higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE

ENGINEERING DRAWING N2

(8090272)

21 April 2021 (X-paper)
09:00–13:00

REQUIREMENTS: A2 drawing sheet (BOE 8/20)

Drawing instruments may be used.

This question paper consists of 11 pages and 1 answer sheet.

282Q1A2121

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DEPARTMENT OF HIGHER EDUCATION AND TRAINING
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE
ENGINEERING DRAWING N2
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. Use both sides of the DRAWING SHEET.
5. Draw a 15 mm border on both sides of the DRAWING SHEET.
6. Make all drawings neatly using your own drawing instruments unless otherwise specified.
7. Only the candidate information on the drawing sheet must be done in ink. ALL other drawing work must be done in pencil.
8. All drawings must conform to the latest SANS 10111 Codes of Practice.
9. Unspecified radii must be R3.
10. A balanced layout is very important and candidates will be penalised for poor planning.
11. Write neatly and legibly

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QUESTION 1: FUNDAMENTALS OF ENGINEERING DRAWING, ELECTRICAL FITTINGS AND WELDING SYMBOLS

NOTE: Answer this question on the attached ANSWER SHEET and submit with DRAWING SHEET.

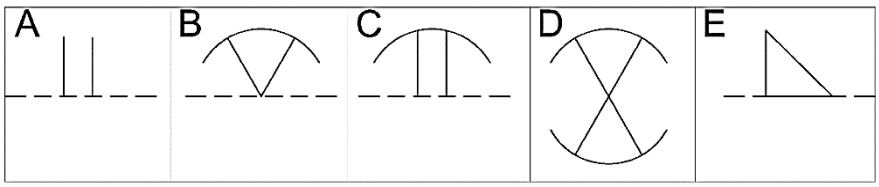
1.1 Give THREE advantages of computer-aided draughting programs. (3)

1.2 Give TWO advantages of laser printers. (2)

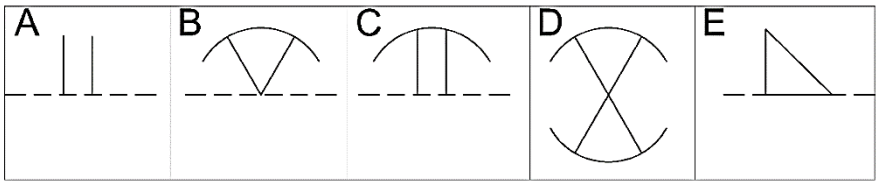
1.3 Make a freehand drawing of a PVC elbow inspection coupling. (5)

1.4 Various options are given as possible answers to the following questions. Choose the correct answer and write only the letter (A–E) next to the question number (1.4.1–1.4.5) on the attached ANSWER SHEET.

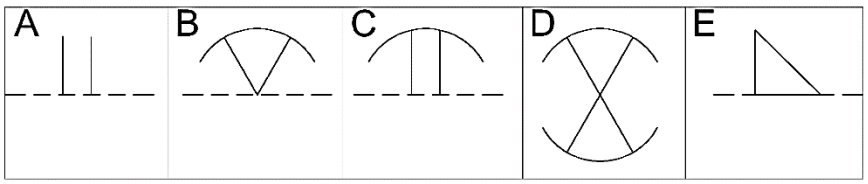
1.4.1 Which ONE of the welding symbols indicates a square butt joint?



1.4.2 Which ONE of the welding symbols indicates a single V-bevelled joint?



1.4.3 Which ONE of the welding symbols indicates a double V-bevelled joint?



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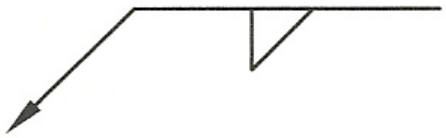
1.4.4 Identify the welding symbol:



A Arrow-side fillet weld
B Other-side fillet weld
C Arrow-side lap weld
D Other-side lap weld

1.4.5 Identify the welding symbol:

A Single V-groove weld
B Double V-groove weld
C Single V arrow-side groove weld
D Double V other-side groove weld

(5 × 1) (5)
[15]

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QUESTION 2: SCREW THREADS

FIGURE 1 shows a front view and a right view of a socket-head bolt.

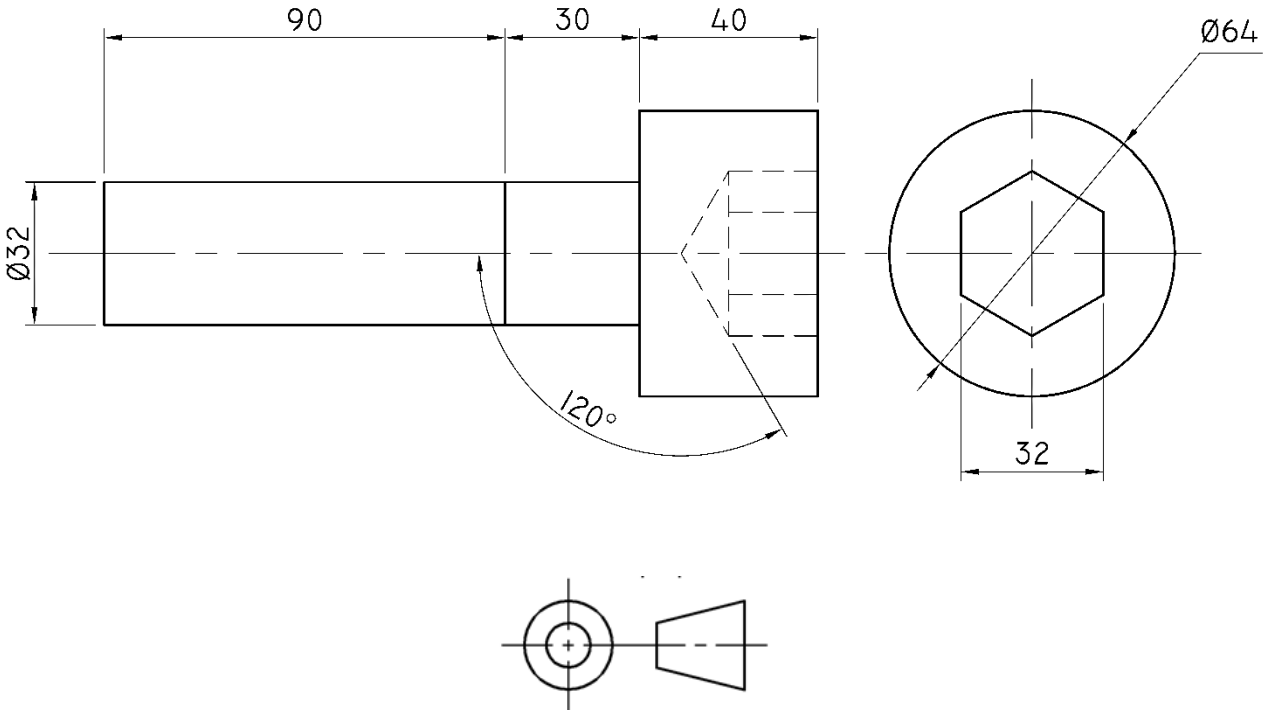

FIGURE 1

Draw to scale 1:1 the given front view of the socket-head bolt. Provide the length 90 mm of the shank with a single-start external right-hand V-screw thread. The pitch is 5 mm. Draw the screw thread in a horizontal position.

Show all hidden detail. (6)

Line work, accuracy, layout and neatness (4)

[10]

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QUESTION 3: FIRST-ANGLE ORTHOGRAPHIC PROJECTION

FIGURE 2, on the next page, shows the primary views in first angle orthographic projection of a casting bolted to a 175 × 120 ×10 mm base plate. The casting and base plate are assembled together by means of 2 × M12 × 35 mm hexagonal bolts, washers and nuts through the Ø12 holes. The bolts, washers and nuts have been omitted. The casting is bolted in the middle of the base plate.

3.1 Draw, to scale 1:1, the following views in first-angle orthographic projection:

3.1.1 An outside front view with the securing bolts, washers and nuts in their correct position. No hidden detail is required. (5)

3.1.2 A sectional left view on cutting plane A-A with the securing bolts, washers and nuts in position (7)

3.2 Print the title and scale beneath the layout:

CASTING CONNECTION
SCALE 1:1 (2)

3.3 Insert the first-angle orthographic projection symbol below the title and scale. (1)

3.4 Layout, neatness, linework and accuracy (5)

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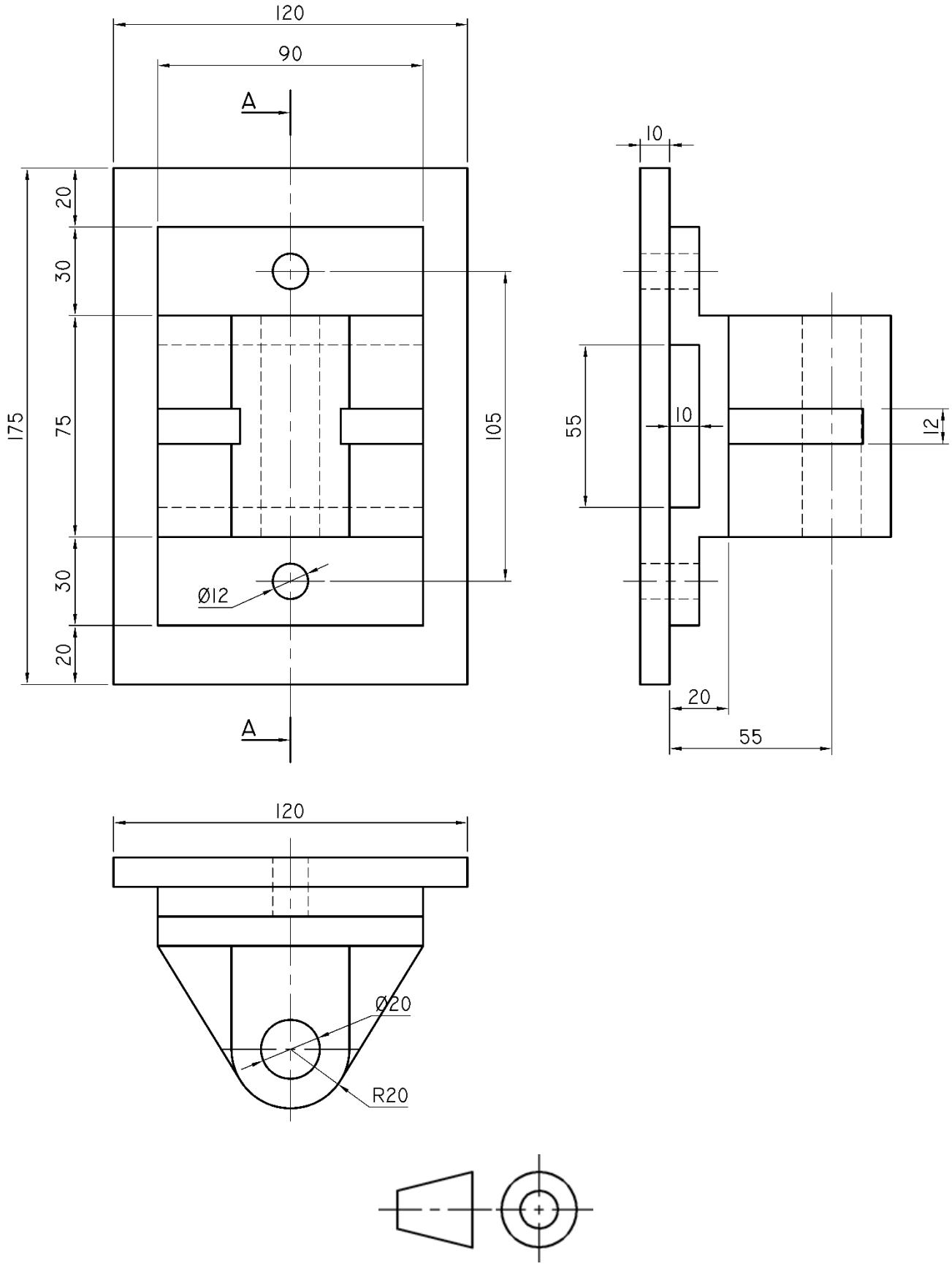

FIGURE 2

[20]

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QUESTION 4: ISOMETRIC

FIGURE 3 shows two views of a casting drawn in third-angle orthographic projection.

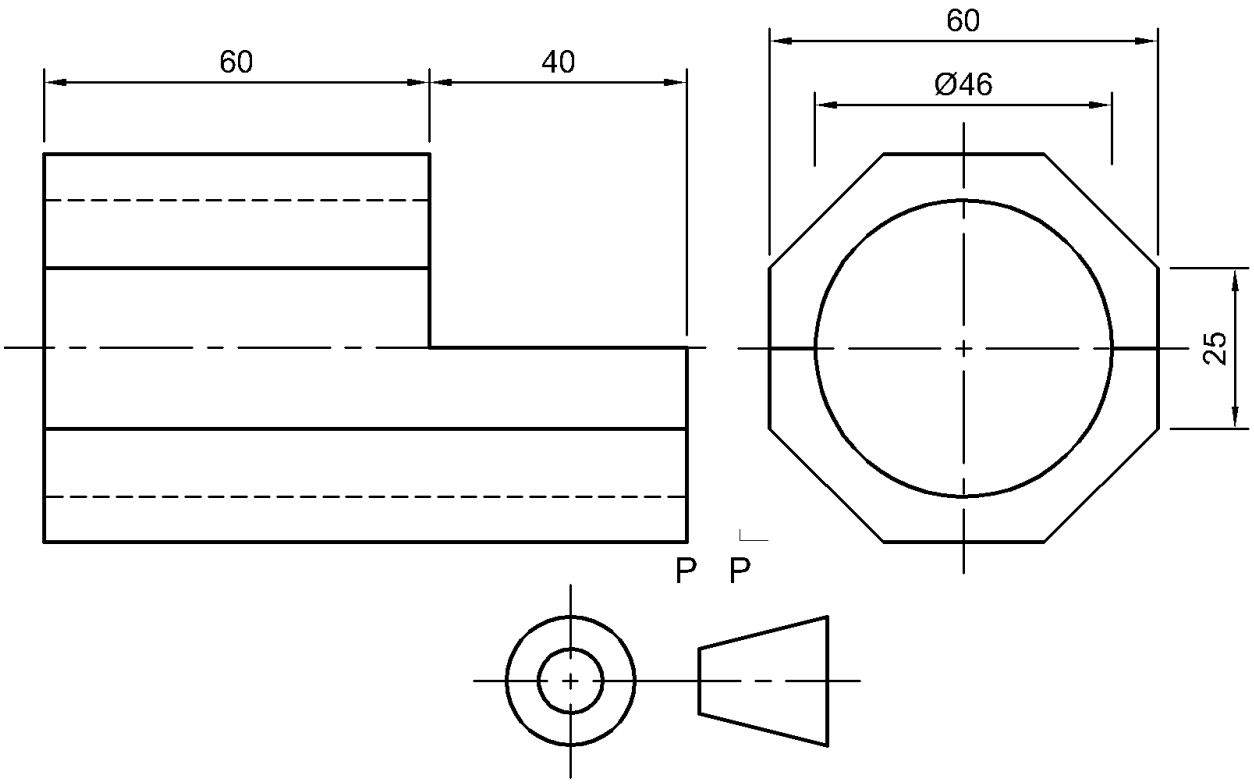

FIGURE 3

Do not redraw the given views, but draw, to scale 1:1, an isometric view of the casting.

Point P must be the lowest point.

No hidden detail is required.

[15]

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QUESTION 5: INTERPENETRATION

FIGURE 4 shows two views of a cylinder and an equilateral triangle without interpenetration lines.

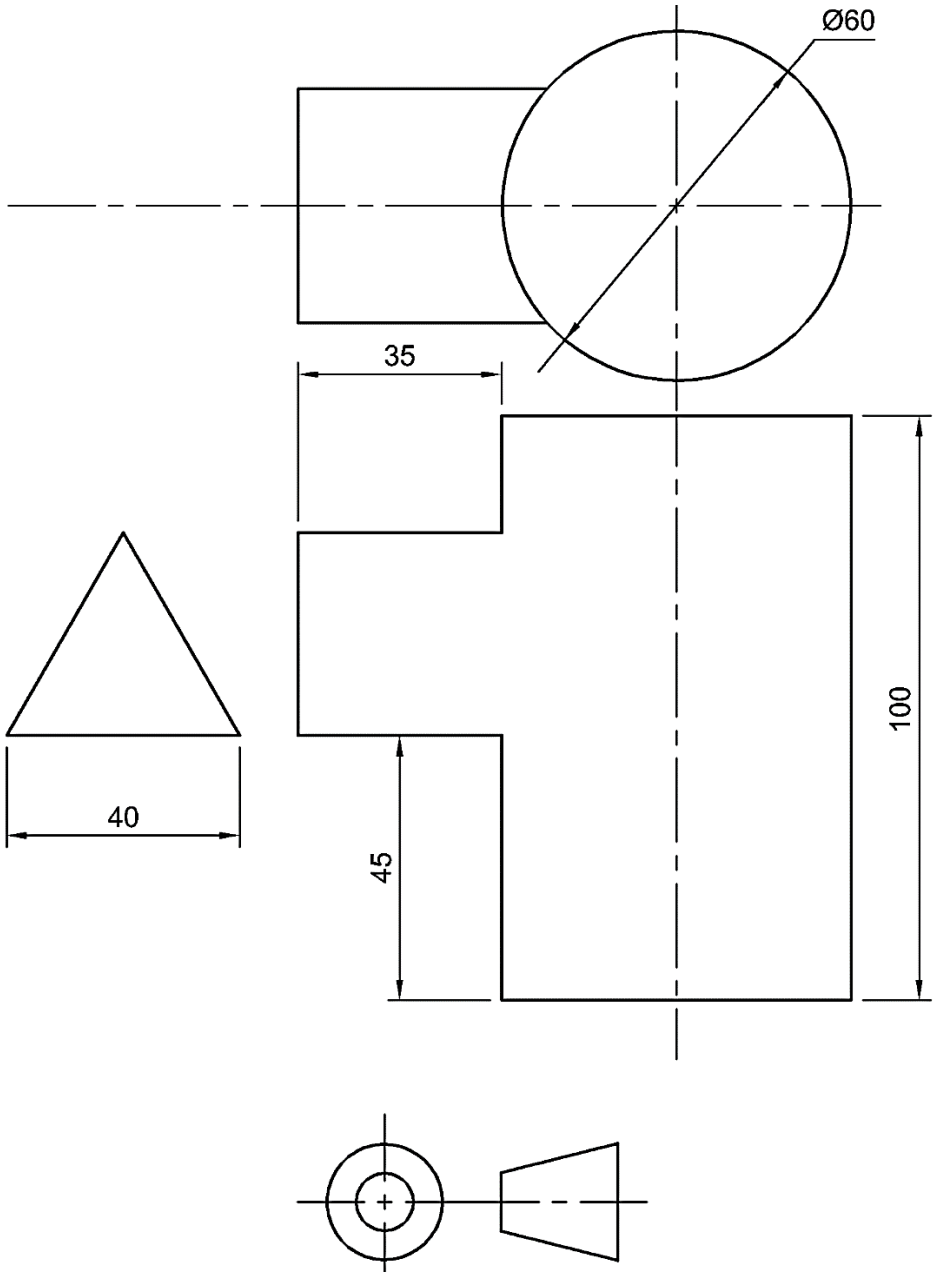

FIGURE 4

5.1 Redraw, to scale 1:1, the TWO given views in third-angle orthographic projection. (4)

5.2 Show the interpenetration curve on the front view. (3)

5.3 Show all construction lines needed to project the curve of interpenetration. (3)

5.4 Linework and accuracy (3)

[13]

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QUESTION 6: THIRD-ANGLE ORTHOGRAPHIC PROJECTION AND MACHINE SYMBOLS

FIGURE 5 on the next page shows two views of a square to round flange.

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

6.1.1 A full sectional front view (6)

6.1.2 An outside right view without hidden detail (6)

6.1.3 An outside top view without hidden detail (6)

6.2 Insert the third-angle orthographic projection symbol centrally below the views (1)

6.3 At A, indicate that a surface texture with a roughness value of 25 um and the finish must be produced by grinding by means of a machining symbol. (2)

6.4 Layout, neatness, linework and accuracy (6)

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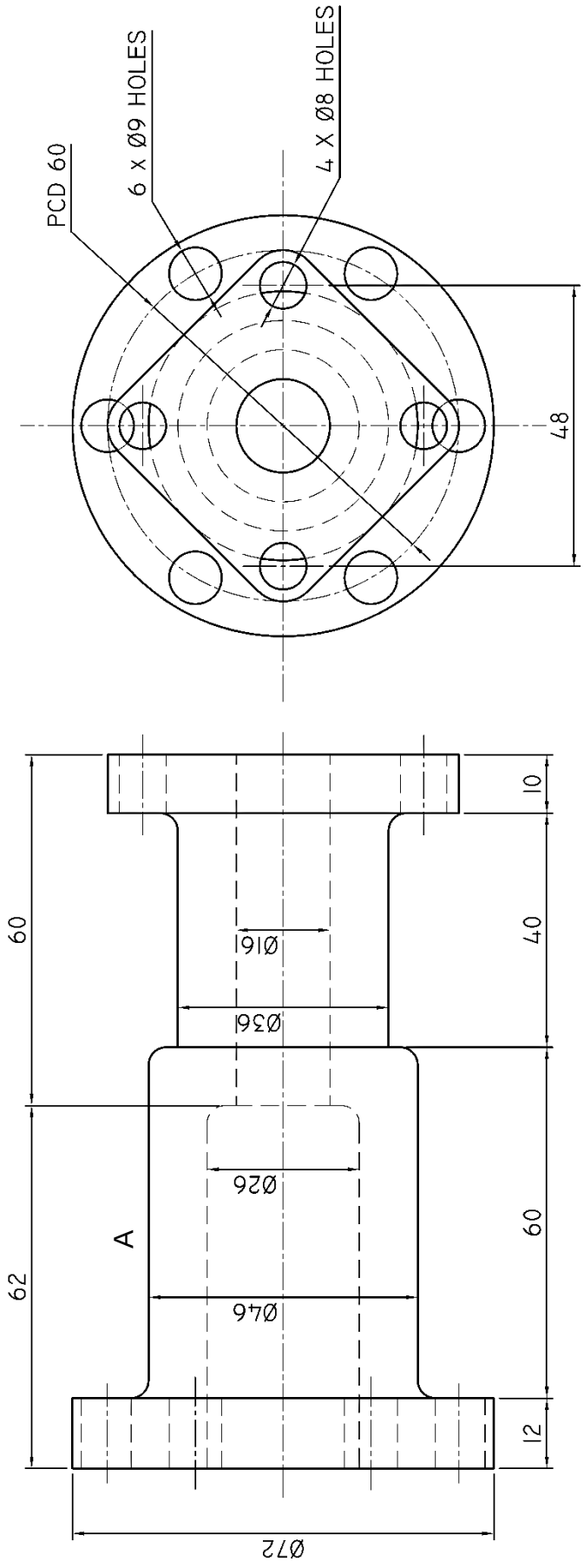

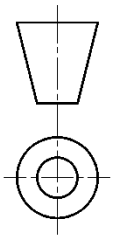

FIGURE 5

[27]

TOTAL: 100

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ANSWER SHEET:

EXAMINATION NUMBER:

CENTRE NUMBER: 9 9 9 9

1.1 1.1.1

1.1.2

1.1.3

(3 x 1) (3)

1.2 1.2.1

1.2.2

(2 x 1) (2)

1.3

(5 × 1) (5)

1.4 1.4.1
1.4.2
1.4.3
1.4.4
1.4.5

(5 x 1) (5)
[15]

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