higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

T1140**(E)**(A2)T

NATIONAL CERTIFICATE

METAL WORKERS' THEORY N1

(11022061)

2 August 2019 (X-Paper)
09:00–12:00

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

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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. Sketches must be large, neat and fully labelled.
5. Show ALL calculations where necessary.
6. QUESTION 3 must be answered on the attached ANSWER SHEET and handed in with the ANSWERBOOK.
7. Take $\pi = 3,142$.
8. Write neatly and legibly.

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QUESTION 1: SAFETY AND HOUSEKEEPING

1.1 Which act promotes safety in the workplace? (2)

1.2 Which personal protective equipment should be worn in each of the following situations?

1.2.1 Working with flammable gases

1.2.2 Grinding a 22 mm steel plate

1.2.3 Working under suspended loads

(3 × 1) (3)
[5]

QUESTION 2: CARE AND USE OF TOOLS

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

2.1.1 Cross-peen hammer

2.1.2 Parallel drift

2.1.3 Flat chisel

2.1.4 Centre punch

(4 × 1) (4)

2.2 Give TWO factors that should be considered when buying a new file. (2)

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

2.3.1 Inside callipers

2.3.2 Try square

2.3.3 Chalk line

2.3.4 Dividers

(4 × 1) (4)

2.4 Use the Pythagoras theorem to calculate the distance of the hypotenuse of a right-angled mild-steel plate with a height of 240 mm and a horizontal length of 350 mm. (3)

2.5 Briefly explain the use of a hacksaw in metal work. (2)
[15]

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QUESTION 3: DEVELOPMENTS

Answer the following questions on the attached ANSWER SHEET and hand it in with the question paper:

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

3.2 Construct the shape of the hole in the main pipe. (2)

3.3 Calculate the circumference of the 44 mm branch pipe. (2)

3.4 Develop the pattern of the branch pipe.

HINT: C = 3,142 × D (4)

[10]

QUESTION 4

4.1 Explain the following properties of metal:

4.1.1 Hardness

4.1.2 Elasticity

4.1.3 Malleability

(3 × 1) (3)

4.2 State TWO uses of each of the following metals:

4.2.1 High-carbon steel

4.2.2 Aluminium

(2 × 2) (4)

4.3 Write down each of the following abbreviations in full:

4.3.1 RSJ (2)

4.3.2 RSC (2)

4.3.3 SOP (1)

[12]

QUESTION 5

State FIVE safety precautions when using each of the following machinery:

5.1 Bending press (5)

5.2 Pedestal grinding machine (5)

[10]

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QUESTION 6

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

7.1 Arrange the following list of gas apparatus in its sequence of use applicable to the oxy-acetylene gas-welding assembly process. Write only the answer next to the correct question number (7.1.1–7.1.5) in the ANSWER BOOK.

INCORRECT ORDER	CORRECT ORDER
7.1.1 Flash-back arrestors	7.1.1
7.1.2 Welding torch	7.1.2
7.1.3 Pressure regulators	7.1.3
7.1.4 Gas bottles	7.1.4
7.1.5 Welding hose	7.1.5

(5)

7.2 Give TWO functions of pressure regulators. (2)

7.3 Name TWO welding techniques commonly used in gas welding. (2)

7.4 State FOUR causes of back-fire during the gas cutting process. (4)

7.5 Explain how to extinguish the LP-oxygen gas welding flame. (2)
[15]

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QUESTION 8

8.1 Define *shielded arc welding.* (1)

8.2 State the function of an earth clamp with a cable. (2)

8.3 Distinguish between a *conductor* and an *insulator* of electricity and give an example of each. (4)

8.4 State FOUR advantages of a direct-current welding machine. (4)

8.5 Indicate whether the following statements are TRUE or FALSE. Choose the answer and write only 'True' or 'False' next to the question number (8.5.1–8.5.2) in the ANSWER BOOK.

8.5.1 A T-joint is used when two plates are welded overlapping each other.

8.5.2 A corner joint is used when two plates are welded at any angle up to 60 degrees.

(2 × 2) (4)
[15]

QUESTION 9

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 the following:

9.1 Length of the round bar required to form the external stiffening ring (4)

9.2 Length of the round bar required to form the internal stiffening ring (4)
[8]

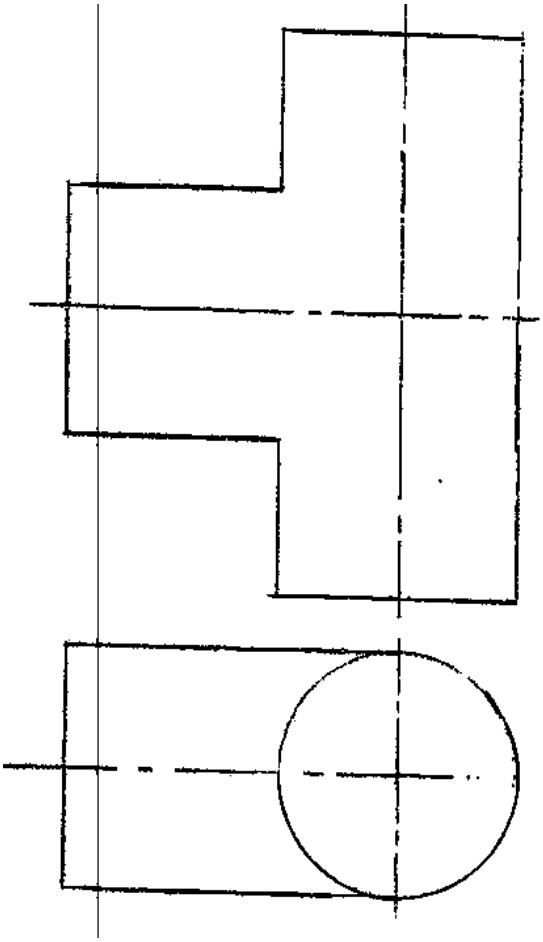
TOTAL: 100

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METAL WORKERS' THEORY N1

ANSWER SHEET EXAMINATION NUMBER:



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