higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

T1140**(E)**(A4)T

NATIONAL CERTIFICATE

METAL WORKERS' THEORY N1

(11022061)

4 April 2019 (X-Paper)
09:00–12:00

Calculators and drawing instruments may be used.

This question paper consists of 6 pages and 1 addendum.

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. Sketches must be large, neat and fully labelled.
5. Show ALL the calculations where calculations are required.
6. QUESTION 3 must be answered on the ADDENDUM and handed in with the ANSWER BOOK. Make sure that your EXAMINATION NUMBER is written in the space provided.
7. Use $\pi = 3,142$.
8. Write neatly and legibly.

QUESTION 1

Choose a description from COLUMN B that matches an item in COLUMN A. Write only the letter (A–F) next to the question number (1.1–1.5) in the ANSWER BOOK.

COLUMN A		COLUMN B	
1.1	Good housekeeping	A	promotes safety in the workplace
1.2	Unsafe conditions	B	working without authority
1.3	Occupational health and safety act	C	regulates the orderly utilisation of the land
1.4	Minerals act	D	a place for everything and everything in its place
1.5	Unsafe acts	E	poor ventilation
		F	a person employed as a metalworker

(5 × 1) **[5]**

QUESTION 2

2.1 Describe the following with reference to a hacksaw.

2.1.1 The type of steel used in manufacturing the blade

2.1.2 Direction of the cutting teeth

(2 × 1) (2)

2.2 State FOUR aspects to be considered when taking care of hand files. (4)

2.3 State the function of each of the following hand tools:

2.3.1 Sleeve punch

2.3.2 Barrel drift

2.3.3 Boilermaker's chisel

(3 × 1) (3)

2.4 Calculate the length of the hypotenuse side of a right-angled mild steel plate. The vertical sides and the horizontal sides are 370 mm and 240 mm respectively.

HINT: R2 = X2 + Y2 (3)

2.5 Explain the application of the following marking-off tools:

2.5.1 Inside callipers

2.5.2 Scriber

2.5.3 Steel folding rule

(3 × 1) (3)
[15]

QUESTION 3

Use the ADDENDUM (attached) to answer the following questions. Make use of drawing instruments. Write your EXAMINATION NUMBER in the space provided and hand it in with your ANSWER BOOK.

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

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

3.3 Calculate the circumference of a 36 mm diameter branch pipe. (2)

3.4 Develop the pattern of the branch pipe with the aid of drawing instruments. (4)
[10]

QUESTION 4

4.1 Describe cast iron with reference to the following:

4.1.1 Metal properties

4.1.2 Any TWO uses

(2 × 2) (4)

4.2 Define the following metal properties:

4.2.1 Ductility

4.2.2 Toughness

(2 × 1) (2)

4.3 Write out the following abbreviations in full:

4.3.1 DRG

4.3.2 MATL

(2 × 1) (2)

4.4 Calculate the back mark of the following profiles:

4.4.1 Angle iron with a 50 mm flange

4.4.2 A rolled steel channel with an 80 mm flange

(2 × 2) (4)
[12]

QUESTION 5

5.1 State FOUR safety precautions to be considered before and during the use of the following machinery:

5.1.1 Horizontal rolling machine

5.1.2 Circular power saw

(2 × 4) (8)

5.2 Indicate whether the following statements are TRUE or FALSE. Choose the answer and write only 'True' or 'False' next to the question number (5.2.1–5.2.2) in the ANSWER BOOK.

5.2.1 A recommended gap between the work rest and the grinding stone in the pedestal grinding machine is 6 mm.

5.2.2 The guillotine shears all types of steel.

(2 × 1) (2)
[10]

QUESTION 6

6.1 Name TWO types of washers that are used in general structural work and explain their uses. (4)

6.2 Explain the following terms as applicable to riveting:

6.2.1 Landing

6.2.2 Pitch

(2 × 1) (2)

6.3 Describe the use of each of the following devices:

6.3.1 Black bolts

6.3.2 Countersunk bolts

(2 × 2) (4)
[10]

QUESTION 7

7.1 Name TWO types of joints that are used in structural steel work. (2)

7.2 State THREE types of flame settings used in gas welding and describe their gas ratios. (6)

7.3 State FIVE safety precautions that should be considered when welding inside confined spaces, using the oxyacetylene gas welding equipment. (5)

7.4 Explain how you would test for gas leaks in oxyacetylene cutting equipment. (2)

[15]

QUESTION 8

8.1 State SIX safety precautions that should be considered before, during and after arc welding. (6)

8.2 State FOUR advantages of using a DC welding machine. (4)

8.3 Briefly explain the following welding terms:

8.3.1 Earthing (1)

8.3.2 Straight polarity (2)

8.4 Make a freehand drawing of a double V-butt joint. (2)

[15]

QUESTION 9

The external diameter of a mild steel pipe with a thickness of 6 mm is 600 mm. A 10 mm diameter round bar is rolled to form stiffening rings.

Calculate the following:

9.1 The length of the round bar required to form the external stiffening ring

9.2 The length of the round bar required to form the internal stiffening ring

(2 × 4) **[8]**

TOTAL: 100

(11022061)

ADDENDUM **EXAMINATION NUMBER:**