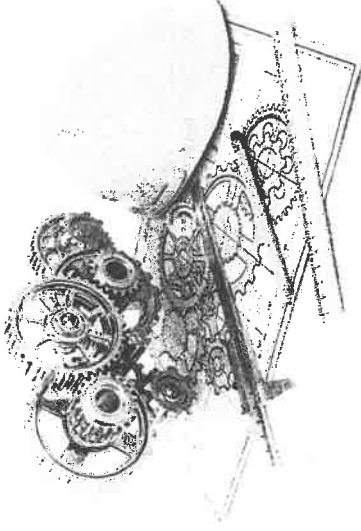


NATIONAL SENIOR CERTIFICATE EXAMINATION

MAY 2022



ENGINEERING GRAPHICS AND DESIGN

PAPER 2

MARKS: 200
TIME: 3 HOURS

FOR OFFICIAL USE ONLY					
QUESTION	SECTION	MARK	MODERATED	MAXIMUM	CODE
1	MECHANICAL ANALYTICAL			20	
2.1	LOCI MECHANISM			15	
2.2	LOCI CAM			25	
3	ISOMETRIC DRAWING			40	
4	MECHANICAL ASSEMBLY			100	
	TOTAL			200	

CHECKED BY

PLEASE READ THE FOLLOWING INSTRUCTIONS CAREFULLY

1. This question paper consists of 7 pages, including the cover page and 5 questions.
2. All questions must be answered.
3. Unless specified otherwise, all questions are in third-angle orthographic projection.
4. Unless specified otherwise, all questions are to be completed to a scale of 1:1.
5. All answer sheets must be re-stapled in numerical order and handed in, including unanswered questions.
6. All construction work must be shown, even if a stencil was used.
7. Print your examination number neatly on each page.
8. Use only the answer sheets provided.
9. Your drawings should be well presented and reflect neatness and accuracy. Marks will be deducted for untidy and inaccurate work.
10. All dimensions or detail not given must be assumed in good proportion with the rest of the drawing.
11. Stencils and calculators may be used.
12. All drawings must adhere to the SANS 10111-1.
13. In order to save time, detailed assembly parts must be drawn to convention.

EXAMINATION NUMBER

--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

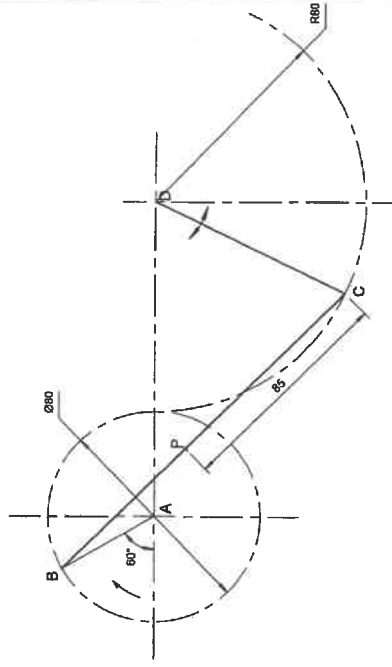
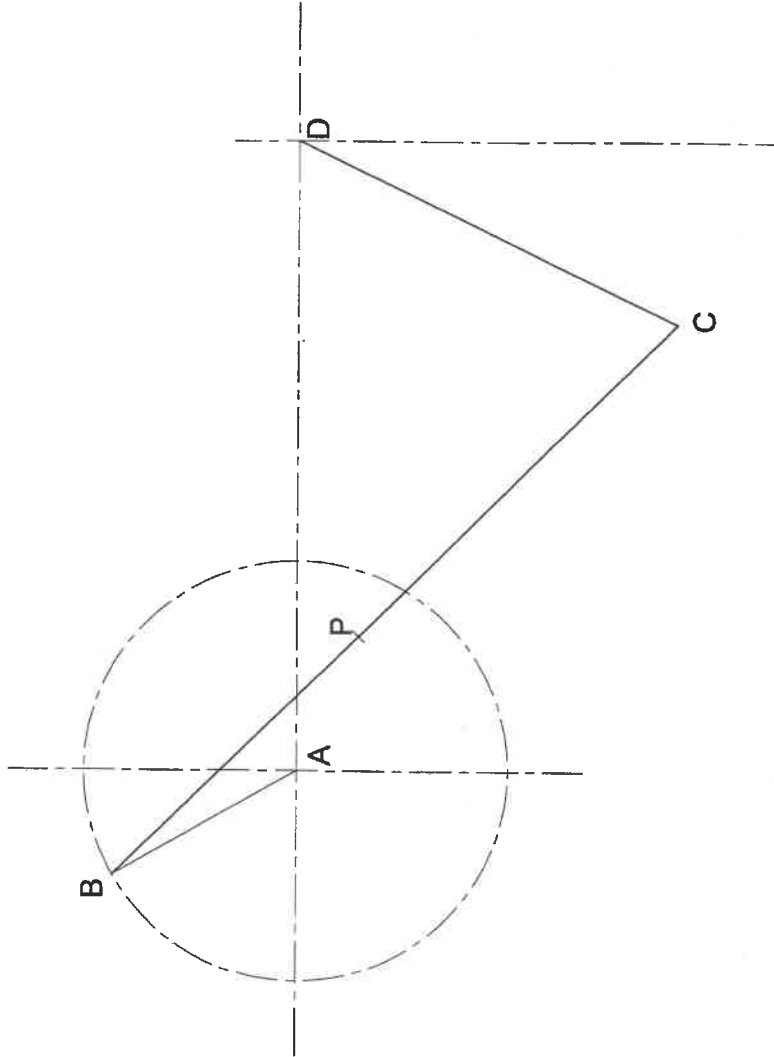
QUESTION 2.1
LOCI
MECHANISM

The schematic figure below shows a mechanism consisting of a crank **AB**, with connecting rods **BC** and **CD** joined at point **C**. **P** is a point on rod **BC**.

The crank **AB** rotates clockwise around centre **A** and rod **BC** pivots at **C** and **D** during rotation.

Use the given centre lines to construct and draw the locus of **point P** for one full rotation of the mechanism.

- The length of rod **BC** is 150.
- Draw the direction arrow.
- Show all **constructions**.



ASSESSMENT CRITERIA	
• Construction	2
• Plot Points	11
• Direction	1
• Locus	1

CON	2						
PTS	11						
DIR	1						
LOC	1						

15 MARKS

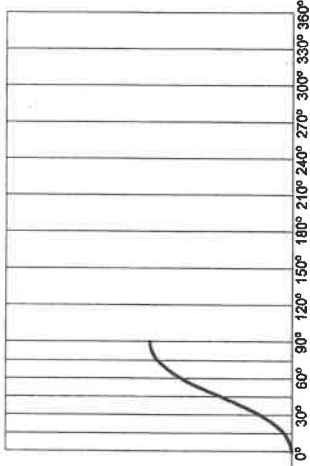
EXAMINATION NUMBER

ANSWER SHEET 2.1

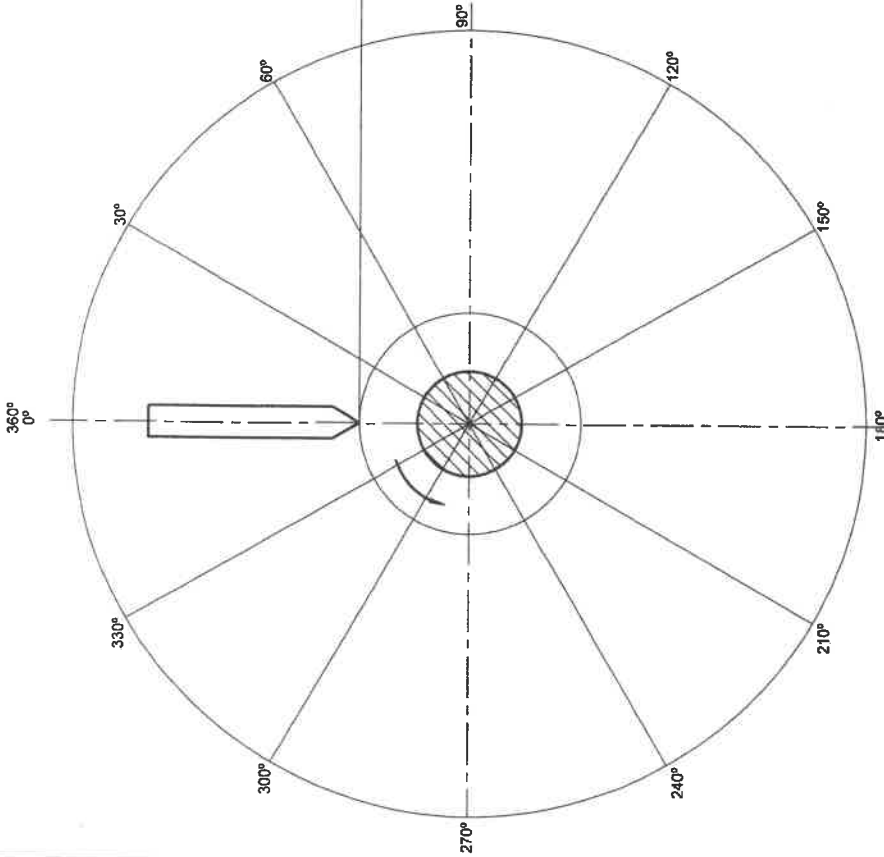
QUESTION 2.2

LOCI
CAM

DISPLACEMENT GRAPH



SCALE: 7 mm = 30°



- The following are given in the adjacent drawing:
- the incomplete **graph of displacement of a wedge-ended follower**
 - the centre of the camshaft
 - the shaft and follower detail at the starting position.
- The cam imparts the following motion to the follower:
- 0°–90° the follower **rises 27 mm with uniform acceleration and retardation**. (given)
 - 90°–135° the follower is at **rest**
 - 135°–180° the follower **rises a further 27 mm with uniform motion**.
 - 180°–360° the follower **returns to its original position with simple harmonic motion**.

The cam profile has the following specifications:

- The direction of rotation is **anti-clockwise**.
- 2.2.1 Draw the complete graph of displacement.
2.2.2 Draw the cam profile from the displacement graph.
2.2.3 Show all constructions.

ASSESSMENT CRITERIA

- Graph 7
- Plot Points 14
- Locus 2
- Constructions 2

GRPH							
PTS							
LOC							
CON							

25 MARKS

EXAMINATION NUMBER

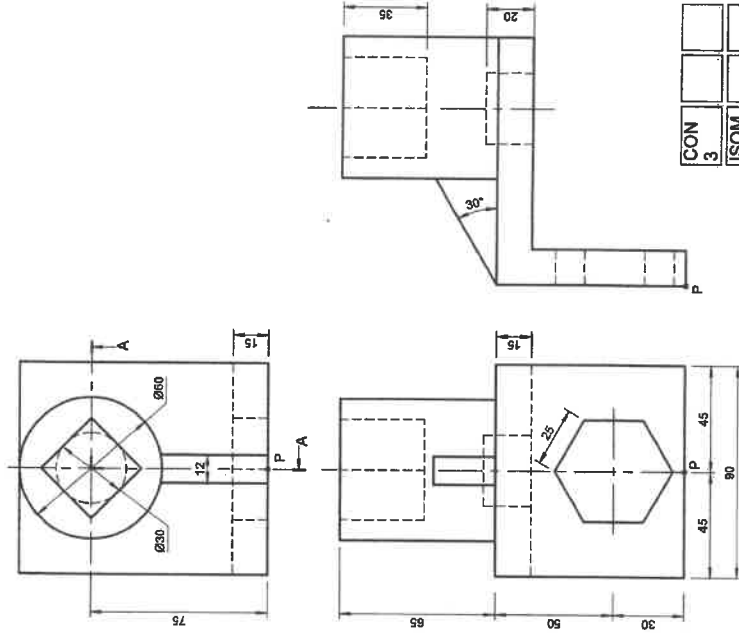
ANSWER SHEET 2.2

CONSTRUCTION AREA

QUESTION 3
ISOMETRIC
DRAWING

The figures below show the front view, top view and right view of a heavy-duty **CASTING**. The **CASTING** is cut by **cutting-plane A-A**.

- 3.1 Draw a neat **half-sectioned isometric** drawing of the **CASTING** on **cutting-plane A-A**.
- 3.2 Show all constructions.
- 3.3 Draw the centre lines for the circles.
- 3.4 Make point **P** the starting point of your drawing.



ASSESSMENT CRITERIA

• Constructions	3
• Isometric Points	22
• Isometric Circles	7
• Centre Lines	3
• Hatching	5

CON	3				
ISOM	44/2				
CIRC	7				
CLS	3				
HAT	5				

40 MARKS

EXAMINATION NUMBER

--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

ANSWER SHEET 3

