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**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.
- 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.
- ALL the answer sheets must be re-stapled in numerical sequence and handed in irrespective of whether the question was attempted or not.
- . 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.
- ALL drawings are in third angle orthographic projection, unless otherwise stated.

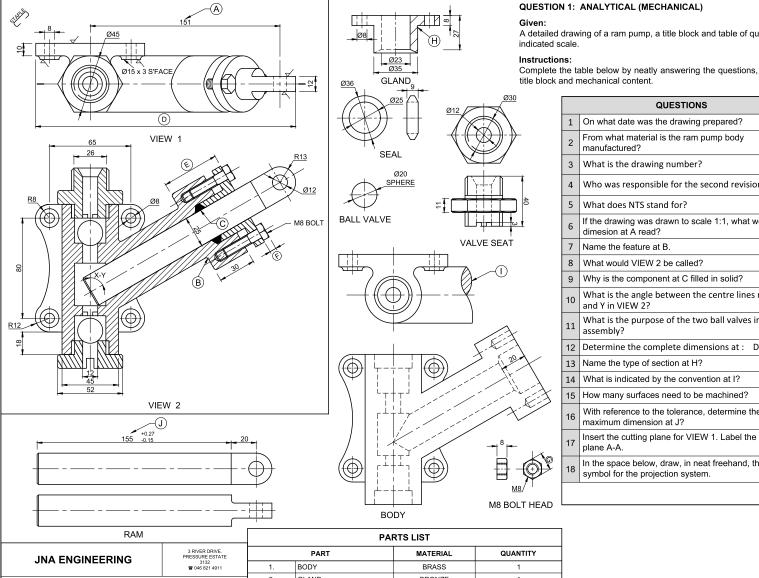
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COMPLETE THE FOLLOWING:	
NAME	
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EXAMINATION CENTRE	
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Engineering Graphics and Design / P2 NSC EC / September 2025



			· · · · · · · · · · · · · · · · · · ·
ESTION 1: ANALYTICAL	(MECHANICAL)		

A detailed drawing of a ram pump, a title block and table of questions. The drawings are not presented to the

Complete the table below by neatly answering the questions, which all refer to the accompanying drawings, the

	QUESTIONS		ļ	NSWERS		
1	On what date was the drawing prepared?				1	I
2	From what material is the ram pump body manufactured?				1	
3	What is the drawing number?				1	I
4	Who was responsible for the second revision?				1	Ī
5	What does NTS stand for?				1	Ī
6	If the drawing was drawn to scale 1:1, what would the dimesion at A read?				1	I
7	Name the feature at B.				1	
8	What would VIEW 2 be called?				2	
9	Why is the component at C filled in solid?				1	I
10	What is the angle between the centre lines marked X and Y in VIEW 2?				1	
11	What is the purpose of the two ball valves in the assembly?				2	I
12	Determine the complete dimensions at : D:	E:	F:	G:	4	I
13	Name the type of section at H?				1	Ī
14	What is indicated by the convention at I?				1	
15	How many surfaces need to be machined?				1	
16	With reference to the tolerance, determine the maximum dimension at J?				2	I
17	Insert the cutting plane for VIEW 1. Label the cutting plane A-A.				3	
18	In the space below, draw, in neat freehand, the SANS symbol for the projection system.				4	
				TOTAL	29	

RAM			PA	RTS LIST					ANSWER 18
JNA ENGINEERING	3 RIVER DRIVE. PRESSURE ESTATE		PART	MATERIAL	QUANTITY				
JNA ENGINEERING	3132 2 046 821 4911	1.	BODY	BRASS	1				
TITLE:		2.	GLAND	BRONZE	1		/=		
RAM PUMP		3.	VALVE SEAT	BRONZE	1	APPROVED:	A KRUGER	2025/06/01	
ALL DIMENSIONS ARE IN MILLIMETRES.	SCALE: NTS	4.	UNION	BRASS	1	CHECKED:	C CARPENTER	2025/03/09	
	OG/LEE: 1410	5.	BALL VALVE	PVC PLASTIC	2	DRAWN:	S ROAN	2025/01/06	
PROGRAMME: AUTOCAD 2024		_					0005/05/00		
FILE NAME: ADB-2025-1989.dwg		6.	SEAL	RUBBER	1	2. MATERIAL OF SEAL	2025/05/08	M COMBS	NAME
DRAWING NO: 1 0F 3		7.	RAM	STAINLESS STEEL	1	1. ADDED FILLETS	2025/04/16	G BAILEY	
QUANTITY: 85		8.	M8 BOLTS	STAINLESS STEEL	2	REVISIONS	DATE	REVISED BY	NAME 2

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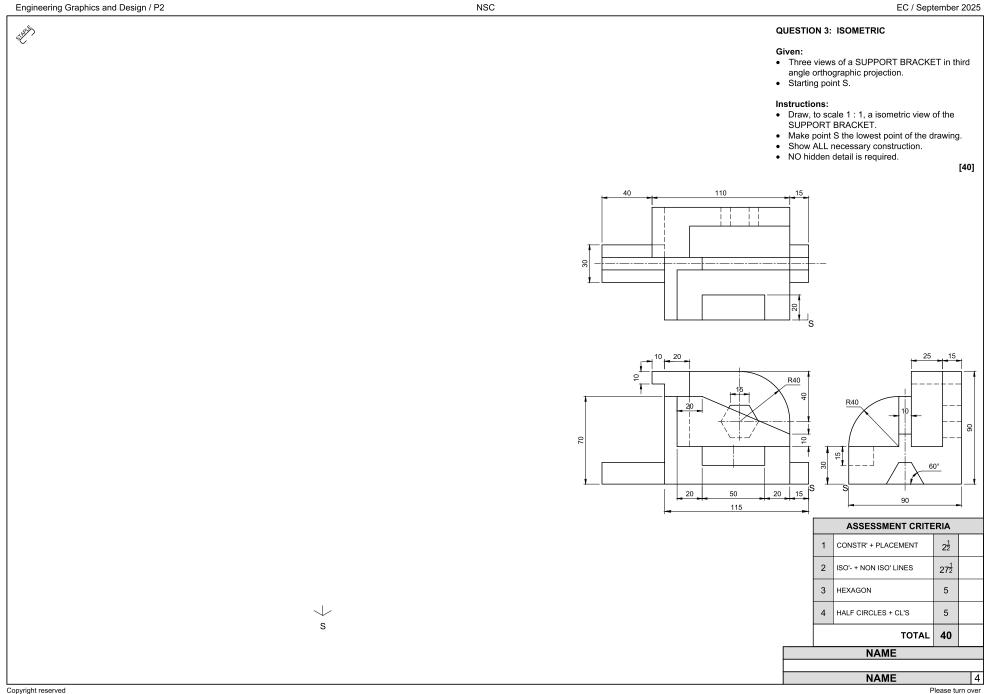
Engineering Graphics and Design / P2 NSC EC / September 2025 QUESTION 2.1: LOCI (MECHANISM) QUESTION 2.2: LOCI (CAM) Given: Given: A mechanism consisting of a crank OA , with connecting rods AB • The wedge-shaped follower and the and BC which are joined at pivot C. O is the centre of the crank. camshaft, as well as the displacement graph Rod AB is extended to P. in the correct position. Motion: Instructions: Crank OA rotates in an anti-clockwise direction around centre O. • Project and complete the cam profile, if the Rod BC pivot at A and B during rotation, while crank OA rotates. cam rotates anti-clockwise. • Indicate the rotation direction with an arrow. Instructions: Show ALL necessary construction. 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. ASSESSMENT CRITERIA Show ALL necessary constructions. [20] 1 CAM CONSTRUCTION 2 CURVE QUALITY 4 3 CAM PROFILE 8 PENALTY (-) SUB-TOTAL 18 38 TOTAL **ASSESSMENT CRITERIA** 1 GIVEN 7 CONSTRUCTION OF 5 DIAGRAM 3 CONSTRUCTION OF LOCI

PENALTY (-)

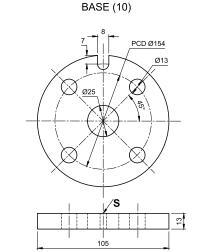
SUB-TOTAL 20

NAME

NAME

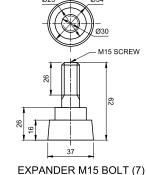


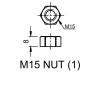
Engineering Graphics and Design / P2 NSC EC / September 2025 LOCATING PIN **QUESTION 4: MECHANICAL ASSEMBLY** Ø13 Given: Orthographic views of each of the parts of the drilling jig. The exploded isometric drawing of the parts of a drilling jig assembly, showing the position of each part relative to the others. Point S in the front view of the drill plate. BUSH (3) 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). 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. FLANGED COUPLING PLATE (8) NO hidden detail is required. All drawings must comply with the guidelines contained in SANS 10111. HARDENED SLEEVE (6)



DRILL PLATE (4)

CLAMPING M10 SCREW (9)



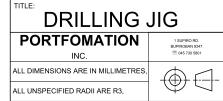




## Add the following features on the drawing:

The construction method for the M15 nut.

[91<sup>1</sup>/<sub>2</sub>]



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			

+	WASHER (2)	
25 25 2		
COLLET (5)		

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M10 SCREW

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		PENALTIES			ASSESSMENT CRIT	ERIA	
<b>₹</b>		1 V	WRONG SCALE	L	TOP VIEW		
		2 P	PARTS NOT ASSEMBLED	1	DRILL PLATE & BUSH	8	
		3 V	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	10½	
				2	M15 NUT & WASHER	6 <del>1</del>	
				3	DRILL PLATE	4 <sup>1</sup> / <sub>2</sub>	
				4	FLANGED COUPLING PLATE	5½	
				5	COLLET	6	
				6	HARDENED SLEEVE	5 <del>1</del>	
					BASE	7 <del>1</del> /2	
				8	M10 CLAMPING SCREW	11½	
					SUB-TOTAL	57 <sup>1</sup> / <sub>2</sub>	
	s			L	GENERAL		
	<b>Q</b>			1	CENTRE LINES	3	
				2	ASSEMBLY	9	
					SUB-TOTAL	12	
					TOTAL	91 <sup>1</sup> / <sub>2</sub>	
				PI	ENALTIES (-)		
					TOTAL	91 <sup>1</sup> / <sub>2</sub>	
					NAME		
					NAME		6
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