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 the questions must be answered on the QUESTION PAPER as instructed.
6. ALL the pages must be restapled in numerical sequence, irrespective of whether the question was attempted.
7. Time management is essential in order to complete all the questions.
8. Print your examination number in the block provided on every page.
9. Any details or dimensions not given, must be assumed in good proportion.
10. ALL answers must be drawn accurately and neatly.

FOR OFFICIAL USE ONLY

<table>
<thead>
<tr>
<th>QUESTION</th>
<th>MARKS OBTAINED</th>
<th>½ SIGN</th>
<th>MODERATED</th>
<th>½ SIGN</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
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<td>2</td>
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<tr>
<td>4</td>
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</tr>
<tr>
<td>TOTAL</td>
<td></td>
<td>200</td>
<td>200</td>
<td></td>
</tr>
</tbody>
</table>

FINAL CONVERTED MARK

100

COMPLETE THE FOLLOWING:

CENTRE NUMBER

CENTRE NUMBER

EXAMINATION NUMBER

EXAMINATION NUMBER
QUESTION 1: ANALYTICAL (MECHANICAL)

Given:
THREE detailed views of a swing check valve, a detailed drawing of the screw pin and plug, a title block and a table of questions. The drawings have not been prepared to the indicated scale.

Instructions:
Complete the table below by neatly answering the questions, which all refer to the accompanying drawings and the title block.

<table>
<thead>
<tr>
<th>QUESTIONS</th>
<th>ANSWERS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 When was the drawing checked?</td>
<td>½</td>
</tr>
<tr>
<td>2 Who approved the drawing?</td>
<td>½</td>
</tr>
<tr>
<td>3 What scale is indicated for the drawing?</td>
<td>½</td>
</tr>
<tr>
<td>4 Who was responsible for the revisions?</td>
<td>½</td>
</tr>
<tr>
<td>5 How many revisions have there been to the drawing?</td>
<td>½</td>
</tr>
<tr>
<td>6 What was the nature of the first revision?</td>
<td>½</td>
</tr>
<tr>
<td>7 How many surfaces require machining?</td>
<td>1</td>
</tr>
<tr>
<td>8 What is the roughness value of the machined surfaces?</td>
<td>1</td>
</tr>
<tr>
<td>9 Name the circled feature at 1.</td>
<td>1</td>
</tr>
<tr>
<td>10 Name the component at 2.</td>
<td>1</td>
</tr>
<tr>
<td>11 In ONE word, describe the true shape of the feature at 3.</td>
<td>1</td>
</tr>
<tr>
<td>12 What type of section is shown at 4?</td>
<td>1</td>
</tr>
<tr>
<td>13 What thread sizes must a component have in order to be coupled to the swing check valve?</td>
<td>1</td>
</tr>
<tr>
<td>14 How many components make up the swing check valve?</td>
<td>1</td>
</tr>
<tr>
<td>15 What would view 3 be called?</td>
<td>1</td>
</tr>
<tr>
<td>16 Determine the dimensions at: A B C D E</td>
<td>5</td>
</tr>
<tr>
<td>17 Draw the cutting plane A-A on view 2.</td>
<td>3</td>
</tr>
<tr>
<td>18 In view 1, trace the focus that will be generated by point P as the gate opens to its maximum.</td>
<td>2</td>
</tr>
<tr>
<td>19 In the box below (ANSWER 19), draw, in neat freehand, the symbol for the projection system used.</td>
<td>4</td>
</tr>
<tr>
<td>20 In the box below (ANSWER 20), complete, in neat freehand and according to the SABS 0111 conventions, the drawing of the inspection plug on the right.</td>
<td>4</td>
</tr>
</tbody>
</table>

TOTAL 30
QUESTION 2: LOCIs

NOTE: Answer QUESTIONS 2.1 AND 2.2.

2.1 AUGER

Given:
- The front view and left view of the shaft of an auger
- A reference point, labelled O, to help with the placement of the answer

Specifications:
- The pitch (ONE full turn) is 35 mm.
- The outer diameter of the auger is Ø80.

Instructions:
- Starting at point A, draw, to scale 1 : 1, TWO turns of a right-hand auger on the given views of the shaft.
- Show ALL necessary construction.
- NO hidden detail is required.

[27]

2.2 CAM

Given:
A cam profile with a wedge-ended follower

Specifications:
The cam rotates with constant velocity in a clockwise direction, imparting uniform motion to the follower.

Instructions:
- Draw the displacement graph for the cam, using a horizontal scale of 8 mm equal to 30°.
- Indicate the direction of rotation on the cam profile.
- Label the displacement graph and indicate the scale used.
- Show ALL necessary construction.

[12]
QUESTION 3: ISOMETRIC DRAWING

Given:
- The front view, top view and right view of a safety clip with TWO regular pentagonal slot holes
- The position of point A on the drawing sheet

Instructions:
Using scale 1 : 1, convert the orthographic views of the safety clip into an isometric drawing.
- Make A the lowest point of the drawing.
- Show ALL necessary construction.
- NO stencils may be used.
- NO hidden detail is required.

<table>
<thead>
<tr>
<th>ASSESSMENT CRITERIA</th>
<th>MARKS</th>
</tr>
</thead>
<tbody>
<tr>
<td>AUXILIARY VIEWS + CIRCLE CONSTRUCTION + PLACE</td>
<td>6</td>
</tr>
<tr>
<td>ISO ARCS + PENTAGONAL HOLE</td>
<td>11</td>
</tr>
<tr>
<td>ISO + NON-ISO LINES</td>
<td>23</td>
</tr>
<tr>
<td>TOTAL</td>
<td>40</td>
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</tbody>
</table>

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QUESTION 4: MECHANICAL ASSEMBLY

Given:
- The exploded isometric drawing of the parts of an offset connecting bar, showing the position of each part relative to all the others.
- Orthographic views of each of the parts of the offset connecting bar assembly.

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 offset connecting bar assembly:
  4.1 A 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, which passes vertically through the centre of the assembly, is shown on the top view of the fork (part B).
  4.2 The right view.
- All drawing must comply with the guidelines contained in the SABS 0111.

NOTE:
- As indicated, place point P on the upper end of the tie rod with point P on the fork and point S on the lower end of the tie rod, with point S on the offset arm.
- Show THREE faces of the nut in the front view and ALL necessary construction.
- No hidden detail is required.

Add the following features to the drawing:
- The cutting plane A-A.
- Label the sectional view SECTION A-A.

PARTS LIST

<table>
<thead>
<tr>
<th>PART</th>
<th>QUANTITY</th>
<th>MATERIAL</th>
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</thead>
<tbody>
<tr>
<td>1. SHAFT A</td>
<td>1</td>
<td>MILD STEEL</td>
</tr>
<tr>
<td>2. BUSH A</td>
<td>1</td>
<td>BRONZE</td>
</tr>
<tr>
<td>3. OFFSET ARM</td>
<td>1</td>
<td>CAST IRON</td>
</tr>
<tr>
<td>4. TIE ROD</td>
<td>1</td>
<td>MILD STEEL</td>
</tr>
<tr>
<td>5. M12 LOCK NUT</td>
<td>1</td>
<td>MILD STEEL</td>
</tr>
<tr>
<td>6. SHAFT B</td>
<td>1</td>
<td>MILD STEEL</td>
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<tr>
<td>7. DOWEL</td>
<td>2</td>
<td>MILD STEEL</td>
</tr>
<tr>
<td>8. FORK</td>
<td>1</td>
<td>CAST IRON</td>
</tr>
<tr>
<td>9. BUSH B</td>
<td>1</td>
<td>BRONZE</td>
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</table>

OFFSET CONNECTING BAR

MECHTECH ENGINEERING
17 LONG STREET
NEW PARK
KIMBERLEY 8300
www.mechtech.co.za
053 665 7820

All dimensions are in millimetres. All unspecified radii are R2.

Please turn over
<table>
<thead>
<tr>
<th>ASSESSMENT CRITERIA</th>
<th>SECTIONAL FRONT VIEW</th>
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<tbody>
<tr>
<td>1 SHAFT A</td>
<td>2</td>
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<tr>
<td>2 SUBSH A</td>
<td>1</td>
</tr>
<tr>
<td>3 OFFSET ARM</td>
<td>( \frac{7}{2} )</td>
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<tr>
<td>4 TIE ROD</td>
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<tr>
<td>5 M12 NUT</td>
<td>8</td>
</tr>
<tr>
<td>6 SHAFT B</td>
<td>2</td>
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<tr>
<td>7 DOWEL</td>
<td>1</td>
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<tr>
<td>8 FORK</td>
<td>( \frac{13}{2} )</td>
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<tr>
<td>9 SUBSH B</td>
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<td>10 HATCHING</td>
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<tr>
<td><strong>RIGHT VIEW</strong></td>
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<td>3 OFFSET ARM</td>
<td>( \frac{5}{2} )</td>
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<tr>
<td>4 TIE ROD</td>
<td>5</td>
</tr>
<tr>
<td>5 M12 NUT</td>
<td>( \frac{4}{2} )</td>
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<tr>
<td>8 FORK</td>
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<td>2 CUTTING PLANE + TITLE</td>
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