PLEASE READ THE FOLLOWING INSTRUCTIONS CAREFULLY

1. This question paper consists of 7 pages including the cover page and 4 questions.
2. All the 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 stapled in numerical order and handed in, even unattempted/blank 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. Any dimensions or detail not given may be assumed in good proportion.
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.
1.1 Which sectioned side view in Figure A is correct to convention? (1)

1.2 What is feature 1 in Figure B called? (1)

1.3 What is feature 2 in Figure C called? (1)

1.4 What type of sectioning is shown by 3 in Figure C? (1)

1.5 Calculate the dimension 4 in Figure C. (1)

1.6 Calculate the dimension 5 in Figure C. (1)

1.7 Calculate the dimension 6 in Figure D. (1)

1.8 Calculate the dimension 7 in Figure D. (1)

1.9 Calculate the dimension 8 in Figure D. (1)

1.10 Calculate the dimension 9 in Figure E. (1)

1.11 What is feature 10 in Figure E called? (1)

1.12 What type of sectioning is shown by 11 in Figure E? (1)

1.13 Calculate the dimension 12 in Figure F. (1)

1.14 Is the thread in Figure E internal or external? (1)

1.15 Figure G shows a machining symbol. Complete the table below by printing the correct letter next to the corresponding phrase. (3)

<table>
<thead>
<tr>
<th>Phrase</th>
<th>Letter</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.15.1 Production method</td>
<td></td>
</tr>
<tr>
<td>1.15.2 Direction of lay</td>
<td></td>
</tr>
<tr>
<td>1.15.3 Machine allowance</td>
<td></td>
</tr>
</tbody>
</table>

1.16 Figure H shows a welding symbol. Complete the table below by printing the correct letter next to the corresponding phrase. (3)

<table>
<thead>
<tr>
<th>Phrase</th>
<th>Letter</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.16.1 Weld all around</td>
<td></td>
</tr>
<tr>
<td>1.16.2 Welding process</td>
<td></td>
</tr>
<tr>
<td>1.16.3 Welding symbol</td>
<td></td>
</tr>
</tbody>
</table>
Given is the incomplete graph of displacement of a wedge-ended follower as well as the centre of the cam shaft as shown by the given centrelines.

The graph of displacement has the following motion:

- 0°-45° the follower is at rest. (Given)
- 45°-60° the follower falls 20 mm. (Uniform motion)
- 60°-90° the follower is at rest. (Uniform motion)
- 90°-120° the follower falls 20 mm. (Uniform motion)
- 120°-150° the follower is at rest. (Uniform motion)
- 150°-180° the follower falls 20 mm. (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 turn is clockwise.
- The camshaft has a radius of 11 mm.

Draw the following:

2a.1 the complete graph of displacement.
2a.2 the cam profile.
2a.3 the wedge-ended follower (to your own appropriate size and measurements).
2a.4 the camshaft.
2a.5 the direction of rotation.
2a.6 show all constructions.
2a.7 label the graph of displacement and the horizontal scale.
The given figure shows a wheel, rotating around the centre O, with a rod AB attached to it at point A. The end of the rod (B) is attached to a second rod (BC) that is free to move about its anchor point C. Rod BC rocks back and forth as the wheel rotates. Construct and draw the locus of point P if the direction of rotation is clockwise.

Show all constructions and indicate the direction correctly.

ASSessment criteria:
- Setup: 5
- Plot Points: 11
- Direction: 1
- Locus: 3

20 MARKS
The figure below shows the front view and right view of a heavy duty BRACKET. The BRACKET has been cut by a cutting plane A-A.

Draw the following:

3.1 draw a neat Sectioned Isometric on the cutting plane A-A.
3.2 show the constructions for the hexagon and the angle in the given area.
3.3 draw all centrelines.
3.4 make point P the lowest part of your drawing.
3.5 start your drawing on the given crosshairs.

CONSTRUCTION AREA

ASSESSMENT CRITERIA

- Constructions 4
- Iso points 22
- Iso circles 6
- Centrelines 3
- Hatching 3
- Non-hatching 2
- Positioning -2

40 MARKS
Figure 2 shows a series of pictures of a bicycle REAR HUB, as well as an exploded view of how the components of a similar, simplified system are assembled. A list of components is also shown.

Figure 1 shows the different components (not drawn to scale) that need to be assembled.

Complete the following to a SCALE of 1:1:

4.1 A sectioned Front View of the assembled components on the cutting plane A-A.
4.2 A Right View of the assembled components.
4.3 Please note the following:
   4.3.1 Point Y on the hub (Part A) must be assembled on Point X of the shaft (Part B).
   4.3.2 Point Y indicates the midpoint.
   4.3.3 Show 3 faces for the hexagonal nuts on the front view.
4.4 Show hidden detail on the right view of only the Dust Cover (Part D) and Key (Part F).
4.5 Draw the cutting plane and the centrelines.
4.6 Draw 3 functional dimensions.
4.7 Draw the projection symbol in the space provided.
4.8 Print the title and scale in the space provided.
4.9 Label the sectioned view.

<table>
<thead>
<tr>
<th>COMPONENT LIST</th>
<th>NO.</th>
<th>PART</th>
<th>QUANTITY</th>
<th>MATERIAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>HUB</td>
<td>1</td>
<td>STAINLESS STEEL</td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>SHAFT</td>
<td>1</td>
<td>MILD STEEL</td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>BEARING</td>
<td>2</td>
<td>MILD STEEL</td>
<td></td>
</tr>
<tr>
<td>D</td>
<td>DUST COVER</td>
<td>2</td>
<td>MILD STEEL</td>
<td></td>
</tr>
<tr>
<td>E</td>
<td>GEAR</td>
<td>1</td>
<td>MILD STEEL</td>
<td></td>
</tr>
<tr>
<td>F</td>
<td>KEY</td>
<td>1</td>
<td>STEEL</td>
<td></td>
</tr>
<tr>
<td>G</td>
<td>WASHER</td>
<td>2</td>
<td>MILD STEEL</td>
<td></td>
</tr>
<tr>
<td>H</td>
<td>M18 NUT</td>
<td>2</td>
<td>MILD STEEL</td>
<td></td>
</tr>
</tbody>
</table>

**Figure 2**
### ASSESSMENT CRITERIA

#### FRONT VIEW
- **HUB**
  - A: 20

- **SHAFT**
  - B: 5

- **BEARINGS**
  - C: 6

- **DUST COVERS**
  - D: 6

- **GEAR**
  - E: 4

- **KEY**
  - F: 1

- **WASHERS**
  - G: 4

- **M18 NUTS**
  - H: 6

**TOTAL** 52

#### RIGHT VIEW
- **GEAR**
  - E: 9

- **KEY**
  - F: 1

- **WASHER**
  - G: 1

- **M18 NUT**
  - H: 2

- **SHAFT**
  - B: 2

- **HIDDEN DETAIL**
  - TOTAL: 3

**TOTAL** 18

#### ADDITIONAL
- **CORRECT ASS.**
  - 3

- **HATCHING**
  - 9

- **NON-HATCHING**
  - 4

- **CENTRE LINES**
  - 4

- **DIMENSIONS**
  - 3

- **CUTTING PLANE**
  - 2

- **SYMBOL**
  - 2

- **TITLE/SCALE**
  - 2

- **LABEL**
  - 1

**TOTAL** 30

**TOTAL** 100