CAMEROON GENERAL CERTIFICATE OF EDUCATION BOARD

Technical and Vocational Education Examination

JUNE XXXX **INTERMEDIATE LEVEL**

Subject Title	**MECHANICAL DRAWING**
Subject Code No.	**5145**
Paper No.	**TWO**

DURATION: 3 HOURS

You are reminded of the necessity for good English and orderly presentation in your answers.

RECOMMENDATIONS

- *No document is authorized;*
- *The work to be done comprises two independent parts:*
  - **PART I : Technological study** (20 MARKS) and
  - **PART II : Graphical study** (30MARKS)
- Make sure you have been distributed 6 sheets numbered from 1/8 to 8/8; the answer sheets from 5/8 to 8/8 are to be handed to the examiner at the end of the paper ,filled or not.
- The candidate will answer **5 out of 7** questions in Technological study.
- All the questions of PART I HAVE THE SAME MARKS WHCH IS 4
- **All the candidates** shall answer ALL the question in part 2
- This paper is rated at 60% of the entire subject

This paper aims at evaluating the candidates in the following competences:

- Identifying and interpreting mechanical links
- Identifying and interpreting a power transmission device between two shafts
- Identifying and interpreting a guiding in a mechanism
- Representing/Interpreting a complex piece taken from a functional mechanism

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THEME: GEAR BOX OF A MODEL LIFT

SET UP

The assembly drawing proposed represents the gear box of a model lift. These include a couple of conic gears **12** and **21**. The rotational motion of the pulley **5** is transmitted to the toothed wheel **5** by the intermediary of the return pinion 21. The global function of this mechanism is to transmit power between the perpendicular shafts. The left view is the assembly of the pieces {7, 13, 30, 24, and 26}.

PART I: Technological study (20 marks)

Question 1: Naming and functioning of parts (4 marks)

1. a) Give the names of pieces **1** and **4** (2 marks)
1. b) Give the functions of pieces **1** and **4** (2 marks)

Question 2: Fits and tolerances (4 marks)

The rotational link between the pinion **21** and the tooth wheel **24** is realized by the rod in the groove with fitting given by 25H8/e9. Use Ø25H8 = $25^{+0.033}_{0}$ and Ø25e9 = $25^{-0.040}_{-0.092}$

2. a) Calculate the maximum and minimum clearances. (2 marks)
2. b) Give your conclusion. (2 marks)

Question 3: Designation of fasteners (4 marks)

3. a) Give the name of the piece **30**. (1 mark)
3. b) Normalized designation of the piece **30**. (1 mark)
3. c) Give its function on the assembly (2 marks)

Question 4: Lubrication and sealing (4 marks)

4. a) Say whether the mechanism can be lubricated and justify (1.5 marks)
4. b) Observe the assembly {16, 17, 18} and give its function (1.5 marks)
4. c) Which lubricate can be used? (1 mark)

Question 5: Knowledge of materials (4 marks)

On the parts list, some materials have the following designation E360 and 37 Cr 4.

5. a) Which type material is designated as E 360? (1 mark)
5. b) Give the description of symbols in E360 (1.5 marks)
5. c) Give the description of symbols in 37 Cr 4. (1.5 marks)

Question 6: Links (4 marks)

Piece **5** and **12** are linked together during functioning

6. a) List the pieces that help to maintain them in rotational motion (1.5 marks)
6. b) List the pieces that help to maintain them in translation motion (1.5 marks)
6. c) Apart from a parallel key to guide a pulley in rotation, which other element can be used? (1 mark)

Question 7: Functional dimensioning (4marks)

7. a) Justify the need for the conditions $\mathbf{J_A}$ and $\mathbf{J_B}$ (1 mark)
7. b) Establish the chain of dimensions relative to the two conditional dimensions $\mathbf{J_A}$ **and** $\mathbf{J_B}$. (3 marks)

PART II: Graphical study (30 marks)

II-1: Draw at scale 1:1, on the pre-printed A4V, the cage **7** on: **(20 marks)**

- Face view half section A-A (9 marks)
- Left Half view (6 marks)
- Top view half section (7 marks)

II-2: Draw at scale 1:1, on the pre-printed A4V, the pinion **12** on: **(10 marks)**

- Face view showing the partial sections (6 marks)
- The view section B-B at the level of the key seat (4 marks)

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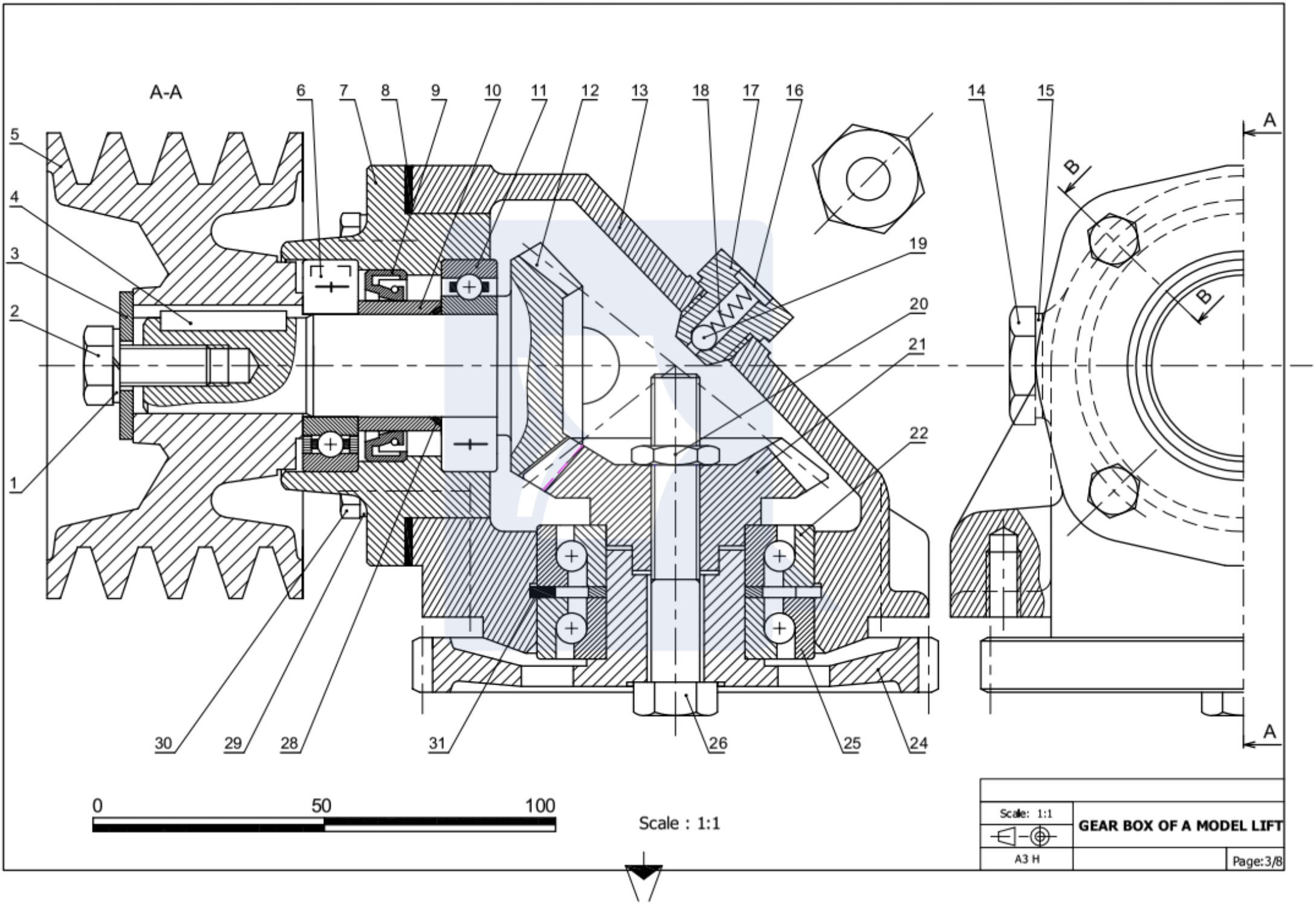
A-A
A
B
B
A
1
2
3
4
5
6
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100
Scale : 1:1
Scale: 1:1
GEAR BOX OF A MODEL LIFT
A3 H
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Rep	Nber	Designation	Material	Observations
31	1	Retaining ring		
30	4	.....		
29	4	Washer W - 8		
28	1	Seal 30x2		
27	1	Packing	16 NC 6	
26	1	Screw H M14-85/60		With a hole of ϕ 25
25	1	Bearing 40 BC 02 (1 seal)		40 x 80 x 18
24	1	Helicoidal toothed wheel	37 Cr 4	
23	1	Internal retaining ring 80		
22	2	Bearing 40 BC 02		40 x 80 x 02
21	2	Return pinion	37 Cr 4	
20	1	Nut M14		
19	1	Ball 1/4		
18	1	Spring		ϕ 7 x 0,5 x 30
17	1	Cork	E 295	
16	1	Pastille	E 295	
15	1	Metalloplastic seal of 20		
14	2	Cork M20x1,5		
13	1	Casing	Ft 22	
12	1	Pinion of cammand	37 Cr 4	
11	1	Bearing 30 BC 02		30 x 62 x 16
10	1	Packing	16 NC 6	
9	1	Seal ring		38 x 56 x 12
8	1	.....		
7	1	Bearing cage	Ft 22	
6	1	Bearing 30BC 02 (2 seals)		30 x 62 x 16
5	1	Pulley	E 275 M	
4	1	.....		
3	1	Washer	E 360	
2	1	Screw H M12-28		
1	1	.....		

Scale : 1:1	MINESEC - CGCE BOARD	
A4V	PART LIST	Mechanical Drawing
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ANSWER SHEET

Question 1: Naming and Functions of parts

1. a) Name of **1** ……
   Name of **4** ……
1. b) Function of **1**……
   Function of **4** ……

Question 2: Fits and tolerances

2. a) Calculation of the maximum and minimum clearances.

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……
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……

2. b) Give your conclusion

……
……..

Question 3: Designation of fasteners

3. a) Name of piece **30:** ……
3. b) Normalized designation of piece **30:** ……
3. c) Its function on the assembly:
   ……
   ……..

Question 4: Lubrication and sealing

4. a) Say whether the mechanism can be lubricated and justify

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……..

4. b) Function the assembly {**16**, **17**, **18**}.

……
……
……

4 c) Which lubricate can be used?

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……

Question 5: Knowledge of materials

5. a) Type of material designated as **E360**:

……
……

5. b) Description of **E360**

E :……..
360:…….....

5 c) Description of **37Cr4**.

37: ……
Cr: ……
4: ……

Question 6: Links

Piece **5** and **12** are linked together during functioning

6. a) List the pieces that help to maintain them in rotational motion

……

……...

6. b) List the pieces that help to maintain them in translation motion

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……

6. c) How does pieces 1 help in the link?

……

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Question 7: Functional dimensioning

7. a) Justify the need for the conditions $\mathbf{J_A}$ and $\mathbf{J_B}$

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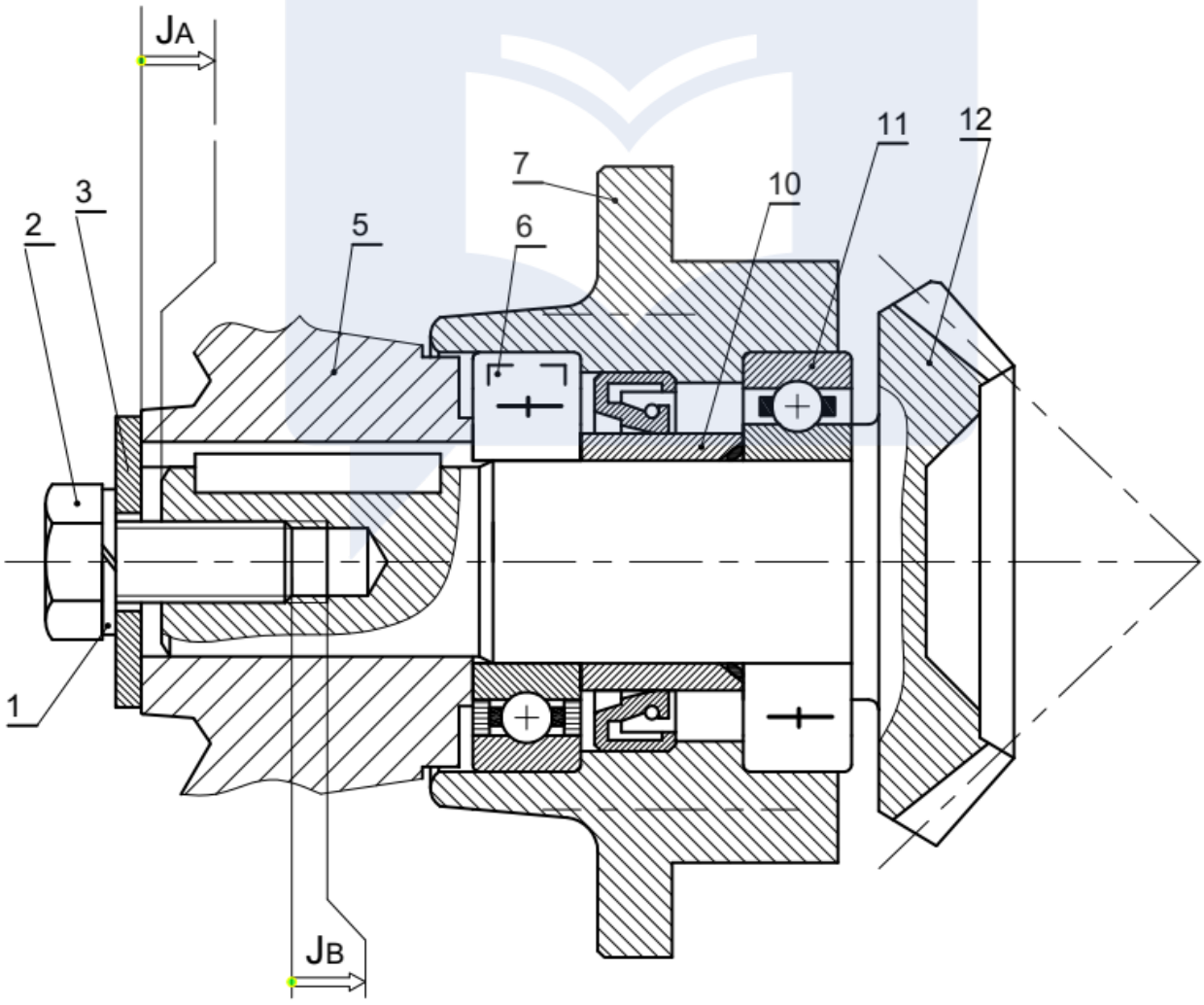
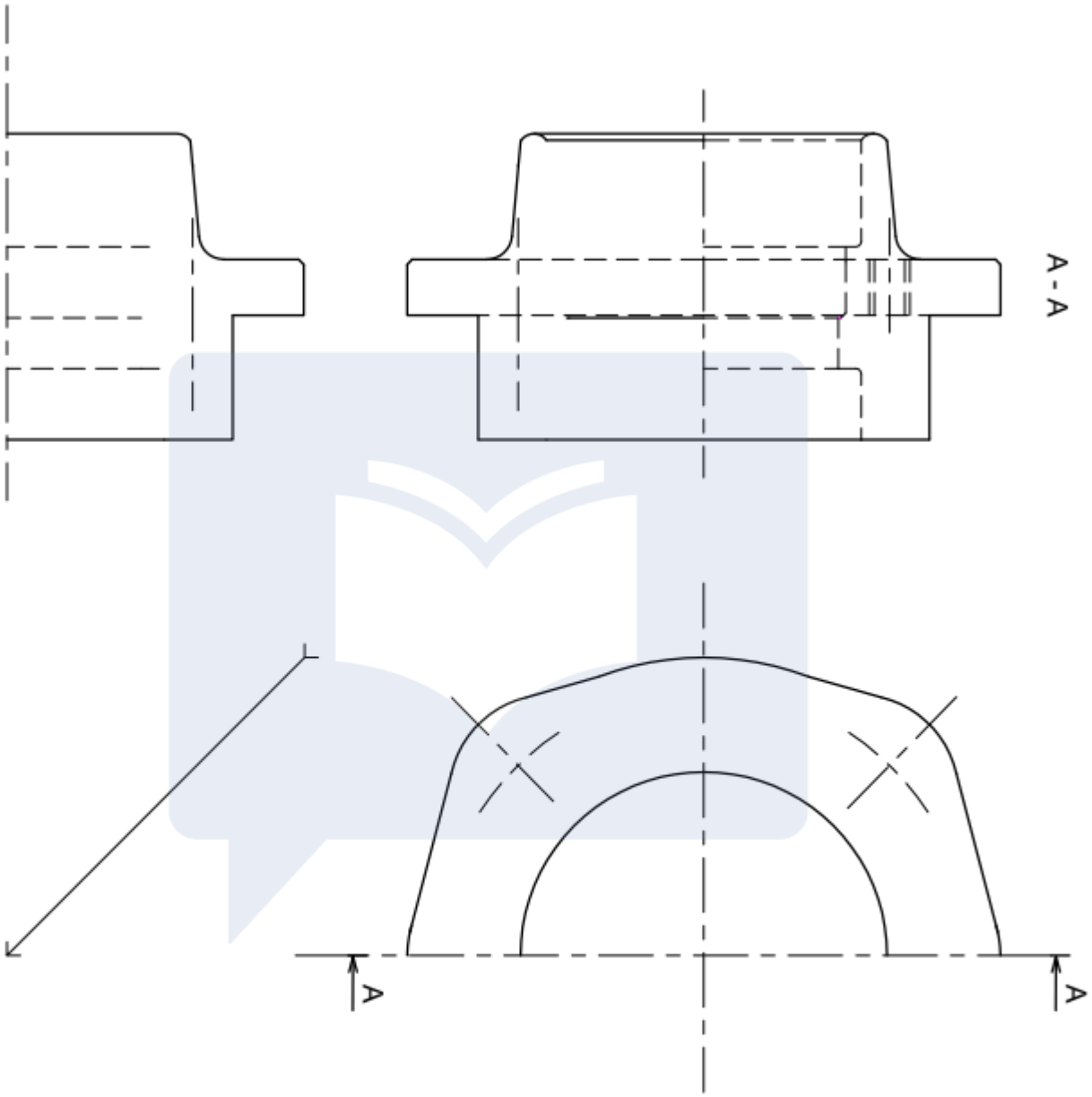
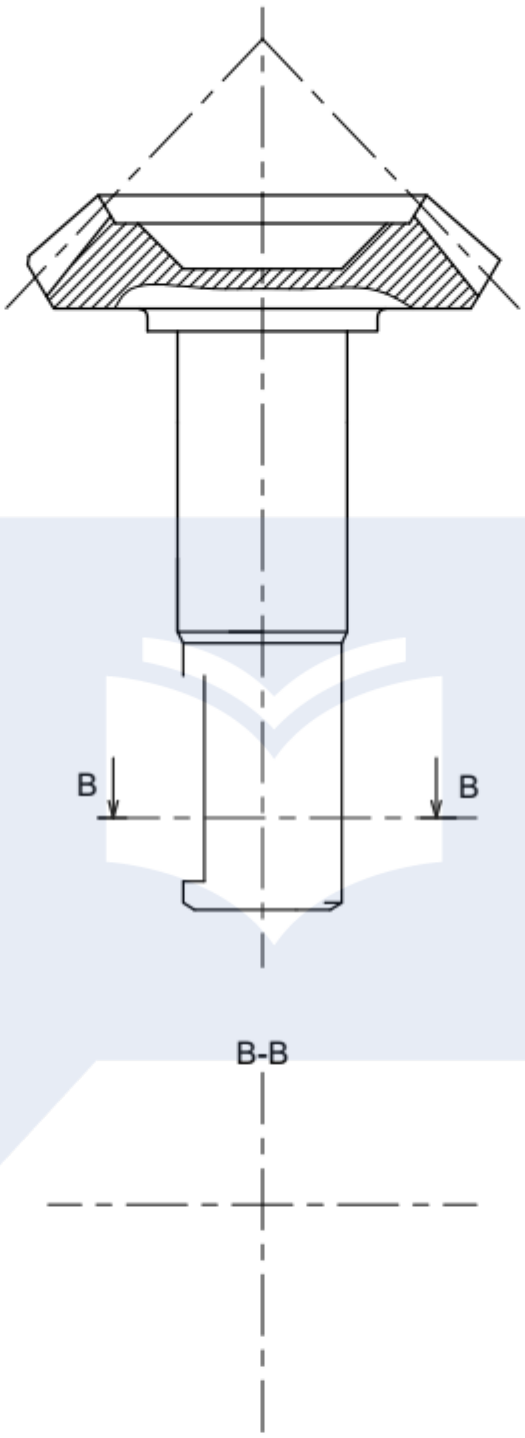
7. b) Establishment of the chain of dimensions relative to the two conditional dimensions $\boldsymbol{J_A}$ and $\boldsymbol{J_B}$





Scale : 1:1	MINESEC - CGCE BOARD	
	CASING 7	Mechanical Drawing
A4H		Page: 7/8



Scale : 1:1	MINESEC - CGCE BOARD	
	PINION 12	Mechanical Drawing
A4V		Page: 8/8