



L-Università
ta' Malta

MATRICULATION AND SECONDARY EDUCATION CERTIFICATE
EXAMINATIONS BOARD

**SECONDARY EDUCATION APPLIED CERTIFICATE LEVEL
2022 SUPPLEMENTARY SESSION**

SUBJECT: **Engineering Technology**
PAPER NUMBER: Synoptic – Unit 2
DATE: 1st November 2022
TIME: 11:30 a.m. to 1:35 p.m.

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

For examiners' use only:

Question	1	2	3	4	5	6	Total
Score							
Maximum	6	8	8	8	8	12	50

Answer **ALL** questions in the space provided. You may answer either in English or in Maltese.

Scenario

A technician working with a company specialising in machinery servicing, is required to answer the following questions on threads, pulleys, gears and ratchets, cam and cranks and lever systems.

Question 1

K-1 (6 marks)

a. List the **TWO** different measuring systems used in thread charts.

Measuring system 1: _____ (1)

Measuring system 2: _____ (1)

b. Outline the following **TWO** terms used when dealing with threads.

Taps:

_____ (1)

Dies:

_____ (1)

- c. Table 1 below shows a Thread chart. Use it to interpret information to answer the following questions.

Table 1: Thread chart

Nominal Diameter (mm)	Pitch (mm)	Tap Drill Size (mm)
M 1.6	0.35	1.22
M 1.8	0.35	1.42
M 2	0.40	1.57
M 2.2	0.45	1.71
M 2.5	0.45	2.01
M 3	0.50	2.46
M 3.5	0.6	2.85
M 4	0.7	3.24
M 4.5	0.75	3.69
M 5	0.80	4.13
M 6	1.00	4.92
M 7	1.00	5.92
M 8	1.25	6.65
M 9	1.25	7.65

- i. Select the correct tap drill size in milli-meters for the manufacturing of an inside thread for an M8 Bolt.

(1)

- ii. Select the correct bolt that has a similar distance between threads as the M8 bolt.

(1)

6

Please turn the page.

Question 2

K-5 (8 marks)

a. List **FOUR** different mechanical systems that use ratchets.

System 1: _____ (0.5)

System 2: _____ (0.5)

System 3: _____ (0.5)

System 4: _____ (0.5)

b. Outline the function of the parts of the ratchet system given in Figure 1 below.



Figure 1: Ratchet and pawl mechanism
(Source: <https://en.wikipedia.org/wiki/Pawl>)

Gear wheel:

_____ (1)

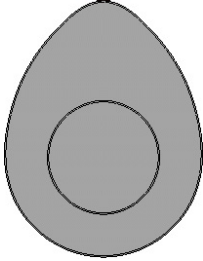
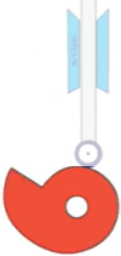
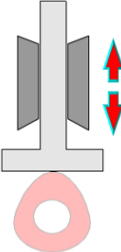
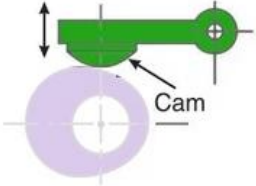
Pawl:

_____ (1)

b. Identify the cams and followers in different systems given in Table 2 below. Use terms from the ones provided below.

spherical	drop	eccentric	plate	pear	roller
-----------	------	-----------	-------	------	--------

Table 2: Cam and follower systems

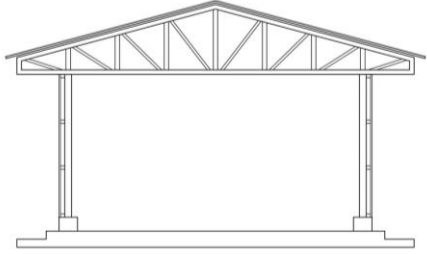
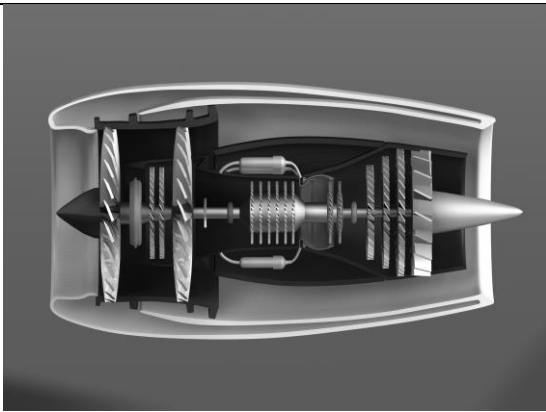
i.	 <p>(Source: https://www.momentogp.com)</p>	<p>_____ (0.5)</p>
ii.	 <p>(Source: https://www.technologystudent.com/)</p>	<p>_____ (0.5)</p>
iii.	 <p>(Source: https://www.technologystudent.com/)</p>	<p>_____ (0.5)</p>
iv.	 <p>(Source: https://extrudesign.com/)</p>	<p>_____ (0.5)</p>

Question 4

K-3 (8 marks)

a. Identify the **TWO** types of Structures given in Table 3 below.

Table 3: Pulleys

	Structure	Name of Structure
i.	 <p>VectorStock® <small>VectorStock.com/23271538</small></p> <p>(Source: VectorStock.com/23271538)</p>	<p>_____ (1)</p>
ii.	 <p>(Source: https://www.highend3d.com/)</p>	<p>_____ (1)</p>

b. Label parts A and B in the structure shown in Figure 4 below.

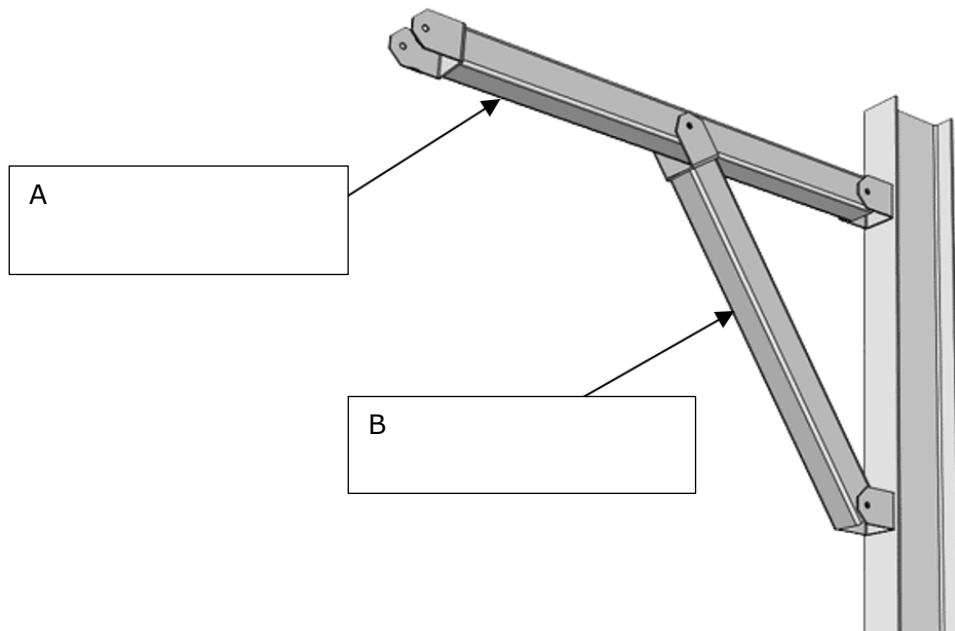


Figure 4: Structure
(Source: <https://civildigital.com/>)

(2)

c. Describe the function of the parts labelled A and B in Figure 4 in Question 4b.

(4)

8

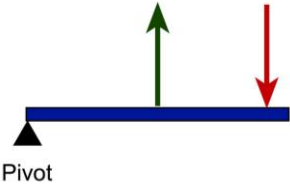
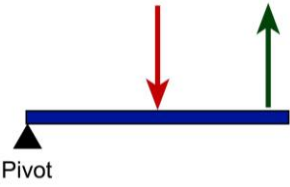
Please turn the page.

Question 5

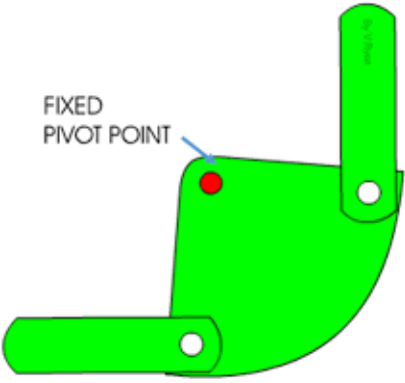
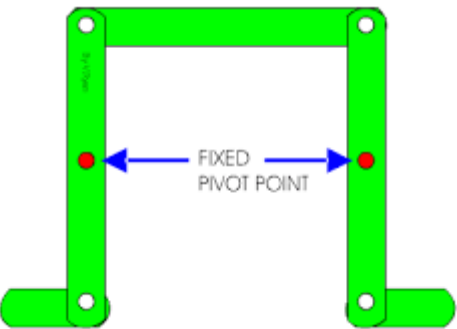
K-8 (8 marks)

a. Label the lever classes given in Table 4.

Table 4: Level Classes

	Lever Class	Lever Systems (E – Effort, L – Load, F – Fulcrum)
i.	<hr/> <p style="text-align: right;">(1)</p>	<div style="text-align: center;"> <p>Effort Load</p>  <p>Pivot</p> <p><i>(Source: https://i.pinimg.com/)</i></p> </div>
ii.	<hr/> <p style="text-align: right;">(1)</p>	<div style="text-align: center;"> <p>Load Effort</p>  <p>Pivot</p> <p><i>(Source: https://i.pinimg.com/)</i></p> </div>

b. Identify the **TWO** different types of linkages in the lever systems shown in Figure 5 and Figure 6.

Lever systems	Type of linkage
 <p>Figure 5: Lever system 1</p>	<p>(1)</p>
 <p>Figure 6: Lever system 2</p>	<p>(1)</p>

c. Describe the output of the linkage system given in Figure 7.

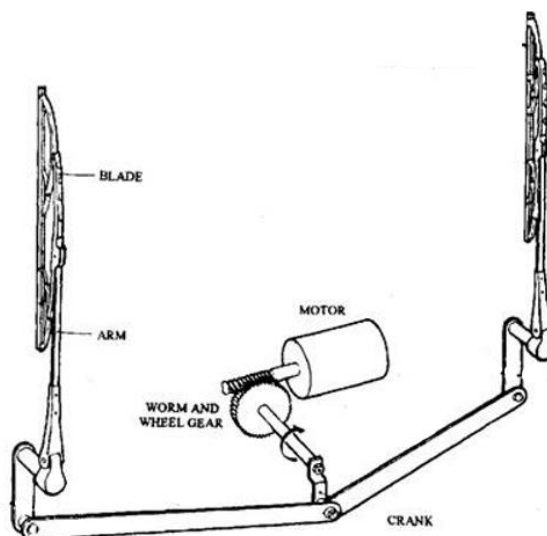


Figure 7: Windows Wipers
 (Source: <http://lh4.ggpht.com/>)

This question continues on next page.

8

(4)

Question 6

C-1 (12 marks)

a. Figure 8 below, shows a suspension bridge structure.

i. Outline the force that the main cables are experiencing due to the bridge deck.

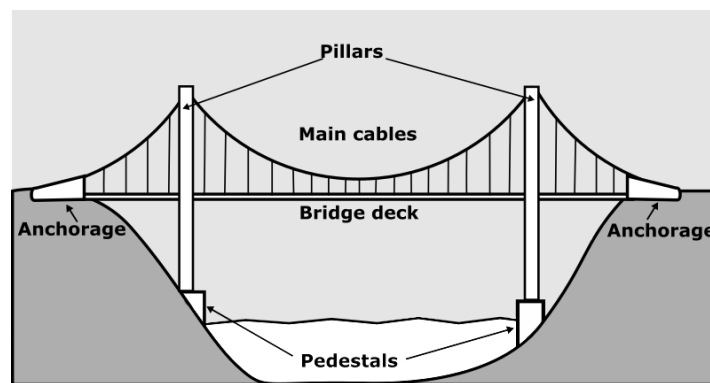


Figure 8: Bridge Structure
(Source: <https://openclipart.org/detail/316594/suspension-bridge-english>)

(2)

ii. Outline the force that the Pillars are experiencing.

(2)

b. Figure 9 shows two pulley setups. Explain the forces F_1 and F_2 when lifting the 200N load.

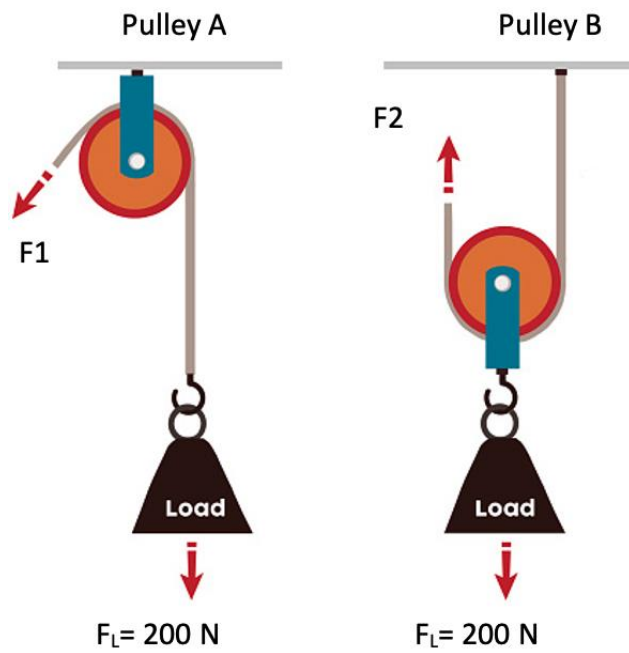


Figure 9: Pulley Setup
(Source: <https://media.istockphoto.com/>)

(4)

This question continues on next page.

Blank Page

Blank Page