STAPEL

education

Department of Education
FREE STATE PROVINCE

PROVINCIAL PAPER

GRADE 12

ENGINEERING GRAPHICS AND DESIGN P2

SEPTEMBER 2018

MARKS: 100
TIME: 3 HOURS

This paper consists of 6 pages.

INSTRUCTIONS AND INFORMATION

1. This question paper consists of FOUR questions.
2. Answer ALL the questions.
3. ALL drawings are in third-angle orthographic projection, unless stated otherwise.
4. ALL drawings must be drawn to scale 1:1, unless stated otherwise.
5. ALL questions must be answered on the DIAGRAM SHEETS, as instructed.
6. ALL the pages must be restapled in numerical sequence, irrespective of whether the question was attempted or not.
7. Time management is essential in order to complete all the questions.
8. Print your name and surname as well as the grade in the space provided on each page.
9. ALL answers must be drawn accurately and neatly.
10. ALL necessary construction and projection lines must be shown.
11. Plan each drawing carefully from the given position, which is indicated on the diagram sheets.
12. Any details or dimensions not given must be assumed in good proportion.

FOR OFFICIAL USE ONLY								
QUESTION	MARKS OBTAINED			½	MODERATED			½
1								
2								
3								
4								
TOTAL								
	2	0	0		2	0	0	

FINAL CONVERTED MARK	CHECKED BY
100	

NAME & SURNAME		GRADE		1

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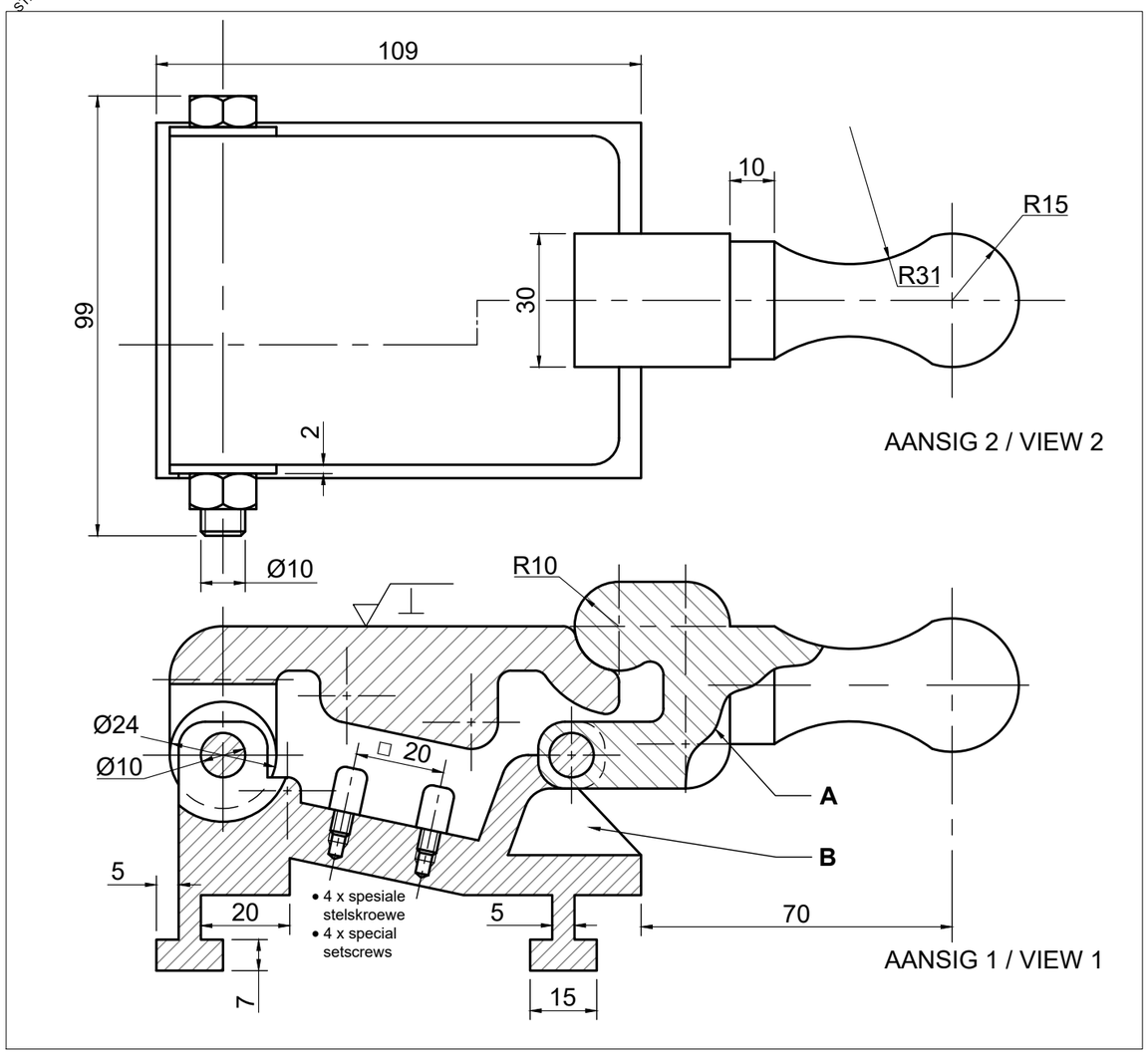


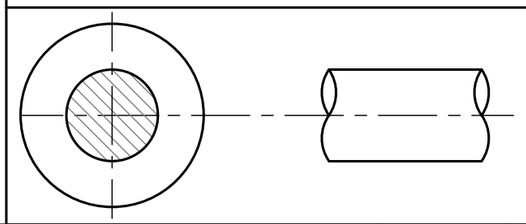
QUESTION 1: ANALYTICAL (MECHANICAL)

Given:
The working drawings of a clamp device in third-angle orthographic projection, a title block and a table of questions.

Instructions:
With a pencil, complete the table by neatly printing the correct answers in the corresponding answer column. All the questions refer to the accompanying drawings and the title block on diagram sheet 1. **[27]**

QUESTIONS		ANSWERS			
1	On which date was this drawing approved?		1		
2	What is the manufacturing company`s name?		1		
3	What treatment process must be applied on the clamp device?		1		
4	What is the name of the drawing file?		1		
5	How many clamp devices should be manufactured?		1		
6	What is VIEW 1 called?		1		
7	What size bolt & nut should be used to bind the upper jaw with the lower jaw of the clamp?		1		
8	What is the thickness of the washers that was used?		1		
9	Name the section line marked A.		1		
10	Why is the area at B not hatched?		1		
11	How many special setscrews must be attached at each part?		1		
12	What distance should the setscrews be apart from each other?		1		
13	What is the total length of the assembled clamp device?		2		
14	On what date was the drawing drawn?		1		
15	Who checked the drawing?		1		
16	Indicate the cutting plane at VIEW 2.		3		
17	What drawing program was used?		1		
18	What is the title of the drawing?		1		
19	What material is used to manufacture the clamp?		1		
20	What is the total length of the hinge bolt?		1		
21	In the space provided (ANSWER 21), draw, in neat free hand, the convensional representation of a bearing.		4		
	TOTAL		27		

ANSWER 21



FILE NAME: AC 12-PQR-350	MATERIAL: CAST IRON		
DRAWING NUMBER: 7 CLAMP DEVICE WG CONTRACTORS 17 WESSEL STREET DURBAN	FINISH: CHROME PLATED DRAWING PROGRAM: AUTOCAD 2018 ALL UNSPECIFIED RADII ARE R3.	ALL DIMENSIONS ARE IN MILLIMETERS	
		DRAWN BY: DAVID MAHLANGA	2011/05/15
		CHECKED: PC SAMS	2011/05/25
PC ENGINEERING WORKS		APPROVED BY: ANN NKHOSI	2011/06/01
TITEL: CLAMP DEVICE		55 Aaron Street Emalahleni 1039 www.ace.co.za. Tel No: 089 000 2598	Manufacture 35 Clamp Devices

Please turn page over

STAPEL

0°

QUESTION 2: LOCI (Cam)

Given:
- The detail of the camshaft and a knife-edge (wedge-ended) follower on its lowest position.
- The starting position (0°) of the cam profile.

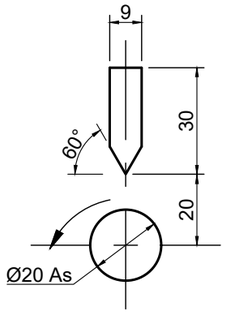
Specifications:
- Camshaft = Ø10 mm.
- Minimum distance from the cam profile to the center of the camshaft = 20 mm.
- Rotation = Clockwise.

The movement of the cam:
- For the first 30°, the follower rises with 15 mm of rotation with **uniform velocity**.
- The follower dwell for 15°.
- The follower rises with 50 mm over the following 120° by means of simple **harmonic motion** to a maximum displacement of 65 mm. Divide the 120° in six parts to determine the simple harmonic motion.
- The follower dwell for 15°.
- The follower returns with **uniform acceleration and retardation** to its original position.

Instructions:
- Draw, to a displacement scale of 1:1 with a horizontal scale of 30° = 8 mm, the complete displacement graph for the required motion.
- Draw the camshaft and follower detail.
- Project and draw the cam profile that would generate the given motion.

Note:
- Label the graph.
- Indicate the horizontal scale.
- Indicate the vertical scale.
- Show the direction of rotation.
- Show all construction lines.

[36]



ASSESSMENT CRITERIA				
1	CAM SHAFT ($\frac{4}{2}$)	2		
2	CAM FOLLOWER ($\frac{4}{2}$)	2		
3	MINIMUM DISTANCE ($\frac{2}{2}$)	1		
4	DIRECTION (Arrow / Degrees) ($\frac{2}{2}$)	1		
5	GRAPH (20)	20		
6	CAM PROFILE ($\frac{14}{2}$)	7		
7	NAMING OF GRAPH ($\frac{2}{2}$)	1		
8	SCALE (HORIZONTAL) ($\frac{2}{2}$)	1		
9	SCALE (VERTICAL) ($\frac{2}{2}$)	1		
TOTAL		36		

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QUESTION 3: ISOMETRIC DRAWING

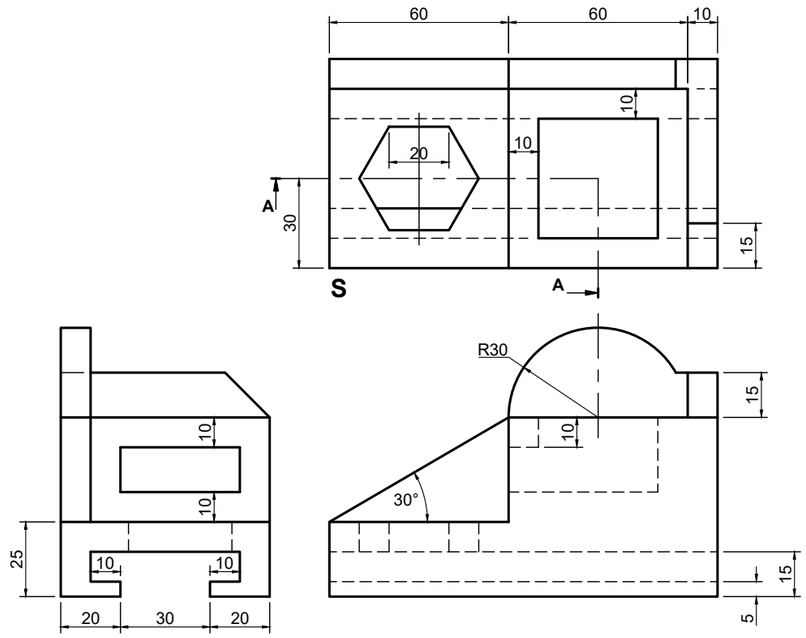
Given:

- The front view, top view and left view of a casting.
- The position of point S on the diagram sheet 3 (page 4).

Instructions:

Use a scale of 1:1 to convert the orthographic view of the casting into a sectional isometric drawing on cutting plane A-A.

- Make S the lowest point of the drawing.
- Show ALL necessary constructions.
- NO hidden detail is required. **[39]**



ASSESSMENT CRITERIA				
1	BASE ($\frac{64}{2}$)	32		
2	ISOMETRIC CIRCLE ($\frac{10}{2}$)	5		
3	AUXILIARY VIEW	4		
4	BACK ($\frac{10}{2}$)	5		
5	PLACEMENT WRONG (MAX -2)			
TOTAL		46		

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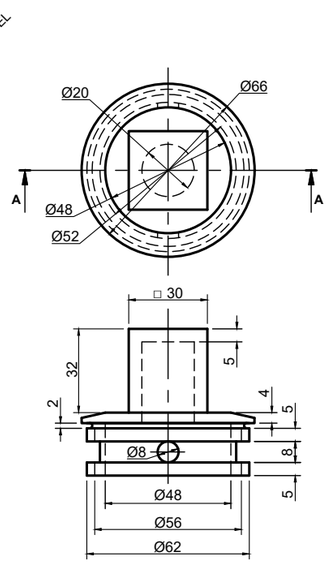
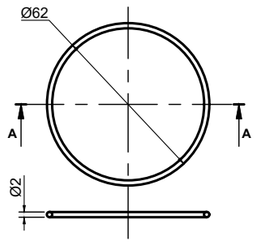
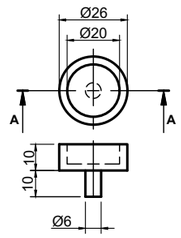
STAPEL



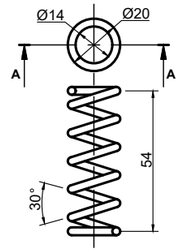
9 Threaded cap
Skroefdeksel



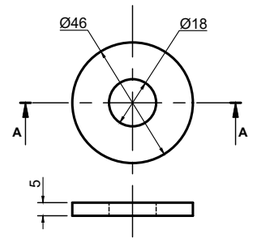
8 O-Ring
Seëlring



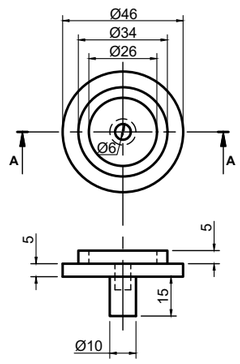
6 Balancing disk
Balanseerskyf



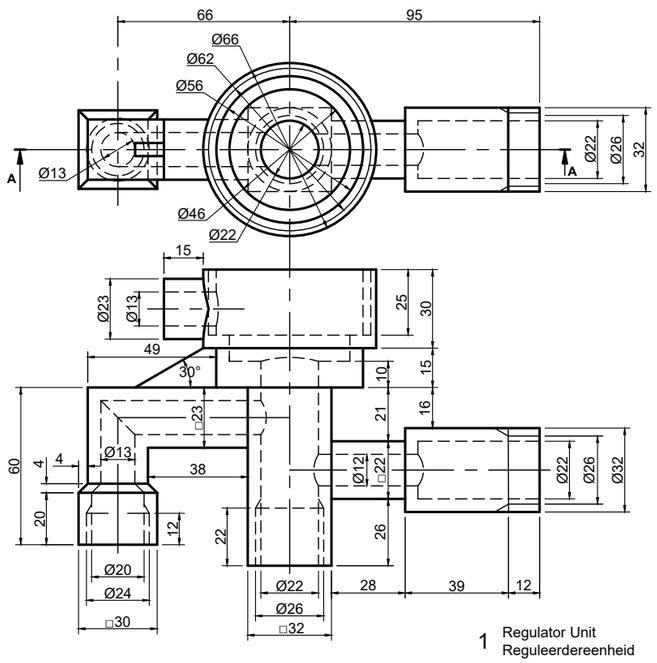
7 Cylindrical Spring
Silindrieseveer



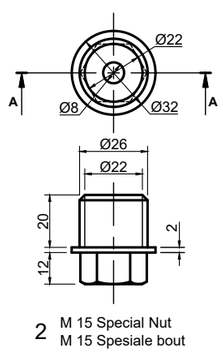
4 Diaphragm
Diafragma



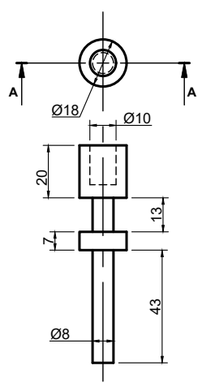
5 Pressure plate
Drukplaat



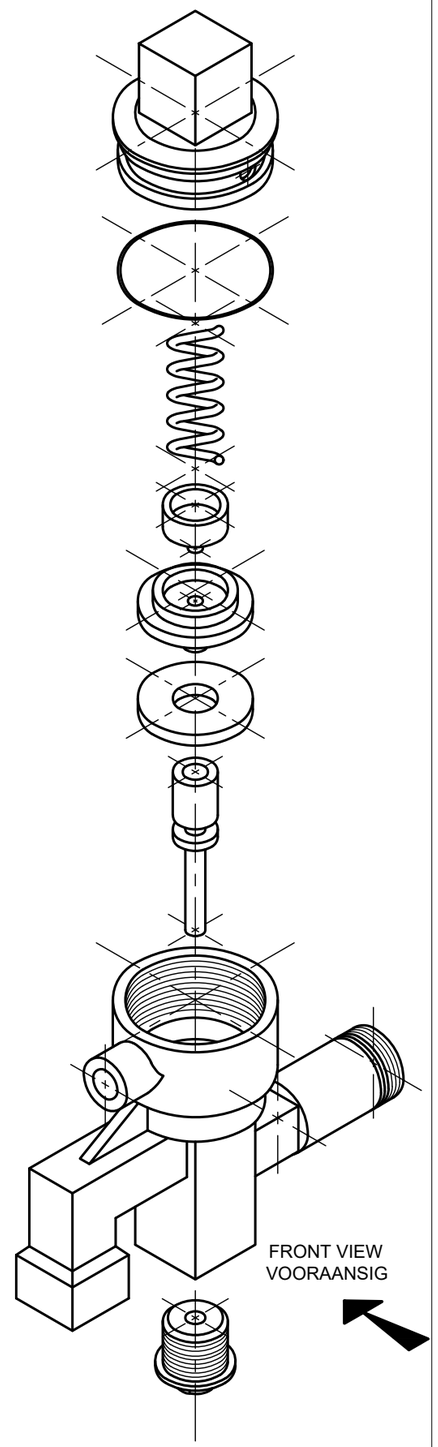
1 Regulator Unit
Reguleerdereenheid



2 M 15 Special Nut
M 15 Spesiale bout



3 Regulator Rod
Reguleerderstang



QUESTION 4: MECHANICAL ASSEMBLY

Given:

Diagram sheet 4:

- The exploded isometric drawing of the parts of a pressure control valve assembly, showing the position of each part relative to all the others.
- Orthographic views of each of the parts of the pressure control valve.

Diagram sheet 5:

- The top view, clearly showing the cutting plane AA.
- The center line of the front view.

Instructions:

- Answer this question on diagram sheet 5.
- Draw, to scale 1:1 and in third-angle orthographic projection, a **sectional front view** of the assembled parts of the pressure control valve assembly.
- On cutting plane AA, is perpendicular (90°) from the direction of the arrow shown on the exploded isometric drawing.

Note:

- This drawing must comply with the guidelines contained in the SANS 0111.
- No hidden detail is required.

Show the following on the drawing:

- Three sides of the M15 special nut in the sectional front view.
- A partial section on the regulator rod to indicate the internal detail of the part in the sectional front view.
- The projection system symbol of the projection used for this drawing.
- Between 5 mm guidelines, neatly supply the drawing with a title and scale in the title block provided:
  PRESSURE CONTROL VALVE
  SCALE 1:1 **[91]**

PARTS

	DESCRIPTION	QUANTITY
1	REGULATOR UNIT	1
2	M15 SPECIAL NUT	1
3	REGULATOR ROD	1
4	DIAPHRAGM	1
5	PRESSURE PLATE	1
6	BALANCING PLATE	1
7	CYLINDRICAL SPRING	1
8	O-RING	1
9	THREADED CAP	1

DIAGRAM SHEET 4 ENGINEERING GRAPHICS AND DESIGN JUNE 2018 - PAPER 2 NAME & SURNAME GRADE 5

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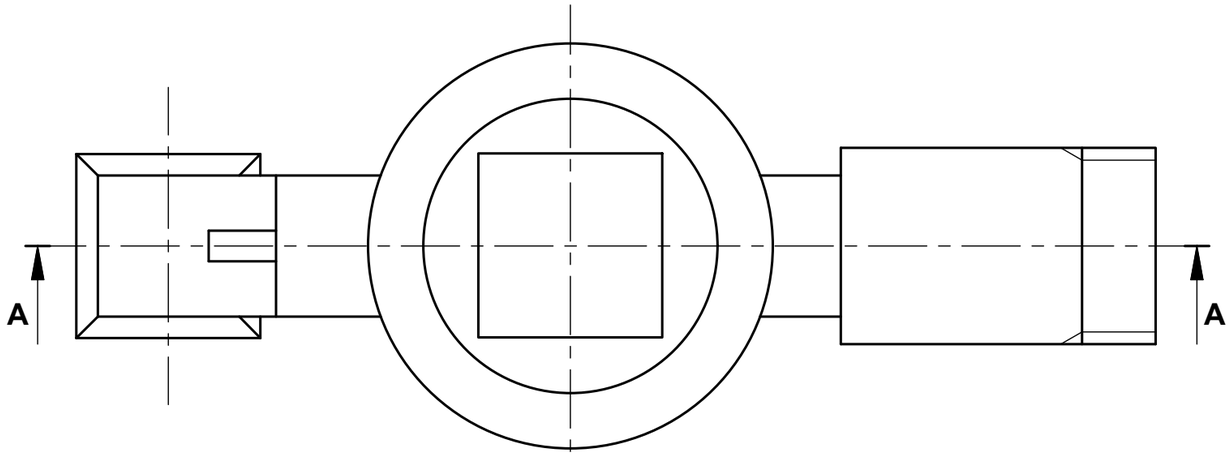

TITLE & SCALE

PROJECTION SYMBOL

ASSESSMENT CRITERIA				
SECTIONED FRONT VIEW				
1	REGULATOR UNIT ($\frac{70}{2}$)	35		
2	M15 SPECIAL NUT ($\frac{22}{2}$)	11		
3	REGULATOR ROD ($\frac{20}{2}$)	10		
4	DIAPHRAGM ($\frac{4}{2}$)	2		
5	PRESSURE PLATE ($\frac{14}{2}$)	7		
6	BALANCING PLATE ($\frac{5}{2}$)	2.5		
7	CYLINDRICAL SPRING ($\frac{3}{2}$)	1.5		
8	O-RING ($\frac{6}{2}$)	3		
9	THREADED CAP ($\frac{26}{2}$)	13		
	SUBTOTAL 1	85		
TECHNICAL CARE				
1	AUXILIARY VIEW (2)	2		
2	TITLE & SCALE (2)	2		
3	PROJECTION SYMBOL (2)	2		
4	DEDUCTIONS SPECIAL CASES			
	SUBTOTAL 2	6		
	TOTAL	91		