a number of safety signs. Name each of the given safety signs.

Table 1: Safety signs

	Safety Sign	Name
i)		_____ (0.2)
ii)		_____ (0.2)
iii)		_____ (0.2)

	Safety Sign	Name
iv)		_____ (0.2)
v)		_____ (0.2)

(Source: https://www.vectorstock.com)

c) Identify **FOUR** suitable safety signs that can be utilized in the situation shown in Figure 1 where a technician is working on a metal pipe within a water treatment facility.

Figure 1: Technician working on a metal pipe
(Source: www.careersinthemilitary.com)

_____

_____

_____

_____(2)

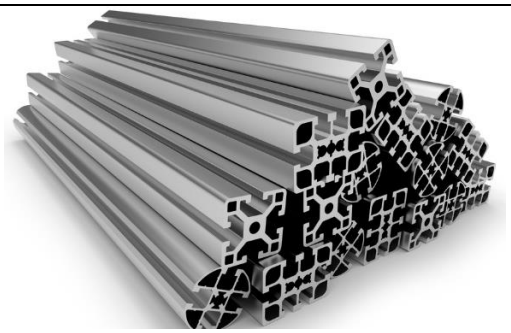
Please turn the page.

Question 2 **K-4 (4 marks)**

Different metal forms are used by the water treatment plant.

a) Identify the different metal forms of supply shown in Table 2 below.

Table 2: Forms of Metal Supply

	Forms of Supply	**Name**
i)	 *(Source: https://www.thomasnet.com)*	_____ (0.25)
ii)	 *(Source: https://shutterstock.com/)*	_____ (0.25)
iii)	 *(Source: https://theconstructor.org/)*	_____ (0.25)
iv)	 *(Source: https://www.indiamart.com/)*	_____ (0.25)

b) For each of the metals given below, outline **TWO** different properties.

Type of metal: Carbon Steel

Property 1: _____

_____ (0.25)

Property 2: _____

_____ (0.25)

Type of metal: Copper

Property 1: _____

_____ (0.25)

Property 2: _____

_____ (0.25)

c) Figure 2 below shows a metallic shield protecting a window.

Figure 2: Metallic Window Shield
(Source: https://www.pinterest.com/)

i) Describe the type of metal used to construct the metallic window shield shown in Figure 2. Your description should include **ONE** reason why this type of metal was selected.

_____

_____

_____

_____

_____ (1)

This question continues on next page.

ii) Describe the form of supply used for manufacturing the upper pointed metallic spades shown in Figure 2. Your description should include **ONE** reason why this metal supply was selected.

_____

_____

_____

_____

_____ (1)

Question 3 **K-5 (4 marks)**

- Wood is supplied in various forms and is used in numerous applications such as building structures, furniture, windows and doors.
- Different applications require different wood types having different properties.

a) List **FOUR** different forms of supply of wood.

Form of Supply 1: _____ (0.25)

Form of Supply 2: _____ (0.25)

Form of Supply 3: _____ (0.25)

Form of Supply 4: _____ (0.25)

b) Outline **TWO** different properties for each of the following types of wood:

Type of wood: Red Deal

Property 1: _____

_____ (0.25)

Property 2: _____

_____ (0.25)

Type of wood: Beech

Property 1: _____

_____ (0.25)

Property 2: _____

_____ (0.25)

c) Figure 3 shows a wooden napkin holder.

Figure 3: Napkin holder.
(Source: https://www.instructables.com/)

i) Describe the type of wood required to construct the wooden napkin holder shown in Figure 3. In your answer, include **ONE** reason for using such type of wood.

_____

_____

_____

_____

_____ (1)

ii) Describe the form of supply required to construct the wooden base of the napkin holder shown in Figure 3. In your answer, include **ONE** reason for using such form of supply.

_____

_____

_____

_____

_____ (1)

Please turn the page.

Question 4 **C-2 (6 marks)**

A number of tests are performed on different materials to test their properties and hence decide whether they are suitable for a particular application or not.

a) Outline the following **TWO** tests:

Shear Test

_____

_____

_____ (1)

Environmental Degradation Test

_____

_____

_____ (1)

b) Explain the test needed to examine the hardness of cast iron.

_____

_____

_____

_____

_____

_____ (2)

c) A technician working in a water treatment plant has been tasked with checking the maximum twisting force of bolts and nuts to be used on flanged couplings (as shown in Figure 1 in Page 3). Justify a test which guarantees the twisting strength of the selected bolts and nuts.

_____

_____

_____

_____

_____

_____ (2)

Question 5 **C-3 (6 marks)**

To manufacture different materials with specific properties different manufacturing processes were developed.

a) i) Identify **TWO** metal manufacturing processes. Underline the appropriate answers.

hardening	moulding	vacuum forming	galvanising

(1)

ii) Identify **TWO** polymers manufacturing processes. Underline the appropriate answers.

finishing	line bending	casting	annealing

(1)

b) Describe the **FOUR** steps, in the correct order, involved in bending a wooden sheet required for an arch frame of a door.

Step 1: _____

_____ (0.5)

Step 2: _____

_____ (0.5)

Step 3: _____

_____ (0.5)

Step 4: _____

_____ (0.5)

c) Explain the reason behind the following processes when manufacturing metals.

i) Annealing: _____

_____

_____

_____

_____

_____

_____ (1)

This question continues on next page.

ii) Electroplating: _____

_____

_____

_____

_____

_____

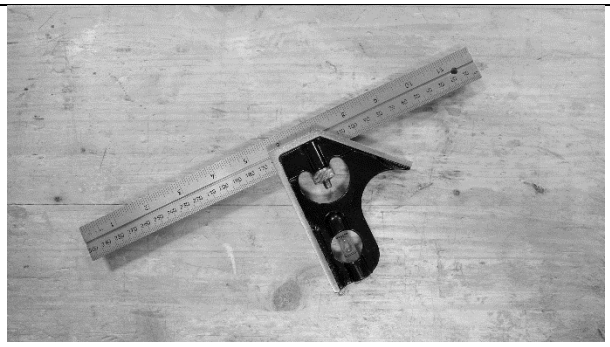
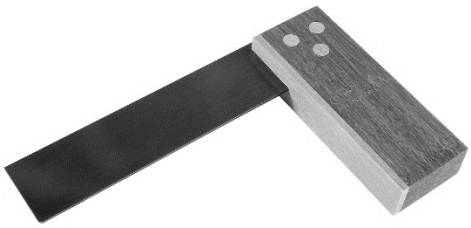
_____ (1)

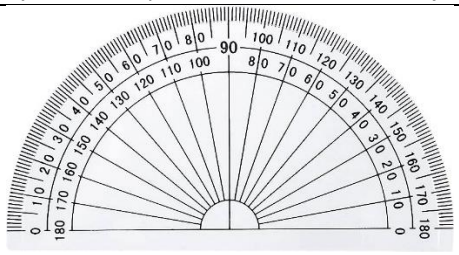
Question 6 **K-7 (4 marks)**

Different measuring and marking tools are used during the manufacturing processes of furniture.

a) Identify the measuring and marking out tools given in Table 3 below.

Table 3: Measuring and marking out tools.

Measuring and Marking Out Tool	Name
 *(Source: https://www.commonwoodworking.com/)*	_____ (0.2)
 *(Source: https: //www.fine-tools.com/)*	_____ (0.2)

Measuring and Marking Out Tool	Name
 *(Source: https://www.mt.rsdelivers.com)*	_____ (0.2)
 *(Source: https://www.limit-tools.com/)*	_____ (0.2)
 *(Source: https:// www.amazon.co.uk/)*	_____ (0.2)

b) Outline the functions of the following measuring and marking out tools.

Sliding Bevel: _____

_____ (0.5)

Centre Square: _____

_____ (0.5)

This question continues on next page.

c) Choose **TWO** appropriate measuring tools and **TWO** marking out tools to manufacture the sheet metal square scoop shown in Figure 4.

Figure 4: Sheet Metal Square Scoop
(Source: https://www.monotaro.sg/)

_____

_____

_____

_____ (2)

Question 7 **C-4 (6 marks)**

a) Describe the following methods of joining materials together.

Plastic welding: _____

_____

_____

_____ (1)

Rivets: _____

_____

_____

_____ (1)

b) Select the ideal joining method for the following scenarios.

i) Joining two wooden sheets in parallel with each other.

_____ (1)

ii) Permanently joining two drain water plastic pipes together without heating.

_____ (1)

c) Justify the ideal joining method for each of the following scenarios:

Scenario 1: Permanently joining thick metal sheet for the bottom edges of a ship.

_____

_____

_____

_____

_____

_____

_____ (1)

Scenario 2: Joining the wooden furniture of a bedroom set that can be dismantled in the future.

_____

_____

_____

_____

_____

_____

_____ (1)

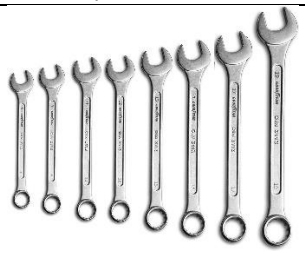
Please turn the page.

Question 8 **K-10 (4 marks)**

Assembly and finishing tools are essential to manufacture items to a given specification.

a) Identify the assembly and finishing tools given in Table 4 below. (1)
b) Relate each tool to a specific task. (1)

Table 4: Assembly and finishing tools

Assembly and Finishing Tools	(a) Name	(b) Specific task for which tool can be used
 *(Source: https://www.tooled-up.com/)*		_____ _____ _____ _____
 *(Source: https://www.amazon.com/)*		_____ _____ _____ _____
 *(Source: https://www.stanleytools.com/)*		_____ _____ _____ _____
 *(Source: https://www.amazon.in/)*		_____ _____ _____ _____
 *(Source: https://www.amazon.in/)*		_____ _____ _____ _____

c) The manufacturing of wooden furniture requires the safe use of assembly and finishing tools. Describe **FOUR** preventive measures when using assembly and finishing tools and equipment.

_____

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_____

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_____

_____

_____ (2)

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