higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

ENGINEERING

T1070(E)(N11)T
NOVEMBER EXAMINATION

NATIONAL CERTIFICATE

METAL WORKERS' THEORY N1

(11022061)

11 November 2014 (Y-Paper)
13:00–16:00

Drawing instruments and calculators may be used.

This question paper consists of 6 pages and 2 diagram sheets.

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DEPARTMENT OF HIGHER EDUCATION AND TRAINING
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE
METAL WORKERS' THEORY N1
TIME: 3 HOURS
MARKS: 100

INSTRUCTIONS AND INFORMATION

1. Answer ALL the questions.
2. QUESTION 3 must be answered on the DIAGRAM SHEET (attached) and then be handed in.
3. Read ALL the questions carefully.
4. Number the answers according to the numbering system used in this question paper.
5. Keep ALL the subsections of questions together.
6. Show ALL the calculation steps.
7. Use $\pi = 3,142$.
8. Write neatly and legibly.

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QUESTION 1

State FIVE safety precautions that must be considered when storing gas cylinders. **[5]**

QUESTION 2

2.1 Make a neat labelled sketch of a ball-pein hammer. (3)

2.2 Name FOUR characteristics that should be considered when buying a new file. (4)

2.3 State the use of each of the following marking-off tools:

2.3.1 Measuring tape

2.3.2 Dividers

2.3.3 Bevel gauge

2.3.4 Inside callipers

2.3.5 Scriber

(5 × 1) (5)

2.4 The following measurements will be used to mark-off the right-angled steel plate:

Hypotenuse side = 365 mm
Vertical side = 246 mm

Calculate the horizontal side of the plate.

HINT: $R^2 = H^2 + V^2$ (3)
[15]

QUESTION 3

Use DIAGRAM SHEET 1 (attached) to answer this question. Drawing instruments must be used.

FIGURE 1 DIAGRAM SHEET 1 (attached) shows a T-piece between two equal diameter steel pipes.

3.1 Draw the line of penetration between the TWO pipes. (2)

3.2 Calculate the circumference of the 36 mm diameter pipe. (2)

3.3 Develop the shape of the hole in the main pipe. (2)

3.4 Develop the pattern of the branch pipe. (4)

HINT: C = 3,142 x D

Hand in DIAGRAM SHEET 1 together with the ANSWER BOOK. **[10]**

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QUESTION 4

4.1 Distinguish, in tabular form, between *mild steel* and *high-carbon steel* with reference to the following:

4.1.1 Carbon content

4.1.2 Metal properties

4.1.3 Uses

(3 × 2) (6)

4.2 Define the term *brittleness.* (1)

4.3 Write the abbreviations for the following:

4.3.1 Rolled steel joist

4.3.2 Drawing

4.3.3 Revolutions per minute

(3 × 1) (3)

4.4 Calculate the back mark of the 70 mm × 90 mm × 6 mm channel iron. The diameter of the hole to be drilled is 10 mm. (2)

[12]

QUESTION 5

5.1 FIGURE 2, DIAGRAM SHEET 2 (attached) shows three machines used in a metal workshop.

Identify the machines numbered (5.1.1–5.1.3) and state the function of each.

(2 × 3) (6)

5.2 State FOUR safety precautions that should be considered when using the bending machine. (4)

[10]

QUESTION 6

6.1 Draw neat labelled sketches to describe a single-riveted butt joint with TWO rivets in position. (2)

6.2 Refer to QUESTION 6.1 above to explain the following:

6.2.1 Snap or cup head rivet (2)

6.2.2 Pitch (1)

6.2.3 Landing (1)

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6.3 State the function of each of the following fastening devices:

6.3.1 Countersunk bolts

6.3.2 High-carbon steel bolts

(2 × 2) (4)
[10]

QUESTION 7

7.1 Name FIVE safety protective equipment that must be worn during gas welding and give the reason for each. (5 × 1) (5)

7.2 State the types of the welding flame settings used in the following:

7.2.1 Welding stainless steel

7.2.2 Brazing mild steel

(2 × 1) (2)

7.3 State THREE functions of pressure regulators. (3)

7.4 Briefly explain the procedure that should be followed when welding in a confined or hidden places using oxy-acetylene gas equipment. (5)
[15]

QUESTION 8

8.1 Explain the following as applied to arc welding and give ONE example of each:

8.1.1 Insulators

8.1.2 Conductors

(2 × 2) (4)

8.2 Define the following welding terms:

8.2.1 Direct current (2)

8.2.2 Metal inert-gas welding (3)

8.2.3 Straight polarity (2)

8.3 State FOUR advantages of using direct-welding machine. (4 × 1) (4)
[15]

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QUESTION 9

FIGURE 3, DIAGRAM SHEET 2 (attached) shows the front view of a chain link.

Calculate the length required to form 20 chain links. [8]

TOTAL: 100

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EXAMINATION NUMBER:

DIAGRAM SHEET 1

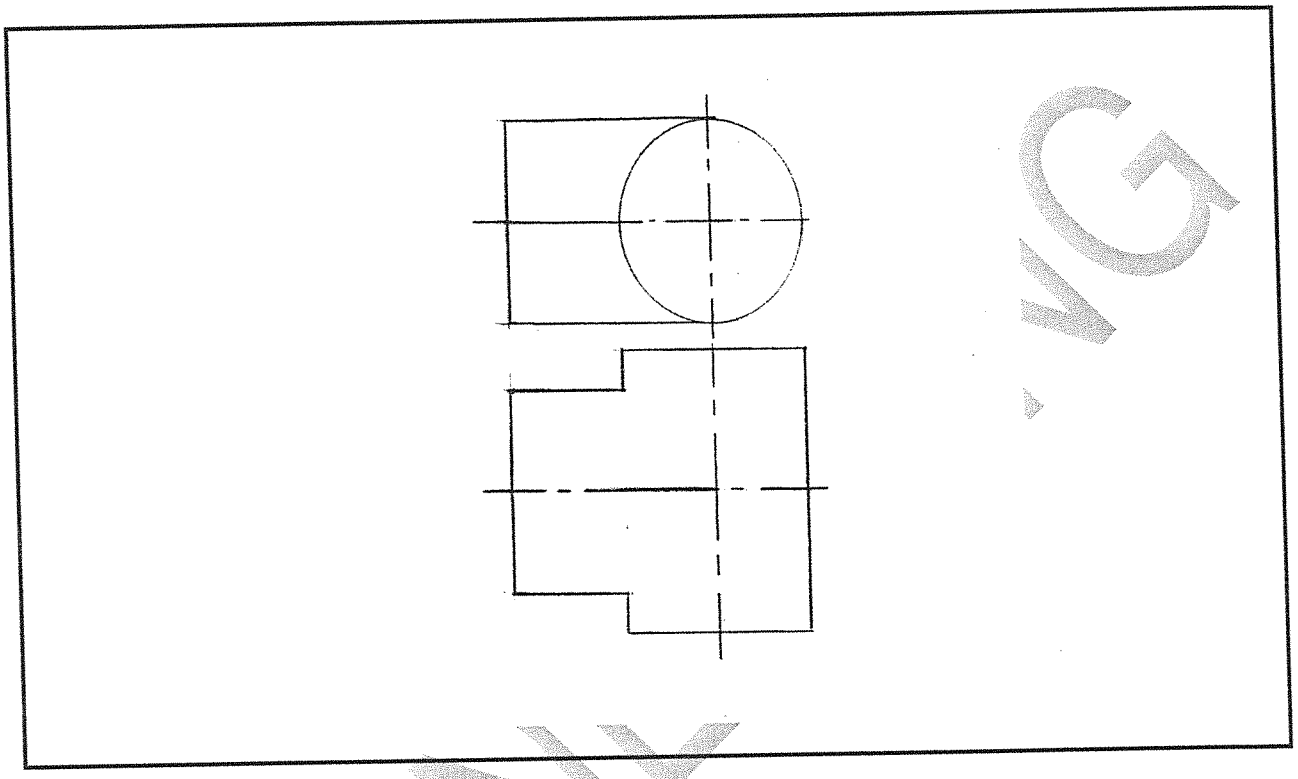
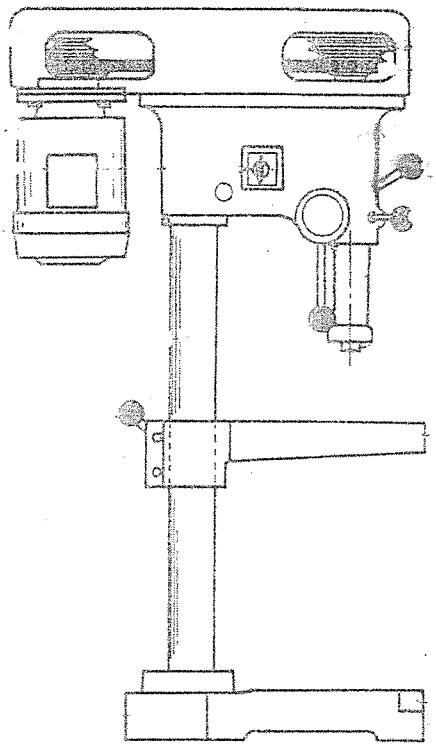


FIGURE 1

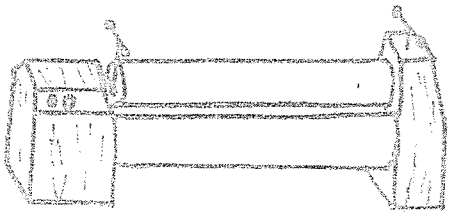
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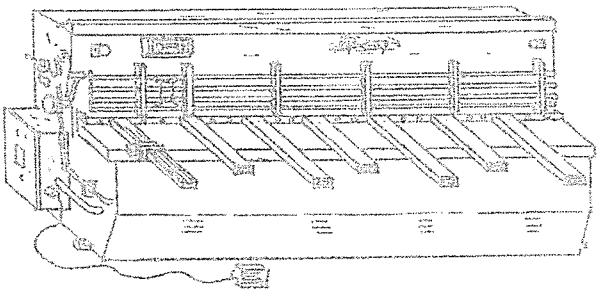
DIAGRAM SHEET 2



5.1.1



5.1.2



5.1.3

FIGURE 2

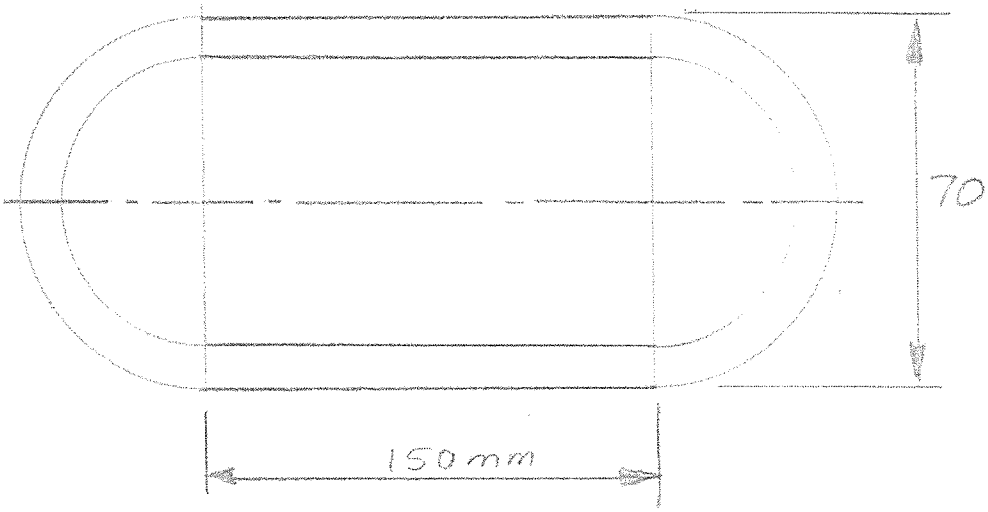


FIGURE 3

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