Index Number:_____ SEAC03/s2.25s

L-Università ta' Malta

MATRICULATION AND SECONDARY EDUCATION CERTIFICATE EXAMINATIONS BOARD

SECONDARY EDUCATION APPLIED CERTIFICATE LEVEL
2025 SUPPLEMENTARY SESSION

SUBJECT:	**Engineering Technology**
PAPER NUMBER:	Synoptic – Unit 2
DATE:	4th November 2025
TIME:	8:30 a.m. to 10:35 a.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. The use of non-programmable electronic calculators is allowed. You may answer either in English or in Maltese.

Scenario

- A test is being done to all technicians working in the manufacture of mechanical engineering.
- The following test is distributed to all technicians, to assess their skills.

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.

Pitch: _____

_____ (1)

Diameter:

_____

_____ (1)

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

Table 1: Part of thread chart

Nominal Diameter (mm)	Pitch (mm)	Tap Drill Size (mm)
M 2	0.4	1.57
M 2.2	0.45	1.71
M 2.5	0.45	2.01
M 3	0.5	2.46
M 3.5	0.6	2.85
M 4	0.7	3.24
M 4.5	0.75	3.69
M 5	0.8	4.13
M 6	1	4.92
M 7	1	5.92
M 8	1.25	6.65

i. Interpret information from Table 1 above to select the correct tap drill size in milli-meters for the manufacturing of an inside thread for an M6 Bolt.

_____ (1)

ii. Select the correct bolt that has a similar distance between threads as the M6 bolt.

_____ (1)

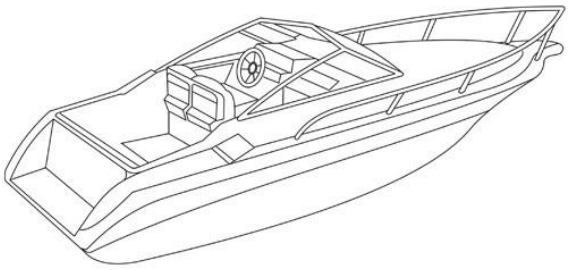
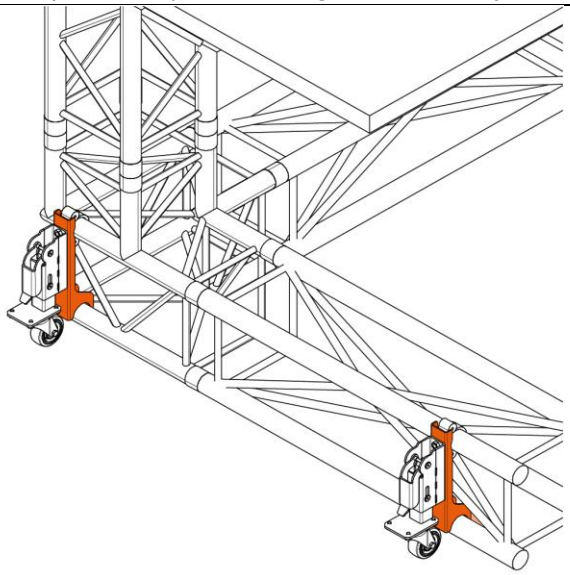
6

Question 2 **K-3 (8 marks)**

a. Identify the **TWO** types of structures given in Table 2. Use types from the ones provided below.

Shell	Solid	Frame

Table 2: Different types of structures

	Structure	**Type of Structure**
i.	 *(Source:https://cdn11.bigcommerce.com)*	_____ (1)
ii.	 *(Source: https://www.admiralstaging.com)*	_____ (1)

This question continues on next page.

b. Label parts A and B in the structure shown in Figure 1.

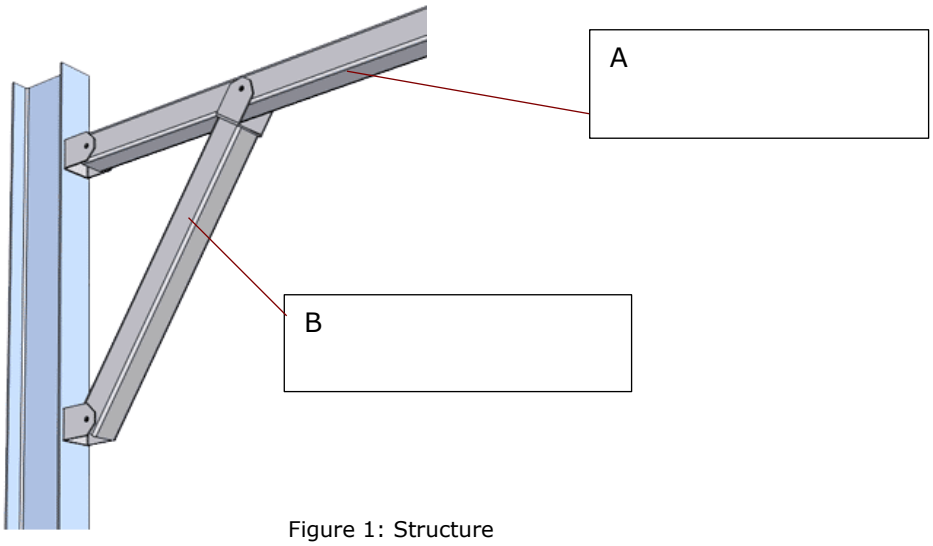


Figure 1: Structure

(Source: https://images.app.goo.gl/6ct4APZPSoJaM7UG9)

(2)

c. Describe the function of the parts labelled A and B in Figure 1 in Question 2b.

_____

_____

_____

_____

_____

_____

_____

_____(4)

8

Question 3 **K-5 (8 marks)**

a. List **TWO** different mechanical systems that use ratchets, apart from a jack and socket ratchet.

System 1: _____ (1)

System 2: _____ (1)

b. Outline the function of the following parts of the ratchet system.

Pawl: _____

_____(1)

Gear wheel: _____

_____(1)

c. Describe the use of ratchet systems in a:

Jack:

_____

_____

_____

_____

_____(2)

Socket ratchet:

_____

_____

_____

_____

_____(2)

8

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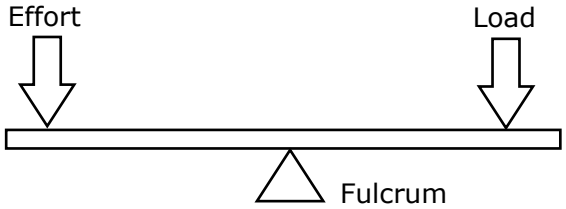
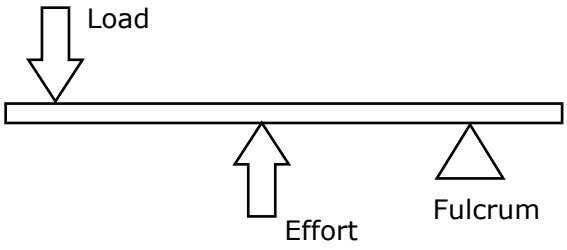
Question 4 **K-8 (8 marks)**

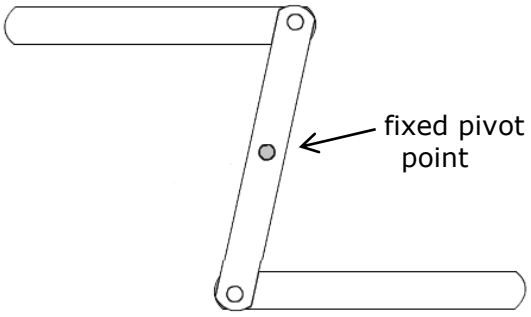
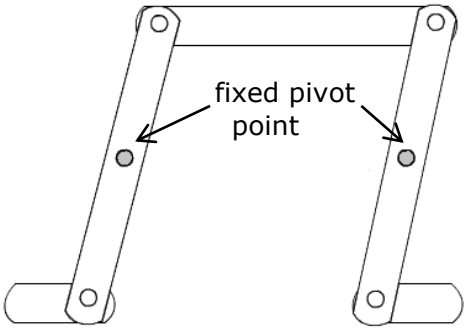
a. Label the **TWO** lever classes given in Table 3.

Table 3: Lever Classes

	Lever Class	**Lever Systems**
i.	_____ (1)	
ii.	_____ (1)	

b. Identify the **TWO** types of linkages in the lever systems shown in Table 4.

Table 4: Different linkages

	
i.	ii.

(2)

c. Describe the output of the linkage systems A and B given in Figure 2.

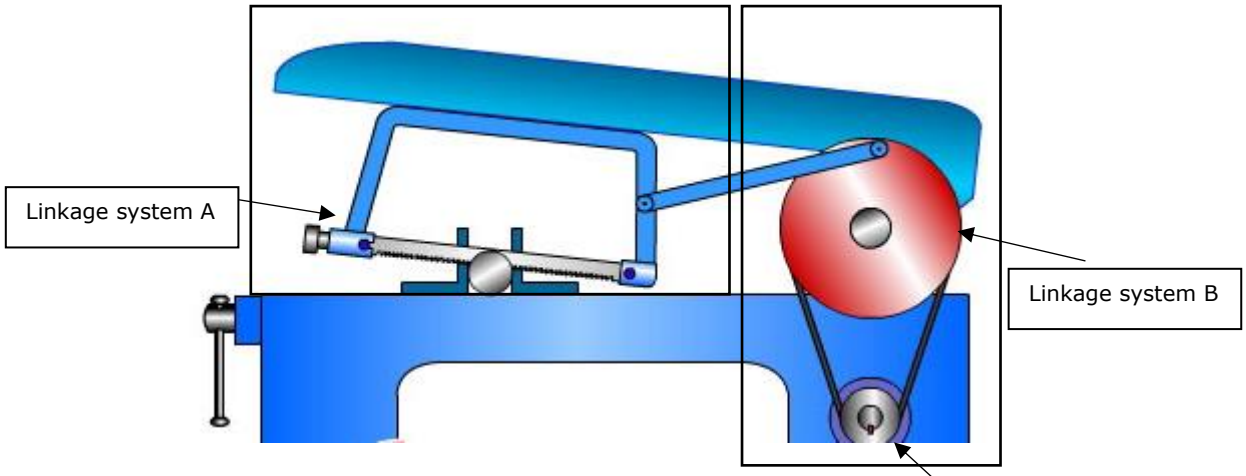


Figure 2: Power Hacksaw
(Source: https://www.notesandsketches.co.uk/)

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_____ (4)

8

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Question 5 **K-6 (8 marks)**

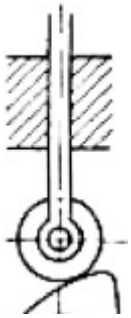
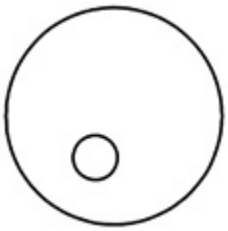
a. Name **TWO** different parts of a cam and follower system.

i. Part 1: _____ (1)

ii. Part 2: _____ (1)

b. Identify the cams and followers in the different systems given in Table 5 below.

Table 5: Cams and followers

	i. _____ (1)
	ii. _____ (1)

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

c. Describe **TWO** motions in the cam and follower system of Figure 3.

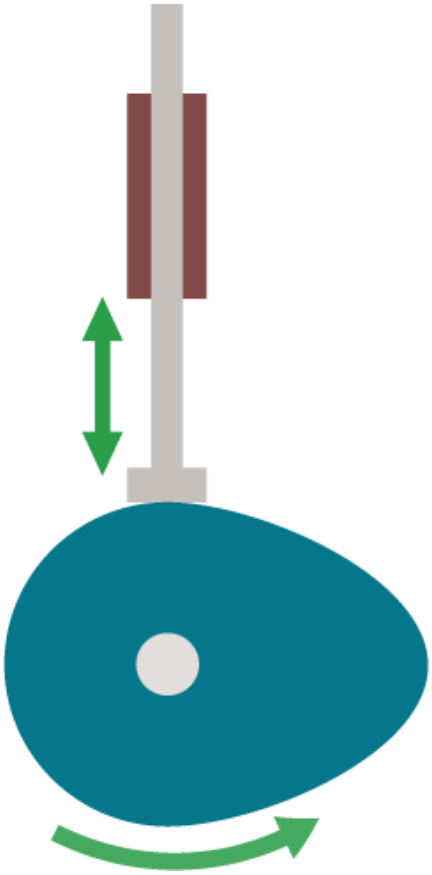


Figure 3: Cam and Follower System
(Source: https://www.bbc.co.uk/bitesize/guides/)

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_____

_____

_____

_____ (4)

8

Please turn the page.

Question 6 **C-2 (12 marks)**

a. Determine the gear ratio for the following gear system. Show all your working.

Driver	30 teeth
Driven	90 teeth

_____

_____

_____

_____(4)

b. Describe the following gear system in terms of tooth height and pitch.

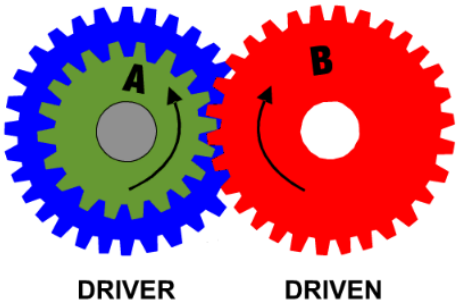

Figure 4: A gear system
(Source: http://mrsmear.weebly.com/pulleys-and-gears.html)

Pitch

_____

_____

_____

_____(2)

Tooth Height

_____

_____

_____

_____(2)

c.
- The design of a gear system is tabulated below.
- This gear system is designed to have a fast rotating gear connected to a fan turbine.
- A handle is attached with gear A, while the fan turbine is attached with gear D.

Justify why this design is appropriate for this job.

	A	**B**	**C**	**D**
Teeth Number	190 teeth	100 teeth	50 teeth	20 teeth
Speed	65 rpm	225 rpm	225 rpm	800 rpm
Direction	Anti-Clockwise	Clockwise	Clockwise	Anti-Clockwise

_____

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_____

_____

_____

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_____(4)

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