higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE

METAL WORKERS' THEORY N1

(11022061)

7 April 2020 (X-paper)
09:00–12:00

Drawing instruments may be used.

This question paper consists of 6 pages.

140Q1A2007

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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 question 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

State FIVE safety precautions to observe when using ladders. **[5]**

QUESTION 2: CARE AND USE OF TOOLS

2.1 Explain how to replace a new hammer shaft and name the wood that should be used for this purpose. (5)

2.2 Briefly explain the function of each of the following hand tools:

2.2.1 Hacksaw

2.2.2 Ball-peen hammer

2.2.3 Crosscut chisel

2.2.4 Round file

2.2.5 Trammels

(5 × 1) (5)

2.3 Briefly explain the function of each of the following marking-off tools:

2.3.1 Bevel gauge

2.3.2 Scriber

2.3.3 Try square

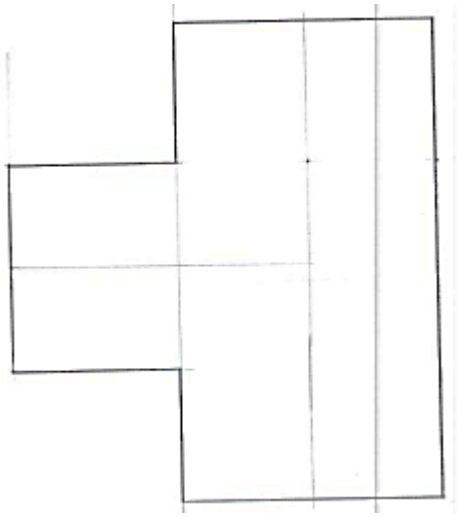
2.3.4 Inside callipers

2.3.5 Outside callipers

(5 × 1) (5)
[15]

QUESTION 3: DEVELOPMENTS (PARALLEL-LINE METHOD)

Shown below is a T-piece manufactured from two pipes with unequal diameters. The diameter of the main pipe is 60 mm.



Draw the T-piece and:

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 42 mm diameter branch pipe.

HINT: C = 3,142 × D (2)

3.4 Develop the pattern of the branch pipe. (4)

[10]

QUESTION 4: METALS, PLATES AND SECTIONS

4.1 Explain each of the following properties of metals:

4.1.1 Toughness

4.1.2 Elasticity

4.1.3 Hardness

(3 × 2) (6)

4.2 Write each of the following abbreviations in full:

4.2.1 SOP

4.2.2 DRG

4.2.3 O/D

4.2.4 CL

(4 × 1) (4)

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4.3 Indicate whether the following statements are TRUE or FALSE by writing only 'True' or 'False' next to the question number (4.3.1–4.3.2) in the ANSWER BOOK.

4.3.1 When holes must be punched or drilled in steel sections there are standard back marks which must be used, unless specified otherwise on the drawing.

4.3.2 Smaller square bars are used to make gates, fences and burglar bars.

(2 × 1) (2)
[12]

QUESTION 5: MACHINES

5.1 State FIVE safety precautions to observe when using a drilling machine. (5)

5.2 State FIVE safety precautions to observe when using a circular power saw. (5)
[10]

QUESTION 6: JOINTS (RIVETED OR BOLTED)

6.1 Name FOUR types of rivet heads used in assembly work. (4)

6.2 Explain each of the following terms used in assembly work:

6.2.1 Pitch

6.2.2 Landing

(2 × 1) (2)

6.3 Compare each of the following fastening devices with reference to its applications:

6.3.1 Countersunk bolts

6.3.2 Black bolts

(2 × 2) (4)
[10]

QUESTION 7: OXYACETYLENE AND LPG CUTTING AND WELDING

7.1 Complete the following paragraph about oxy-acetylene gas welding by writing only the missing word or words next to the question number (7.1.1–7.1.5) in the ANSWER BOOK.

An acetylene gas cylinder is (7.1.1) … in colour whereas the oxygen is (7.1.2) ... Right-hand thread fittings are for (7.1.3) … The gas cylinder and (7.1.4) … is left-hand thread fitted. It is therefore necessary to keep the acetylene gas cylinder in a/an (7.1.5) … position when transported. (5 × 1) (5)

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7.2 Name FIVE pieces of personal protective equipment that should be worn when gas welding and give reasons why it should be worn. (5)

7.3 Give FOUR causes of backfire during oxy-acetylene gas cutting. (4)

7.4 Explain how to extinguish the neutral flame in oxy-acetylene gas welding. (1)
[15]

QUESTION 8: METAL ARC WELDING

8.1 Arrange each of the following gas-welding apparatus in order when assembling it from the gas cylinder to the cutting or welding torch:

- Welding torch
- Flashback arrestor
- Pressure regulator
- Acetylene gas cylinder
- Welding hose

(5 × 1) (5)

8.2 Explain, without the aid of a sketch, the leftward welding technique. (4)

8.3 List FOUR factors to consider when rectifying backfire during gas welding. (4)

8.4 Explain how to test gas leaks during LP gas cutting. (2)
[15]

QUESTION 9: CALCULATIONS

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:

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

(4 × 2) **[8]**

TOTAL: 100

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