



# higher education & training

Department:  
Higher Education and Training  
**REPUBLIC OF SOUTH AFRICA**

T1080(E)(M30)T  
**APRIL EXAMINATION**

**NATIONAL CERTIFICATE**

**METAL WORKERS' THEORY N1**

(11022061)

**30 March 2016 (X-Paper)**  
**9:00–12:00**

**REQUIREMENTS:** Drawing instruments

**Calculators 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 WORKER'S THEORY N1  
TIME: 3 HOURS  
MARKS: 100

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**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 should be answered on the ADDENDUM and handed in.
  7. Use  $\pi = 3,142$
  8. Write neatly and legibly.
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**QUESTION 1**

- 1.1 Define an *accident*. (2)
- 1.2 State the legislation act that caters for safety in the workplace. (3)
- [5]**

**QUESTION 2**

- 2.1 State the hand tool that will be used for the following:
- 2.1.1 Cutting square or rectangular grooves into metal
  - 2.1.2 For lining up the holes for bolting or riveting work
  - 2.1.3 To grip pipes or badly worn nuts
  - 2.1.4 For removing waste or excess metal and cutting rods, bars or plates
  - 2.1.5 For filing softer metals such as brass and copper
- (5 × 1) (5)
- 2.2 Describe the angle of presentation with reference to chisels. (2)
- 2.3 Describe the function of each of the following marking-off tools:
- 2.3.1 Scriber
  - 2.3.2 Inside callipers
  - 2.3.3 Trammels
  - 2.3.4 Chalk line
  - 2.3.5 Steel folding rule
- (5 × 1) (5)
- 2.4 A right-angled gusset steel plate is to be manufactured using the following measurements:
- The vertical side = 250 mm  
The horizontal side = 164 mm  
Calculate the length of its hypotenuse side.  
HINT:  $R^2 = H^2 + V^2$
- (3)  
**[15]**

**QUESTION 3**

Use FIGURE 1 on the ADDENDUM (attached) to answer this question. Drawing instruments should 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 33 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. (2)

HINT:  $C = 3,142 \times D$

Hand in the ADDENDUM on completion inside your ANSWER BOOK.

(4)  
**[10]**

**QUESTION 4**

- 4.1 State the meaning of the following abbreviations:
  - 4.1.1 UB
  - 4.1.2 O/D
  - 4.1.3 SOP

(3 × 1) (3)
- 4.2 Define the following metal properties:
  - 4.2.1 Hardness
  - 4.2.2 Toughness
  - 4.2.3 Elasticity

(3 × 1) (3)
- 4.3 Describe the nature of the mild steel with reference to the following:
  - 4.3.1 Colour (1)
  - 4.3.2 Carbon content (1)
  - 4.3.3 Uses (2)
- 4.4 Calculate the back mark of a 220 mm x 80 mm rolled steel channel in reference to its flange. (2)

**[12]**

**QUESTION 5**

5.1 Name FIVE safety precautions that should be considered before and during the use of each machine stated below:

5.1.1 Guillotine

5.1.2 Pedestal grinding machine

(2 × 5) [10]

**QUESTION 6**

6.1 Draw the front and top views of a double riveted lap joint with the snap head rivet in position. (3)

6.2 Define the following terms as applicable to assembly work:

6.2.1 Pitch

6.2.2 Landing

(2 × 1) (2)

6.3 Calculate the length of a black bolt that will be used for assembling THREE 12 mm thick steel plates. The maximum diameter of the hole to be drilled is 18 mm. (3)

6.4 Explain the use of the countersunk bolt during assembly work. (2)

[10]

**QUESTION 7**

7.1 State the function of each of the following gas apparatus:

7.1.1 Welding torch

7.1.2 Welding hose

7.1.3 Oxygen pressure gauge

7.1.4 Acetylene flash back arrestor

7.1.5 LP-gas cylinder

(5 × 1) (5)

- 7.2 Describe the following oxyacetylene gas flame settings and their function:
- 7.2.1 Neutral
- 7.2.2 Oxidising
- (2 × 2) (4)
- 7.3 State FOUR causes of backfire during gas cutting. (4)
- 7.4 Explain how to extinguish the flame in the oxyacetylene welding process. (2)
- [15]**

### QUESTION 8

- 8.1 Define the *shielded arc welding process*. (2)
- 8.2 Name SIX protective clothing that should be worn during arc welding and give reasons. (6)
- 8.3 Indicate whether the following statements are TRUE or FALSE. Choose the answer and write only 'true' or 'false' next to the question number (8.3.1–8.3.3) in the ANSWER BOOK.
- 8.3.1 Slag protects the weld from atmospheric pollution.
- 8.3.2 A low current results in a good welding joint.
- 8.3.3 Porosity is the result of an incorrect welding rod.
- (3 × 1) (3)
- 8.4 State FOUR disadvantages in using a direct-current welding machine. (4)
- [15]**

### QUESTION 9

The internal diameter of a cylinder is 670 mm made out of a 6 mm thick steel plate. The cylinder is secured with a 10 mm thick stiffening ring.

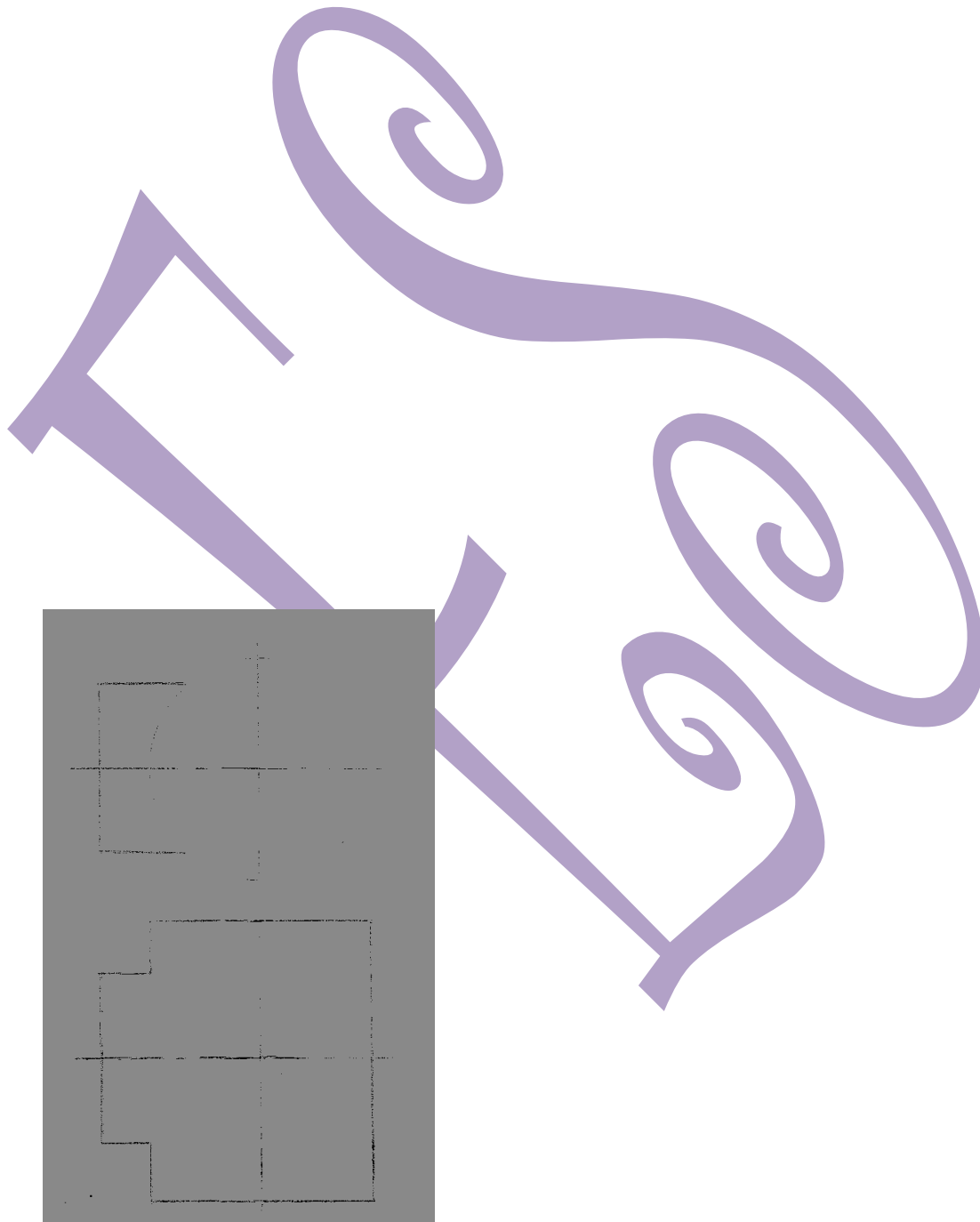
- 9.1 Calculate the length of the material required to form the cylinder.
- 9.2 Calculate the length of a round bar required to form a stiffening ring.
- (2 × 4) **[8]**

**TOTAL: 100**

**ADDENDUM**

**EXAMINATION NUMBER:**

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**FIGURE 1**