



higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

T1140(E)(J31)T

NATIONAL CERTIFICATE

METAL WORKERS' THEORY N1

(11022061)

31 July 2018 (X-Paper)

09:00–12:00

REQUIREMENTS: Candidates need drawing instruments.

Nonprogrammable calculators may be used.

This question paper consists of 6 pages and 1 answer sheet.

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. Answer QUESTION 3 on the ANSWER SHEET (attached).
 5. Fill in your examination number on the ANSWER SHEET and hand it in with your ANSWER BOOK.
 6. Keep ALL the subsections of questions together.
 7. Show ALL calculation steps.
 8. Write neatly and legibly.
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QUESTION 1

Name FIVE safety precautions to be observed when storing gas cylinders. **[5]**

QUESTION 2

2.1 Name FIVE points to remember before starting to use a hacksaw blade. (5)

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

2.2.1 Ball-peen hammer

2.2.3 Parallel drift

2.2.3 Flat file

(3 × 1) (3)

2.3 Describe the purpose of each of the following marking-off tools:

2.3.1 Chalk line

2.3.2 Inside calipers

2.3.3 Try square

2.3.4 Bevel gauge

(4 × 1) (4)

2.4 Calculate the hypotenuse of the right-angled triangle of a 12 mm thick mild steel plate. The base and the height are 185 mm and 350 mm respectively.

HINT: $R^2 = X^2 + Y^2$

(3)
[15]

QUESTION 3

Detach the ANSWER SHEET (attached). Use drawing instruments to answer QUESTION 3.1, 3.2 and 3.4 on the ANSWER SHEET. Fill in your examination number on the ANSWER SHEET and hand it in with your ANSWER BOOK.

The FIGURE on the ANSWER SHEET shows two views of a T-piece manufactured from two unequal diameter pipes.

3.1 Construct 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 50 mm diameter branch pipe. (2)

3.4 With the aid of drawing instruments, develop the pattern of the branch pipe.

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

(4)
[10]

QUESTION 4

- 4.1 Distinguish, in tabular form, between mild steel and high-carbon steel with reference to 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 down the abbreviations for the following:
- | | | | |
|-------|--------------------|---------|-----|
| 4.3.1 | Rolled steel joist | | |
| 4.3.2 | Drawing | | |
| 4.3.3 | Outside diameter | (3 × 1) | (3) |
- 4.4 You need to drill a hole with a diameter of 10 mm.
Calculate the back mark of the 70 mm x 90 mm x 6 mm channel iron. (2)
[12]

QUESTION 5

- 5.1 Name FIVE safety precautions to be observed when using a punch, shear, and cropping machine. (5)
- 5.2 Name FIVE safety precautions to be observed when using a guillotine. (5)
[10]

QUESTION 6

- 6.1 Name THREE types of rivet heads used in assembly. (3)
- 6.2 Explain the following terms used in fabrication work:
- | | | |
|-------|---------|-----|
| 6.2.1 | Landing | (1) |
| 6.2.2 | Pitch | (1) |
- 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 countersunk bolts 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 Acetylene gas cylinder
 - 7.1.3 Pressure regulator
 - 7.1.4 Flash back arrestor
 - 7.1.5 Welding hose
- (5 × 1) (5)
- 7.2 Describe the following oxyacetylene gas flame settings and their function:
- 7.2.1 Neutral flame (2)
 - 7.2.2 Oxidising flame (2)
- 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 term *shielded arc welding process*. (2)
- 8.2 Name SIX types of protective clothing that should be worn during arc welding and give a reason for each. (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 Porosity is the result of an incorrect welding rod.
 - 8.3.2 Slag protects the weld from atmospheric pollution.
 - 8.3.3 Low current results in a good welding joint.
- (3 × 1) (3)
- 8.4 State FOUR disadvantages of using a direct current welding machine. (4)
- [15]**

QUESTION 9

The following information is given to manufacture two stiffening rings:

Internal diameter of a mild steel cylinder = 840 mm

Thickness of the mild steel plate = 10 mm

Diameter of the ring = 10 mm

Calculate the following:

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

