higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

T1060**(E)**(M27)T

NATIONAL CERTIFICATE: MULTI-DISCIPLINARY DRAWING OFFICE PRACTICE

MECHANICAL DRAUGHTING

(8090244)

27 March 2019 (X-Paper)
09:00–13:00

REQUIREMENTS: **A2 drawing sheets (instrumental drawing)**
A3 and A4 drawing sheets (computer drawing)

Calculators and drawing instruments may be used.

This question paper consists of 5 pages and 3 diagram sheets.

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DEPARTMENT OF HIGHER EDUCATION AND TRAINING
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NATIONAL CERTIFICATE: MULTI-DISCIPLINARY DRAWING OFFICE PRACTICE
MECHANICAL DRAUGHTING
TIME: 4 HOURS
MARKS: 100

INSTRUCTIONS AND INFORMATION

1. Answer ALL the questions.
2. Read ALL the questions carefully.
3. Number the answers according to the numbering system used in this question paper.
4. Candidates using pencil must use both sides of an A2 DRAWING SHEET.
5. Candidates using a computer must answer each question on a separate A3 or A4 plotted DRAWING SHEET.
6. Before any drawing work is commenced, a border must be retrieved from the symbols directory and displayed on the screen when using a computer.
7. Print or plot ALL candidate information in the title block.
8. Candidates are responsible for plotting their own answers under suitable supervision.
9. ALL standard symbols (mechanical) can be obtained from the symbols directory.
10. Use your discretion for dimensions NOT given.
11. Use a 3 mm fillet radius for ALL radii NOT given.
12. ALL drawing work must comply with the SABS 0111-1990 Code of Practice.
13. Work neatly.

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QUESTION 1: CONVENTIONAL REPRESENTATION

FIGURE 1, DIAGRAM SHEET 1 (attached), shows a full-sectional front view of a V-belt drive pulley assembly.

Draw, to scale 1:1, a detail drawing of the gear (Item 4) in first-angle orthographic projection showing the following views:

- A half-sectional front view with the top half in section
- A left view showing the keyway detail of the hole

Use the following data:

• Addendum	4 mm
• Dedendum	5 mm
• Width of gear	25 mm
• PCD	96 mm
• Hole diameter	28 mm

Show hidden detail only on the bottom half of the front view. **[10]**

QUESTION 2: CAM PROFILES

A cam profile, which will impart motion to a roller follower, is required.

Draw, to scale 1:1, the full profile of a disc-cam using the following information:

Cam data:

• Minimum diameter:	30 mm
• Stroke height (lift/fall):	32 mm
• Shaft diameter:	20 mm
• Roller diameter:	15 mm
• Performance:	Rises 32 mm for the first 120° of cam rotation Dwells for the next 60° of cam rotation Falls 32 mm for the next 150° of cam rotation Dwells for the last 30° of cam rotation Motion is uniform velocity Rotation of cam is anticlockwise

Show the displacement diagram and ALL construction lines. The displacement diagram must be drawn on the left-hand side of the cam profile. The roller follower need NOT be drawn. Draw the shaft together with hatching detail. **[15]**

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QUESTION 3: SECTIONAL DRAWING

FIGURE 2, DIAGRAM SHEET 2 (attached), shows two views of a casted link for a machine.

Draw, to scale 1:1, the following views of the casting in third-angle orthographic projection:

- A full-sectional front view on cutting plane Y-Y (9)
- A full-sectional right view on cutting plane X-X (8)

Show only the following dimensions and symbols on the drawing:

- At A: Indicate that NO machining must be done on this surface. (1)
- At B: Indicate that this surface has to be machined. The roughness value of the surface texture is 15 µm. (2)

NO dashed lines are required. **[20]**

QUESTION 4: DETAIL DRAWING

FIGURE 1, DIAGRAM SHEET 1 (attached), shows a full-sectional front view of a V-belt drive pulley assembly consisting of the following parts:

- Item 1 – Carrier
- Item 2 – Body
- Item 3 – Pulley
- Item 4 – Spur gear
- Item 5 – Bush
- Item 6 – Shaft
- Item 7 – M24 hexagonal nut
- Item 8 – M12 hexagonal head screw
- Item 9 – Key

Draw, to scale 1:1, detail drawings of the following components in third-angle orthographic projection:

4.1 The pulley (Item 3) showing the following views:

4.1.1 A half-sectional front view with the bottom half in section (8)

4.1.2 A right view (5)

Insert any FOUR dimensions on the completed detail. (2)

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4.2 The shaft (Item 6) showing the following:

A front view, showing the detail of the keyway as well as the thread detail as per conventional representation – NO dash lines are required (5)

[20]

QUESTION 5: ASSEMBLY DRAWING

FIGURE 3, DIAGRAM SHEET 3 (attached), shows the components of a universal coupling as used in most shaft couplings and connections. As a draughtsperson you must draw an assembly drawing of this universal coupling.

The complete parts list is as follows:

Item 1	Forked end	2 of	Mild steel
Item 2	Cross piece	1 of	Mild steel
Item 3	Drive shaft	2 of	Mild steel
Item 4	Driving pin	4 of	Mild steel
Item 5	Key	2 of	Mild steel

Draw, to scale 1:1, an assembly drawing showing a full-sectional front view of the universal coupling. (23)

Indicate ALL item numbers on the completed sectional assembly. (3)

Show a parts list below the completed drawing on the A2 DRAWING SHEET or on a separate DRAWING SHEET if A4 sheets are used. (4)

Keyway width = D/4
Keyway depth = D/12 **[30]**

QUESTION 6: BALANCED LAYOUT AND NEATNESS

Layout, neatness and general impression of the DRAWING SHEETS **[5]**

TOTAL: 100

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DIAGRAM SHEET 1

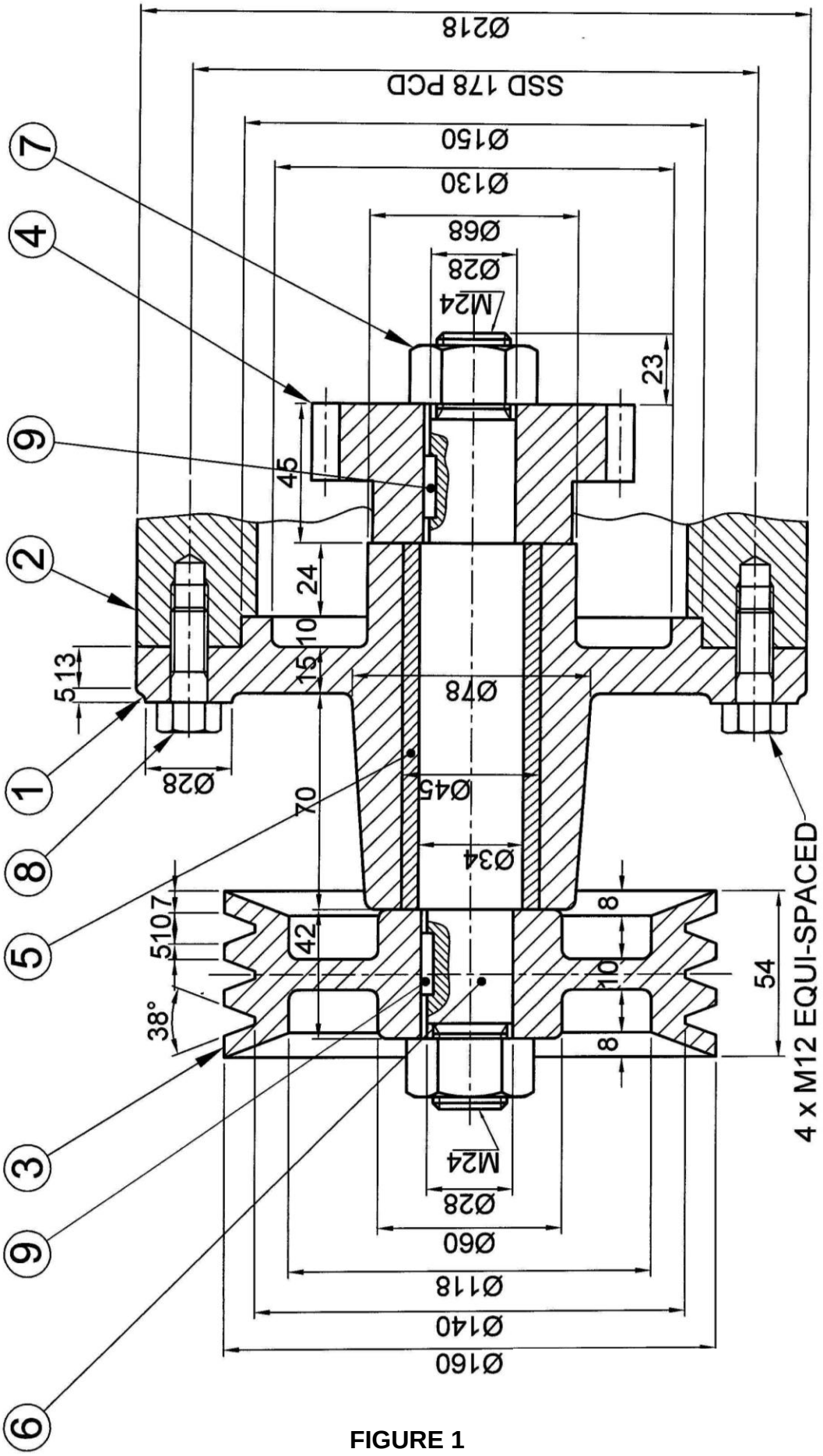


FIGURE 1

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DIAGRAM SHEET 2

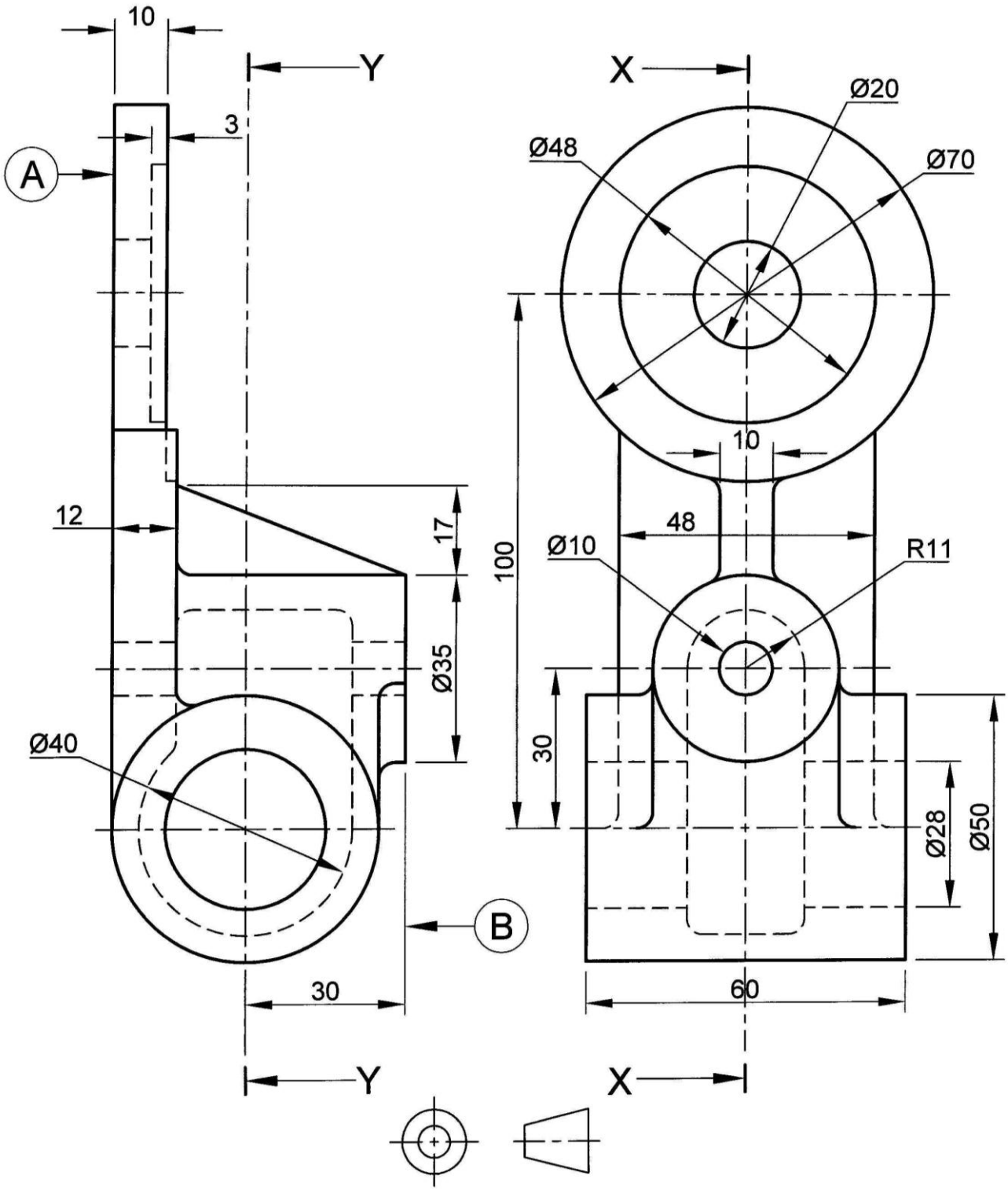


FIGURE 2

DIAGRAM SHEET 3

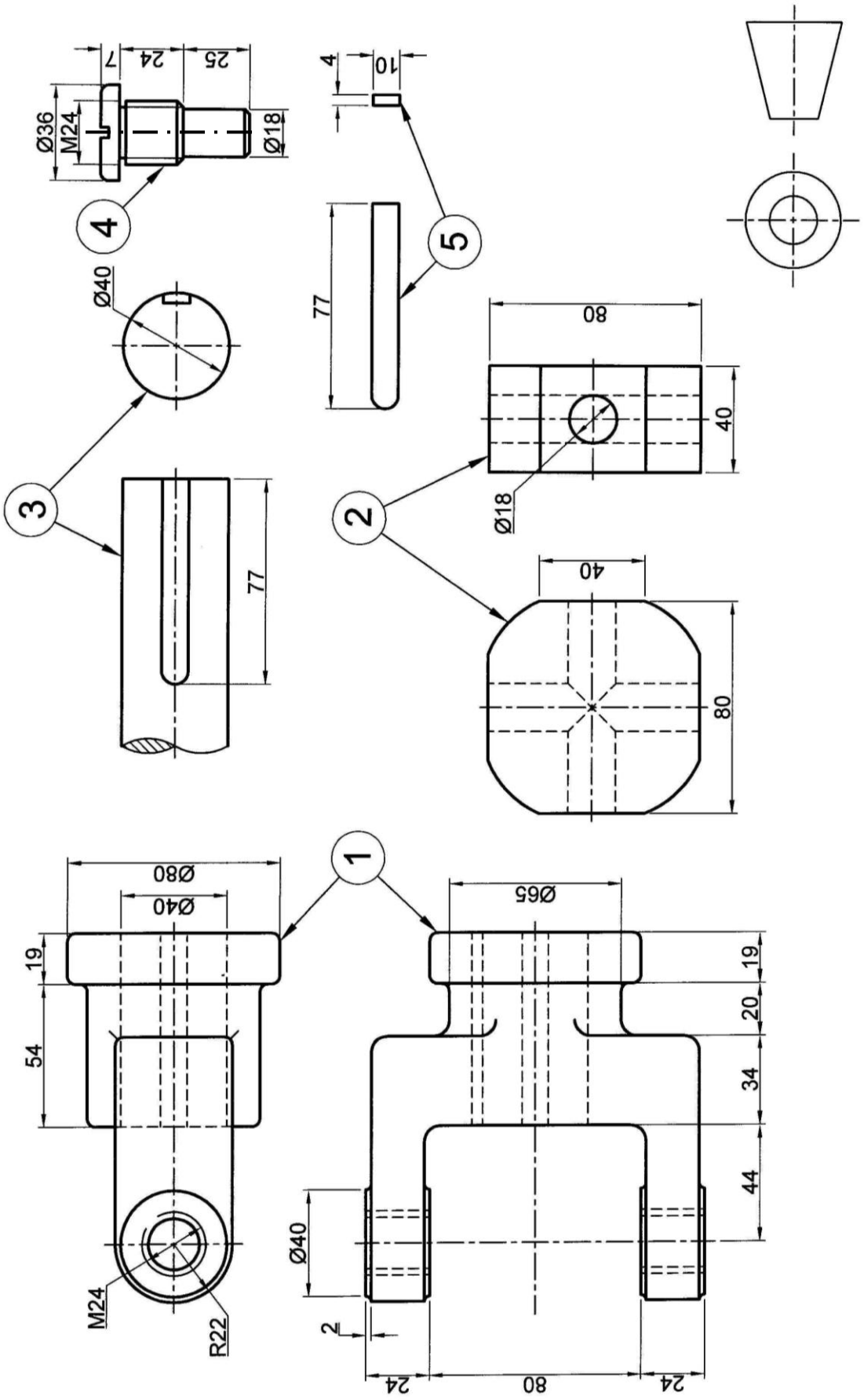


FIGURE 3

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