higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE

METAL WORKERS' THEORY N1

(11022061)

12 April 2021 (X-paper)
09:00–12:00

Drawing instruments may be used.

This question paper consists of 6 pages and 1 addendum.

140Q1A2112

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 section on a new page.
5. Use only a black or blue pen.
6. Write neatly and legibly.

QUESTION 1: SAFETY AND HOUSEKEEPING

Name FIVE safety precautions to be observed when using ladders. **[5]**

QUESTION 2: CARE FOR AND USE OF TOOLS

2.1 Describe how you would replace a hammer shaft and name the wood you would use for this purpose. (5)

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

2.2.1 The hacksaw

2.2.2 The ball-peen hammer

2.2.3 The cross-cut chisel

2.2.4 The 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)

Make use of drawing instruments to draw the T-piece that is manufactured from two unequal diameter pipes. The diameter of the main pipe is 60 mm.

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. (2)

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

HINT: C = 3,142 × D

[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)

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 are to be punched or drilled in steel sections, there are standard back marks that must be used unless specified 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 be observed when using a drilling machine. (5)

5.2 State FIVE safety precautions to be observed 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 the following terms as used in assembly work:

6.2.1 Pitch

6.2.2 Landing

(2 × 1) (2)

6.3 Compare the following fastening devices with reference to their 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 sentences, with reference to oxyacetylene gas welding, by writing only the missing words next to the question number (7.1.1–7.1.5) in the ANSWER BOOK.

The acetylene gas cylinder is (7.1.1) ... in colour, whereas the oxygen cylinder is (7.1.2) ... Right-hand thread fittings are for the (7.1.3) ... gas cylinder and left-hand threads are for (7.1.4) …

It is therefore necessary to keep the acetylene gas cylinder in an (7.1.5) … position when transporting it.

(5 × 1) (5)

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

7.3 Describe FOUR causes of backfire during an oxyacetylene gas cutting process. (4)

7.4 Explain how to extinguish the neutral flame in oxyacetylene gas welding. (1)

[15]

QUESTION 8: METAL ARC WELDING

8.1 Arrange the following gas welding apparatus in the order in which it would be assembled, from the gas cylinder to the cutting or welding torch:

8.1.1 Welding torch

8.1.2 Flashback arrestor

8.1.3 Pressure regulator

8.1.4 Acetylene gas cylinder

8.1.5 Welding hose

(5 × 1) (5)

8.2 Without the aid of a sketch, describe the leftward welding technique. (4)

8.3 State FOUR factors that would be considered to rectify backfire during the gas welding process. (4)

8.4 Describe how to test gas leaks during LP gas cutting process. (2)

[15]

QUESTION 9: CALCULATIONS

The external diameter of a mild steel pipe with a thickness of 6 mm is 600 mm. A round bar with a diameter of 10 mm 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.

(4 × 2) **[8]**

TOTAL: 100

(11022061)

ADDENDUM **EXAMINATION NUMBER:**