higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE

METAL WORKERS' THEORY N1

(11022061)

2 August 2021 (X-paper)
09:00–12:00

Drawing instruments and nonprogrammable calculators may be used.

This question paper consists of 6 pages and 1 addendum.

144Q1G2102

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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 section 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

Describe an accident that can arise from the following:

1.1 A workpiece is not clamped properly on the table of the drilling machine.

1.2 A hammer with a loose head is used.

1.3 An emery wheel is used without wearing goggles.

1.4 A chisel with a mushroomed head is used.

1.5 Carrying large plates with sharp edges without wearing safety gloves.

(5 × 1) **[5]**

QUESTION 2: CARE FOR AND USE OF TOOLS

2.1 Name the instrument you would use to do the following:

2.1.1 Determine the outside diameter of a round shaft.

2.1.2 Determine the inside diameter of a round hole.

2.1.3 Draw a long straight line.

2.1.4 Do heavy work, drive in wedges and posts, or do forging work.

2.1.5 Fasten or loosen nuts and bolts.

(5 × 1) (5)

2.2 State a particular job in the workshop where each of the following marking-off tools could be used:

2.2.1 Steel tape

2.2.2 Folding rule

2.2.3 Trammel

2.2.4 Centre punch

2.2.5 Try square

(5 × 1) (5)

2.3 The following dimensions are given for the 3-4-5 method to produce a right-angled triangle.

The dimensions of 3 and 4 are given respectively as 90 mm × 120 mm. Calculate the third side (5) of the right-angled triangle.

HINT: $X^2 + Y^2 = R^2$ (3)

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2.4 Indicate whether the following statements are TRUE or FALSE. Choose the answer and write only 'True' or 'False' next to the question number (2.4.1–2.4.2) in the ANSWER BOOK.

2.4.1 Sometimes you can use a try square as a hammer.

2.4.2 It will be good for an artisan to work on an oily surface.

(2 × 1) (2)
[15]

QUESTION 3: DEVELOPMENTS (PARALLEL LINE METHOD)

Refer to the ADDENDUM (attached). Make use of drawing instruments to draw a T-piece that is manufactured from two pipes of unequal diameter. The diameter of the main pipe is 70 mm.

3.1 Contrast the line of penetration between the two pipes. (2)

3.2 Show the shape of the hole in the main pipe. (2)

3.3 Calculate the circumference of the 44 mm diameter branch pipe. (2)

3.4 Develop the pattern of the branch pipe.

HINT: C = 3,142 × D (4)
[10]

QUESTION 4: METALS

4.1 Give ONE word for each of the following descriptions by writing it next to the question number (4.1.1–4.1.2) in the ANSWER BOOK.

4.1.1 It is corrosion-resistant, heat-resistant, creep-resistant and abrasion-resistant.

4.1.2 It is very light, soft, malleable, ductile and corrosion-resistant, and it is a good conductor of heat and electricity.

(2 × 2) (4)

4.2 Define the following terms:

4.2.1 Toughness

4.2.2 Elasticity

4.2.3 Malleability

(3 × 1) (3)

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4.3 Give the full meaning of the following abbreviations:

4.3.1 DRG

4.3.2 GALV

(2 × 1) (2)

4.4 Name THREE types of steel profiles commonly used in metal work. (3)
[12]

QUESTION 5: MACHINES

Different machines are used by an artisan to cut, bend and roll the steel plates in the workshop.

State FIVE safety precautions to be taken when using each of the following machines:

5.1 Bending press (5)

5.2 Circular power saw (5)
[10]

QUESTION 6: JOINTS AND BOLTED JOINTS

6.1 Describe where the following bolts are used:

6.1.1 Countersunk bolts

6.1.2 Black bolts

(2 × 2) (4)

6.2 Name THREE types of bolts most commonly used in the workshop. (3)

6.3 Explain the following terms:

6.3.1 Pitch

6.3.2 Lap

6.3.3 Landing

(3 × 1) (3)
[10]

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QUESTION 7: OXYACETYLENE AND LPG CUTTING AND WELDING

7.1 Briefly explain the rightward welding technique. (5)

7.2 Write an essay of not more than 60 words explaining how to test for gas leaks in the oxyacetylene gas cylinders' rubber hoses. (5)

7.3 Introduction to Personal Protective Equipment will give workers a solid overview of what is required of employers for the use of PPE.

Mention FIVE pieces of safety clothing to be worn when cutting or welding and explain the use of each. (5)
[15]

QUESTION 8: METAL ARC WELDING

8.1 State the meaning of the following terms:

8.1.1 Earthing

8.1.2 Electromotive force

8.1.3 Welding machine

8.1.4 Current flow (direct current)

8.1.5 Welding cables

(5 × 1) (5)

8.2 State FIVE safety precautions to be taken by an artisan before, during and after welding. (5)

8.3 Briefly explain the term *alternating current* (AC). (5)
[15]

QUESTION 9: CALCULATIONS

The following information is given to manufacture TWO stiffening rings:

Internal diameter of a mild steel cylinder = 480 mm

Thickness of the mild steel plate = 10 mm

Diameter of the ring = 12 mm

Calculate:

9.1 The length required to form the internal stiffening ring. (4)

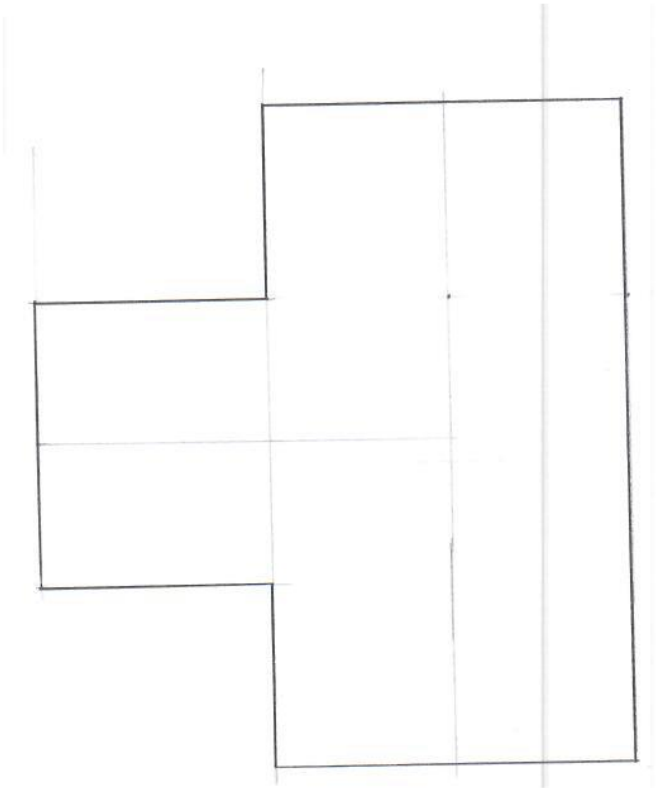
9.2 The length required to form the external stiffening ring. (4)
[8]

TOTAL: 100

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ADDENDUM



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