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**ISEBE LEMFUNDO LEMPUMA KOLONI
EASTERN CAPE EDUCATION DEPARTMENT
OOS-KAAP ONDERWYSDEPARTEMENT**

NATIONAL SENIOR CERTIFICATE

GRADE 12

ENGINEERING GRAPHICS AND DESIGN P2

SEPTEMBER 2025

PREPARATORY EXAMINATION

MARKS: 200

TIME: 3 hours

This question paper consists of 6 pages.

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INSTRUCTIONS AND INFORMATION

1. This question paper consists of FOUR questions.
2. Answer ALL the questions.
3. ALL drawings must be drawn to scale 1 : 1, unless otherwise stated.
4. ALL the questions must be answered on the answer sheets provided.
5. ALL the answer sheets must be re-stapled in numerical sequence and handed in irrespective of whether the question was attempted or not.
6. Careful time management is essential in order to complete all the questions.
7. Print your name in the block provided on every ANSWER SHEET.
8. ALL answers must be drawn accurately and neatly.
9. Any details or dimensions not given must be estimated in good proportion.
10. ALL drawings are in third angle orthographic projection, unless otherwise stated.

FOR OFFICIAL USE ONLY									
							MODERATED MARK		
1									
2									
3									
4									
TOTAL									
	2	0	0				2	0	0

FINAL CONVERTED MARK	CHECKED BY
100	

COMPLETE THE FOLLOWING:
NAME
NAME
EXAMINATION CENTRE
SCHOOL

STABLE

QUESTION 2.1: LOCI (MECHANISM)**Given:**

- A mechanism consisting of a crank OA, with connecting rods AB and BC which are joined at pivot C. O is the centre of the crank. Rod AB is extended to P.

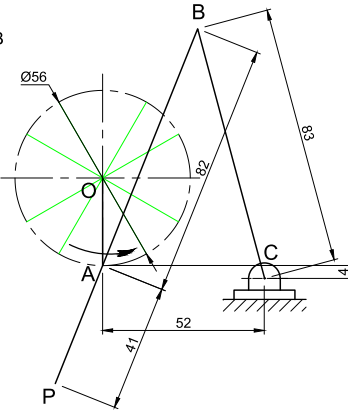
Motion:

- Crank OA rotates in an anti-clockwise direction around centre O. Rod BC pivot at A and B during rotation, while crank OA rotates.

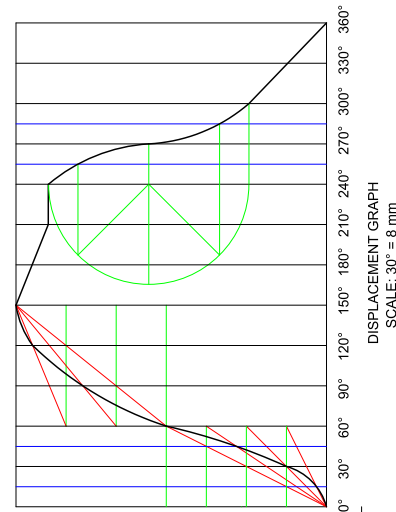
Instructions:

- Draw to scale 1 : 1, the given schematic diagram, using point O as given reference point.
- Trace the loci generated by point P, located on the connecting rod AB, as OA completes one revolution.
- Show ALL necessary constructions.

[20]

+
O

ASSESSMENT CRITERIA		
1	GIVEN	7
2	CONSTRUCTION OF DIAGRAM	5
3	CONSTRUCTION OF LOCI	8
PENALTY (-)		
SUB-TOTAL		20

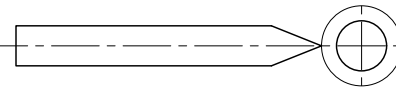
**QUESTION 2.2: LOCI (CAM)****Given:**

- The wedge-shaped follower and the camshaft, as well as the displacement graph in the correct position.

Instructions:

- Project and complete the cam profile, if the cam rotates anti-clockwise.
- Indicate the rotation direction with an arrow.
- Show ALL necessary construction. [18]

ASSESSMENT CRITERIA		
1	CAM CONSTRUCTION	6
2	CURVE QUALITY	4
3	CAM PROFILE	8
PENALTY (-)		
SUB-TOTAL		18
TOTAL		38



NAME	
NAME	

3

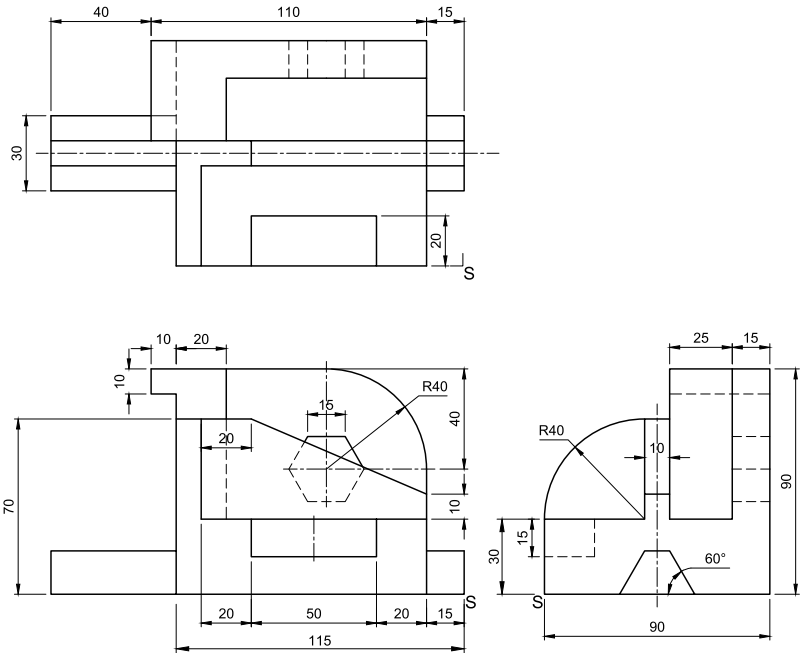
SCALE

QUESTION 3: ISOMETRIC

- Given:**
- Three views of a SUPPORT BRACKET in third angle orthographic projection.
 - Starting point S.

- Instructions:**
- Draw, to scale 1 : 1, a isometric view of the SUPPORT BRACKET.
 - Make point S the lowest point of the drawing.
 - Show ALL necessary construction.
 - NO hidden detail is required.

[40]



ASSESSMENT CRITERIA

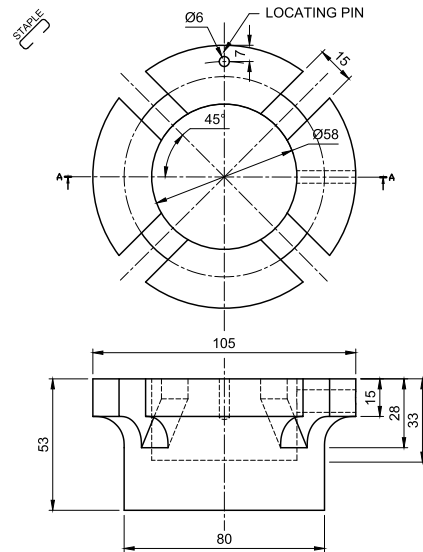
1	CONSTR' + PLACEMENT	2 $\frac{1}{2}$	
2	ISO'- + NON ISO' LINES	27 $\frac{1}{2}$	
3	HEXAGON	5	
4	HALF CIRCLES + CL'S	5	
TOTAL		40	

NAME

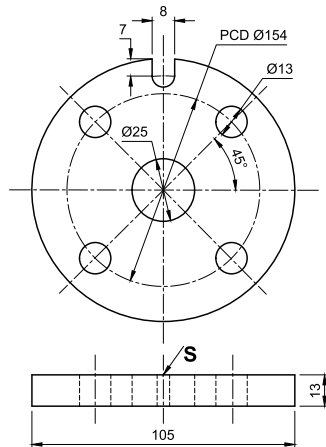
NAME

4

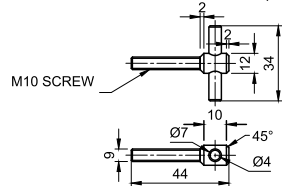
S



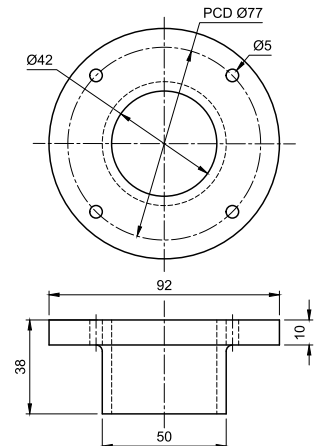
BASE (10)



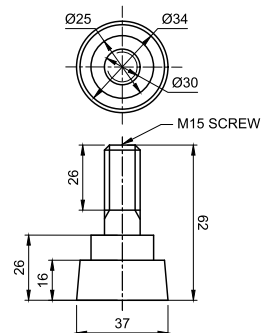
DRILL PLATE (4)



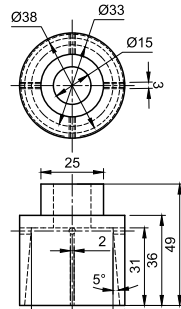
CLAMPING M10 SCREW (9)



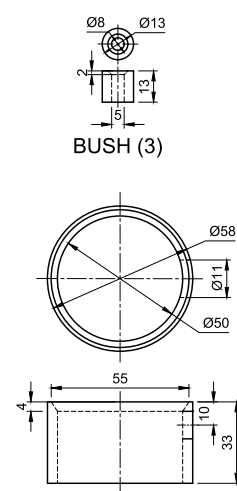
FLANGED COUPLING PLATE (8)



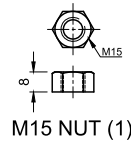
EXPANDER M15 BOLT (7)



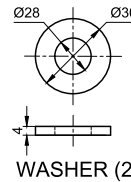
COLLET (5)



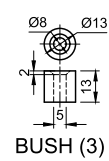
HARDENED SLEEVE (6)



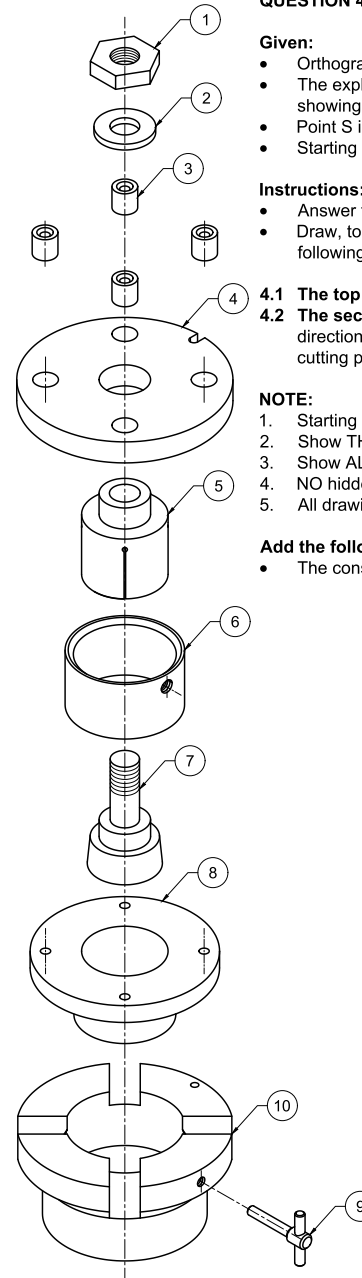
M15 NUT (1)



WASHER (2)



BUSH (3)



QUESTION 4: MECHANICAL ASSEMBLY

Given:

- Orthographic views of each of the parts of the drilling jig.
- The exploded isometric drawing of the parts of a drilling jig assembly, showing the position of each part relative to the others.
- Point S in the front view of the drill plate.
- Starting point S on the answer sheet, page 6.

Instructions:

- Answer this question on page 6.
- Draw, to scale 1 : 1 and in third angle orthographic projection, the following views of the assembled parts of the drilling jig.

4.1 The top view.

- 4.2 The sectional front view, on cutting plane A-A, as seen from the direction of the arrow shown on the exploded isometric drawing. The cutting plane is shown on the top view of the base (part 10).

NOTE:

- Starting point S is indicated on the front view of the drill plate (part 4).
- Show THREE faces of the M15 nut in the sectional front view.
- Show ALL construction.
- NO hidden detail is required.
- All drawings must comply with the guidelines contained in SANS 10111.

Add the following features on the drawing:

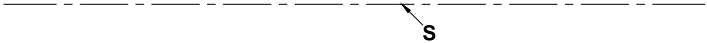
- The construction method for the M15 nut.

[912]

TITLE:		
DRILLING JIG		
PORTFOMATION INC.		
ALL DIMENSIONS ARE IN MILLIMETRES,		
ALL UNSPECIFIED RADII ARE R3,		
LIST OF PARTS		
PART	MATERIAL	QUANTITY
1. M15 NUT	MILD STEEL	1
2. WASHER	MILD STEEL	1
3. BUSH	MILD STEEL	4
4. DRILL PLATE	ALUMINUM	1
5. COLLET	STAINLESS STEEL	1
6. HARDENED SLEEVE	BRONZE	1
7. EXPANDER M15 BOLT	MILD STEEL	1
8. FLANGED COUPLING PLATE	STAINLESS STEEL	1
9. CLAMPING M10 SCREW	STAINLESS STEEL	1
10. BASE	STAINLESS STEEL	1

5

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PENALTIES		ASSESSMENT CRITERIA			
1	WRONG SCALE		TOP VIEW		
2	PARTS NOT ASSEMBLED		1	DRILL PLATE & BUSH	8
3	WRONG HATCHING		2	BASE & FLANGED COUPLING PLATE	1
TOTAL PENALTIES (-)			3	WASHER & NUT	5
			4	CLAMPING SCREW	5
			5	SECTION A - A	3
			SUB-TOTAL		22
			SECTIONAL FRONT VIEW		
			1	EXPANDER M15 BOLT	10 $\frac{1}{2}$
			2	M15 NUT & WASHER	6 $\frac{1}{2}$
			3	DRILL PLATE	4 $\frac{1}{2}$
			4	FLANGED COUPLING PLATE	5 $\frac{1}{2}$
			5	COLLET	6
			6	HARDENED SLEEVE	5 $\frac{1}{2}$
			7	BASE	7 $\frac{1}{2}$
			8	M10 CLAMPING SCREW	11 $\frac{1}{2}$
			SUB-TOTAL		57 $\frac{1}{2}$
			GENERAL		
			1	CENTRE LINES	3
			2	ASSEMBLY	9
			SUB-TOTAL		12
			TOTAL		91 $\frac{1}{2}$
			PENALTIES (-)		
			TOTAL		91 $\frac{1}{2}$
			NAME		
			NAME		6