higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE

METAL WORKERS' THEORY N1

(11022061)

22 November 2022 (X-paper)
09:00–12:00

Drawing instruments and nonprogrammable calculators may be used.

This question paper consists of 6 pages.

142Q1E2222

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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. Read all the questions carefully.
3. Number the answers according to the numbering system used in this question paper.
4. Start each question on a new page.
5. Use only a black or blue pen.
6. Write neatly and legibly.

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QUESTION 1: SAFETY AND HOUSEKEEPING

Indicate whether the following statements are TRUE or FALSE by writing only 'True' or 'False' next to the question number (1.1–1.5) in the ANSWER BOOK.

1.1 It is safe to work under suspended loads in a boilermaking workshop.

1.2 Gas cylinders should be stored in a special fire-resistant storeroom.

1.3 One of the safety precautions to observe when working with electricity is that electricity may be touched with wet hands.

1.4 All ear-protection equipment should be kept clean and free from dirt.

1.5 Heavy-duty gloves must be used in the workshop.

(5 × 1) **[5]**

QUESTION 2: CARE AND USE OF TOOLS

2.1 Give the use of each of the following hand tools:

2.1.1 Centre punch

2.1.2 Hacksaw

2.1.3 Barrel drift

2.1.4 Sledge hammer

2.1.5 Flat file

(5 × 1) (5)

2.2 Name the correct marking-off tool that should be used in each of the following cases:

2.2.1 Measuring the outside diameter of the shaft

2.2.2 Marking off bevels on steel sections

2.2.3 Checking the accuracy of small jobs

2.2.4 Marking the centres of holes before it is punched

2.2.5 Marking off large arcs or circles

(5 × 1) (5)

2.3 State FOUR characteristics to consider when buying a file. (4)

2.4 What is the function of a G-clamp? (1)

[15]

QUESTION 3: DEVELOPMENTS

Name FIVE types of lines that are used when drawing a T-piece and developing the pattern of the branch pipe. State the function of each line. (5 × 2) **[10]**

QUESTION 4: METALS, PLATES AND SECTIONS

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

4.3.1 Rolled steel joist

4.3.2 Drawing

4.3.3 Outside diameter

(3 × 1) (3)

4.4 Calculate the back mark of a 70 mm × 90 mm × 6 mm channel iron. The diameter of the hole to be drilled is 10 mm. (2)
[12]

QUESTION 5: MACHINES

5.1 State FIVE safety precautions to observe when using a punch, shear and cropping machine. (5)

5.2 State FIVE safety precautions to observe when using guillotine machine. (5)
[10]

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QUESTION 6: JOINTS AND BOLTED JOINTS

6.1 Name TWO types of washers used in general structural work and explain the use of each. (2 × 2) (4)

6.2 Explain each of the following terms that relates to riveting:

6.2.1 Landing

6.2.2 Pitch

(2 × 1) (2)

6.3 Give the use of each of the following devices:

6.3.1 Black bolts

6.3.2 Countersunk bolts

(2 × 2) (4)

[10]

QUESTION7: OXY-ACETYLENE AND LPG CUTTING AND WELDING

7.1 Complete the following table showing different types of cylinders used in cutting or welding by writing only the answer next to the question number (7.1.1–71.1.5) in the ANSWER BOOK.

CYLINDER	COLOUR	THREAD TYPE
7.1.1 …	Black	7.1.2 …
Acetylene	7.1.3	Left-hand thread
7.1.4	Silver	7.1.5

(5 × 1) (5)

7.2 Explain how to test oxy-acetylene equipment for any gas leaks. (5)

7.3 Illustrate, with the aid of a sketch, the rightward welding technique showing the direction of the weld, angle of the filler rod and angle of the gas-welding torch. (3)

7.4 Name TWO types of safety clothing that should be worn when working with oxy-acetylene equipment. (2)

[15]

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QUESTION 8: METAL ARC WELDING

8.1 Give the use of each of the following welding tools/equipment:

8.1.1 AC welding machine

8.1.2 Wire brush

8.1.3 Earth cable and clamp

(3 × 1) (3)

8.2 Give FIVE advantages of an AC welding machine. (5)

8.3 Briefly explain the purpose of coating an electrode with flux. (3)

8.4 Explain each of the following welding terms:

8.4.1 Reverse polarity

8.4.2 Metal inert gas welding

(2 × 2) (4)
[15]

QUESTION 9: CALCULATIONS AND PLANNING

The following information is given to manufacture two stiffening rings:

Internal diameter of a mild-steel cylinder:	840 mm
Thickness of the mild-steel cylinder:	10 mm
Thickness of the flat bar used to manufacture the stiffening ring:	12 mm

Calculate:

9.1 The length required to form the internal stiffening ring

9.2 The length required to form the external stiffening ring

(2 × 4) **[8]**

TOTAL: 100

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