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higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

T1160(E)(N13)T
**NOVEMBER EXAMINATION**

# NATIONAL CERTIFICATE

# METAL WORKERS' THEORY N1

(11022061)

**13 November 2013 (X-Paper)**
**09:00–12:00**

**Calculators may be used.**

**Drawing instruments will be required.**

**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. Keep ALL the subsections of questions together.
5. Show ALL the steps where calculations should be done.
6. QUESTION 3 must be answered on ADDENDUM A and then be handed in.
7. Use $\pi = 3,142$
8. Write neatly and legibly.

## QUESTION 1

State FIVE aspects to be considered when storing acetylene gas cylinders. [5]

## QUESTION 2

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

2.1.1 Flat file

2.1.2 Parallel drift

2.1.3 Centre punch (3 × 1) (3)

2.2 Explain the *angle of presentation* with reference to chisels. (2)

2.3 State FOUR aspects to be considered when buying a new file. (4)

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

2.4.1 Trammels

2.4.2 Inside callipers

2.4.3 Back-mark gauge (3 × 1) (3)

2.5 The vertical and the horizontal sides of a 12 mm thick mild steel plate are 250 mm and 388 mm respectively.

Calculate the hypotenuse.

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

## QUESTION 3

Use FIGURE 1, ADDENDUM A (attached) to answer this question. Drawing instruments must be used.

FIGURE 1 shows a T-piece between two unequal diameter steel pipes.

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

3.2 Calculate the circumference of the 35 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.

HINT: C = 3,142 x D (4)

**[10]**

Hand in ADDENDUM A on completion.

## QUESTION 4

4.1 Define the following metal properties:

4.1.1 Ductility

4.1.2 Hardness

4.1.3 Toughness (3 × 1) (3)

4.2 Describe stainless steel with reference to the following:

4.2.1 Metal properties

4.2.2 Uses (2 × 2) (4)

4.3 State the meaning of the following abbreviations:

4.3.1 RSC

4.3.2 O/D

4.3.3 UB (3 × 1) (3)

4.4 The flange of a steel profile is 90 mm.

Calculate the back mark. (2)

**[12]**

## QUESTION 5

5.1 Describe the function of each of the following machines:

5.1.1 Circular power saw

5.1.2 Radial arm drilling machine (2 × 1) (2)

5.2 State FOUR safety precautions that must be considered during the use of each of the following machinery:

5.2.1 Bending press

5.2.2 Pedestal grinding machine

(2 × 4) (8)
**[10]**

## QUESTION 6

6.1 State THREE types of rivets commonly used in riveting work. (3)

6.2 Calculate the length of the rivet that is required to fasten two 12 mm thick plates. Use an 18 mm diameter rivet. (3)

6.3 Compare the following fastening devices in terms of their structure and uses:

6.3.1 Countersunk bolts

6.3.2 Black bolts

(2 × 2) (4)
**[10]**

## QUESTION 7

7.1 State FIVE personal protective equipment that should be worn during gas welding and give reasons for their use. (5)

7.2 Define the function of each of the following gas welding components:

7.2.1 Welding hose

7.2.2 Flashback arrestor

7.2.3 Cutting torch

(3 × 1) (3)

7.3 Explain why regulators should be slowly opened. (2)

7.4 Describe how to test for gas leaks. (2)

7.5 State THREE aspects to consider when rectifying backfire. (3)
**[15]**



## QUESTION 8

8.1 State FIVE safety precautions that should be considered during the arc-welding process. (5)

8.2 State the use of the following welding tools:

8.2.1 Welding machine

8.2.2 Welding cable and electrode holder

8.2.3 Welding helmet

(3 × 1) (3)

8.3 State THREE disadvantages of using an alternating welding machine. (3)

8.4 Describe the following welding terms:

8.4.1 Earthing

8.4.2 Direct-current reverse polarity

(2 × 2) (4)
**[15]**

## QUESTION 9

A mild steel cylinder is made by using the following measurements:

The internal diameter = 262 mm
The height of the cylinder = 800 mm
The thickness of the mild steel plate = 8 mm

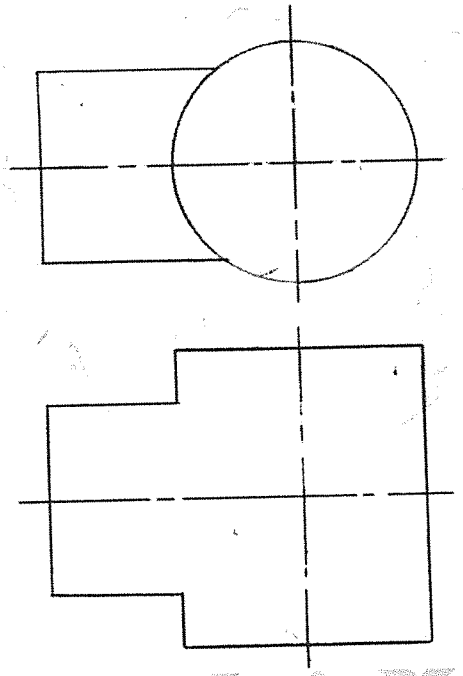
9.1 Calculate the length of the material required to form the cylinder. (3)

9.2 Calculate the length of the material required to form the external stiffening with 12 mm round bar. (5)
**[8]**

**TOTAL: 100**

**ADDENDUM A** **EXAMINATION NUMBER:**

**FIGURE 1**





3.2 _____

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(2)