



**L-Università
ta' Malta**

MATRICULATION AND SECONDARY EDUCATION CERTIFICATE
EXAMINATIONS BOARD

**SECONDARY EDUCATION APPLIED CERTIFICATE LEVEL
2023 SUPPLEMENTARY SESSION**

SUBJECT: **Engineering Technology**
 PAPER NUMBER: Synoptic – Unit 2
 DATE: 2nd November 2023
 TIME: 5:30 p.m. to 7:35 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 company needs to assess the employed technicians in terms of mechanical knowledge.
- The following test is distributed to all technicians.

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 part of a thread chart. All the values in the table are in millimeters. Interpret Table 1 to select the correct tap/die to manufacture M17 bolt and nut. Give your answers to three decimal points.

Table 1: Part of thread chart

NOM. THREAD DIA.	PITCH P	MAJOR DIA. D d	PITCH DIA. D2 d2	MINOR DIA. D1 d1	NOM. THREAD DIA.	PITCH P	MAJOR DIA. D d	PITCH DIA. D2 d2	MINOR DIA. D1 d1	NOM. THREAD DIA.	PITCH P	MAJOR DIA. D d	PITCH DIA. D2 d2	MINOR DIA. D1 d1
M 0.3	0.08	0.300	0.248038	0.213397	M 17	1.5	17.000	16.025721	15.376202	M 52	5	52.000	48.752405	46.587341
M 0.35	0.09	0.350	0.291543	0.252572		1		16.350481	15.917468		4		49.401924	47.669873
M 0.4	0.1	0.400	0.335048	0.291747	M 18	2.5	18.000	16.376202	15.293671		3		50.051443	48.752405
M 0.45	0.1	0.450	0.385048	0.341747		2		16.700962	15.834936		2		50.700962	49.834936
M 0.5	0.125	0.500	0.418810	0.364684	1.5	M 20	20.000	17.025721	16.376202	1.5	51.025721	50.376202		
M 0.55	0.125	0.550	0.468810	0.414684	1			17.350481	16.917468	4	52.401924	50.669873		
M 0.6	0.15	0.600	0.502572	0.437620	2.5	M 22	22.000	18.376202	17.293671	M 55	3	55.000	53.051443	51.752405
M 0.7	0.175	0.700	0.586334	0.510557	2			18.700962	17.834936		2		53.700962	52.834936
M 0.8	0.2	0.800	0.670096	0.583494	1.5			19.025721	18.376202	1.5	54.025721	53.376202		
M 0.9	0.225	0.900	0.753858	0.656430	1	M 56	56.000	19.350481	18.917468	5.5	52.427645	50.046075		
M 1	0.25	1.000	0.837620	0.729367	2.5			20.376202	19.293671	4	53.401924	51.669873		
	0.2		0.870096	0.783494	2			20.700962	19.834936	3	54.051443	52.752405		
					1.5			21.025721	20.376202	2	54.700962	53.834936		

(Source: <https://www.slideshare.net/ClimenteAlin/filete-basic-dimensions-isor-7241968>)

Pitch Bolt: _____

Pitch Nut: _____

Major Diameter: _____

Minor Diameter Bolt: _____

Minor Diameter Nut: _____

(2) 6

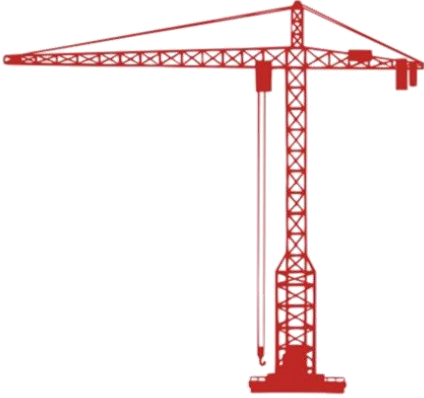

Question 2

K-3 (8 marks)

a. Identify the **TWO** types of structures given in Table 2.

frame	solid	shell
-------	-------	-------

Table 2: Different types of structures

	Structure	Type of Structure
i.	 (Source: www.seekpng.com)	_____ _____ (1)
ii.	 (Source: http://atlas-content-cdn.pixelsquid.com/)	_____ _____ (1)

This question continues on next page.

Question 3

K-4 (8 marks)

a. Name **FOUR** different types of gears.

Type 1: _____ (0.5)

Type 2: _____ (0.5)

Type 3: _____ (0.5)

Type 4: _____ (0.5)

b. Outline the function of the driver and the driven part in a gear system.

Driver: _____
_____ (1)

Driven: _____
_____ (1)

c. Describe the outcome of the gear system shown in Figure 2.

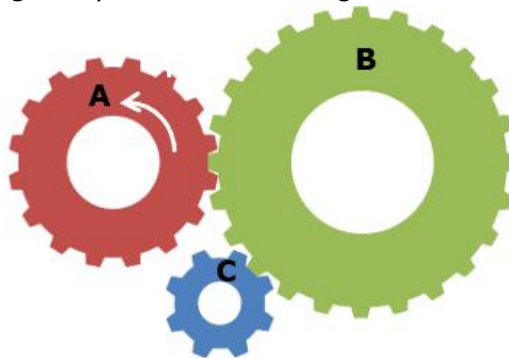


Figure 2: Gear system
(Source: <https://w7.pngwing.com/>)

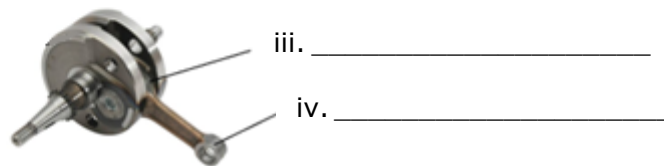
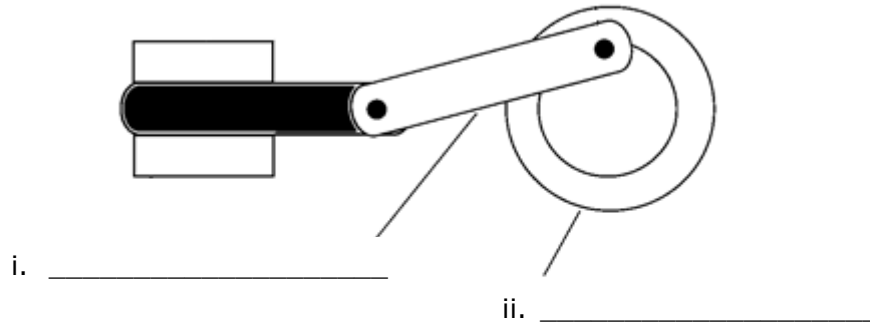
_____ (4)

8

Question 4

K-7 (8 marks)

a. Label the following crank assemblies and their parts.



(Source: qxf2.com; amazon.com)

(2)

b. Determine the reciprocating distance of a crank assembly in Figure 3, if the distance between the centre of the main journal of the flywheel and the crank pin is 54 cm.

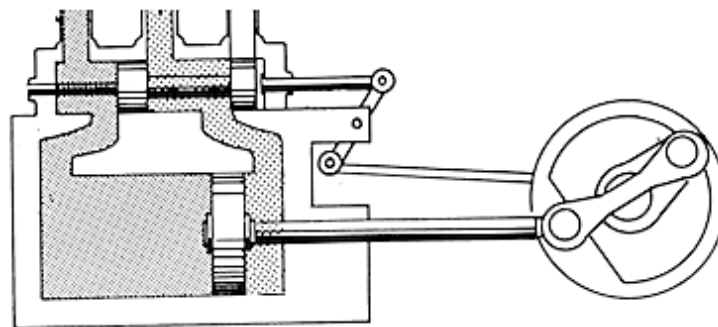


Figure 3: Steam crank assembly
(Source: study.com)

(2)

Question 5

K-8 (8 marks)

a. Label the lever classes given in Table 3.

Table 3: Lever Classes

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

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

Table 4: Different linkages

i.	ii.

(2)

Question 6

C-2 (12 marks)

a. Determine the gear ratio of the following gear system, in Table 5. Show all your working.

Table 5: Gear system setup

Driver: 120 teeth Driven: 60 teeth	(4)
---------------------------------------	-----

b. Describe the gear system given in Figure 6 in terms of diameter and pitch.

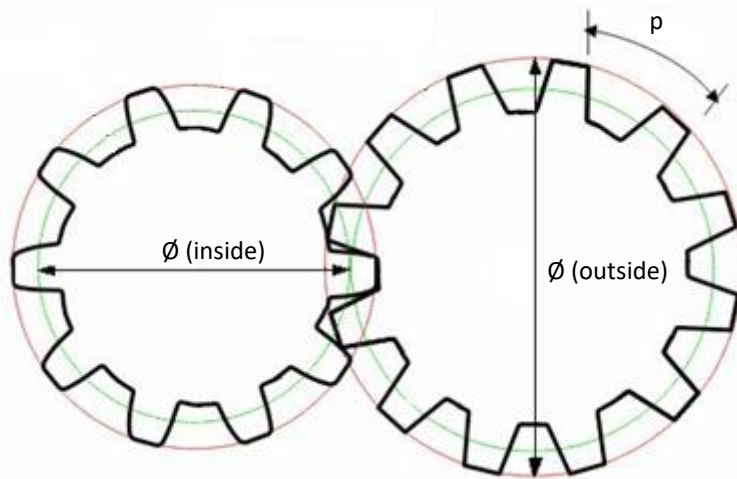


Figure 6: Gear system

(4)

Blank Page