

MATRICULATION AND SECONDARY EDUCATION CERTIFICATE EXAMINATIONS BOARD  
UNIVERSITY OF MALTA, MSIDA

**SECONDARY EDUCATION CERTIFICATE LEVEL**

**MAY 2016**

---

<b>SUBJECT:</b>	<b>Engineering Technology</b>
<b>PAPER NUMBER:</b>	Controlled – Unit 2
<b>DATE:</b>	1 <sup>st</sup> June 2016
<b>TIME:</b>	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.**

**Introduction**

*A building that was used as a store by a construction company has just been bought by another company that provides engineering services. The building has been abandoned for quite a long time now and needs cleaning and clearing up before any other activity can take place. Workers from the new company are on site and are all preparing for the new activity. Some of them are new and may need your help in their assigned activities. See where you can help our friends with their tasks.*

**Question 1**

**K3 (4 marks)**

At the factory Thomas is in charge of reorganising the workshop. Today he must separate ferrous and non-ferrous materials that are mixed in a container.

Below is a list of materials that can be separated as ferrous and non-ferrous. Help Thomas separate the materials by filling Table 1 correctly. The first one is made for you.

<b>Type of material</b>	<b>Ferrous or Non-ferrous</b>
Mild steel	Ferrous
Copper	
Aluminium	
Wrought iron	
Carbon steel	
Cast iron	
Lead	

Table 1

(½ mark each)

Explain the main difference between ferrous and non-ferrous materials.

---



---



---

(1 mark)

**Question 2**

**K4 (4 marks)**

Today Catherine is at the wood store. Her job is to identify and separate different types of wood according to their type. She has to put natural wood on one side and manufactured wood on the other side.

In Table 2 below, there is a list of different types of wood at the store. Indicate if the type of wood is natural or manufactured. The first one is made for you.

Type of wood	Natural or manufactured
Mahogany	Natural
Plywood	
Chipboard	
Oak	
Pine	
Fibreboard	
Birchwood	

Table 2

(½ mark each)

Explain the main difference between natural and manufactured wood.

---



---



---

(1 mark)

*Please turn the page.*

**Question 3**

**K5 (4 marks)**

Thomas and Catherine now moved to another part of the stores where plastics are stored. Once again they have to separate the plastics in thermosetting and thermoplastics.

Fill in Table 3 correctly and explain the difference between the two. The first one is made for you.

Type of material in plastic	Thermoplastic or Thermosetting
Plastic cutlery	Thermoplastic
Plastic water kettle	
Electricity conduit pipes	
Electrical switches	
Storage boxes	
Bottles for soft drinks	
Water drain pipes	

Table 3

(½ mark each)

Explain the difference between thermoplastic and thermosetting plastic.

---



---



---

(1 mark)

**Question 4****K8 (4 marks)**

Buzz is a new employee at the workshop. He has just finished school and this is his first employment. He needs to be guided when using hand tools. Help him identify a list of correct practices when handling tools.

Fill in Table 4 and state if the actions are true or false. The first one is made for you.

<b>Action</b>	<b>True or False</b>
Files can be used without a handle	False
In a hacksaw, the cutting stroke is forward.	
In case of emergency, a screwdriver can be used as a scribe.	
When sharp tools are stored, there is no need to cover the sharp edges.	
Micro-meters must be handled with care.	
Broken tools should be discarded.	
No protection glasses need to be worn when using pillar drills.	
Worn jaws on pliers cannot be repaired and tool must be discarded.	
Do not wear loose clothes when using power tools.	

Table 4

(½ mark each)

*Please turn the page.*

**Question 5**

**K9 (4 marks)**

Leo and Thea are two students assigned to the workshop. They need to make sure they have all tools in place.

In Table 5 (b) there is a list of engineering tasks. Match each task with the appropriate tool in Table 5 (a). There is only one correct answer. The first one is done for you.










1.		2.		3.	
4.		5.		6.	
7.		8.		9.	

Table 5 (a)

Description of engineering tasks	Selected tool number
Twisting of electrical wires	5
Delivering shock blows	
Cutting of material	
Tightening of bolts and nuts	
General purpose drilling of holes	
Fastening of screws	
Measurement reading	
Turning of wood in round shapes	
Precision drilling	

Table 5 (b)

(½ mark each)

**Question 6****C2 (6 marks)**

Theresa is a mechanical student who just got her diploma. She studied materials and their properties. You are assigned with her to assist in selecting materials for the construction of an extension to the existent building.

In Table 6 you are given two lists. One list gives a number of engineering situations. The other list gives a number of material properties. Your task is to match the material property to the situation.

<b>Engineering situation</b>	<b>Selected property number</b>	<b>Material property</b>
Which material can resist stress and return to its original shape?	5	1. Plastic
Copper is a material used for electrical wires. The material is highly.....		2. Tensile
Wrought iron can resist corrosion, but it cannot withstand shock blows. The material is said to be.....		3. Flexible
When a piece of iron is heated its dimensions change. This is due to.....		4. Conductive
An electrician uses PVC pipes as wire conduit. The electrician bends the pipe in different shapes without breaking. What property does the PVC have?		5. Elastic
A wire rope is used to lift heavy loads. What property is needed so the rope will not break under load?		6. Expansion
A material that bends to every shape without any damage must be.....		7. Brittle

Table 6

(1 mark each)

*Please turn the page.*

**Question 7**

**C3 (6 marks)**

James is tasked with carrying out mechanical tests of various materials at the laboratory.

In Table 7, you are given questions that describe the action being carried out. Answer the question. The first one is done for you.

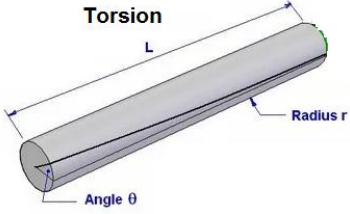
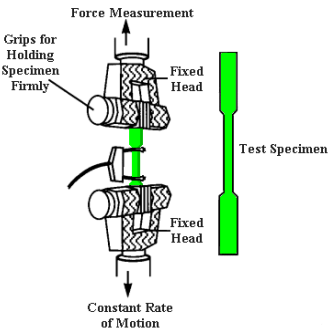
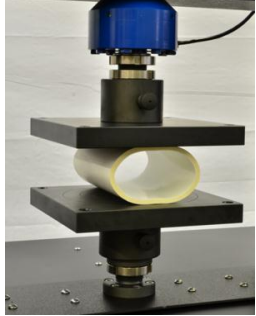

Tests	Question	Answer
 <p><b>Torsion</b></p> <p>Labels: L, Radius r, Angle <math>\theta</math></p>	<p>A mechanical shaft is tested for its twisting properties. Describe how a test is carried out to show this property.</p> <p>State what property is being tested.</p>	<p>The shaft is twisted from both ends to opposite directions. A measure is taken of the amount of displacement the shaft turns from the original datum.</p> <p>The property tested is torsion</p>
 <p>Labels: Force Measurement, Grips for Holding Specimen Firmly, Fixed Head, Test Specimen, Fixed Head, Constant Rate of Motion</p>	<p>A test specimen is subjected to a test as shown. Describe the test and what mechanical property is being tested.</p>	
	<p>The picture aside shows a clamp pressing on a plastic pipe. Describe this test and state what mechanical property is being tested.</p>	
	<p>Suggest a test that can be carried out to identify a ferrous material. Explain how ferrous materials are recognised.</p>	

Table 7

(6 marks)



**Question 8**

**C5 (6 marks)**

Kirsten, one of the junior managers suggested to provide a number of chequered boards that can be used to play draughts during the break. (Draughts is a game played on a chequered board using 12 round moving pieces per player). The management agreed to the idea and suggested that the woodworkers can help out. Help the woodworkers to complete their job.

In Figure 1 you are given a picture of a finished draught board made of wood. It is complete with two sets of round pieces.

Each set of moving pieces is round but each set is different in colour; one is dark and the other is light coloured.



Figure 1

The older woodworkers are working on the board. Your task is to produce both sets of moving pieces **made of wood** for each player.

Select the appropriate tools for the completion of the moving pieces.

---

---

---

---

---

---

---

---

---

---

(6 marks)

Blank Page

Blank Page

Blank Page