higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE

METAL WORKERS' THEORY N1

(11022061)

22 November 2019 (X-Paper)
09:00–12:00

Drawing instruments may be used.

This question paper consists of 6 pages and 1 addendum.

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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 calculation steps where calculations should be done.
6. QUESTION 3 must be answered on the ADDENDUM (attached). Write your EXAMINATION NUMBER in the space provided, detach the ADDENDUM and hand it in with the ANSWER BOOK.
7. Use $\pi = 3,142$
8. Write neatly and legibly.

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QUESTION 1

State whether the following is regarded as either an UNSAFE ACT or UNSAFE CONDITION. Choose the answer and write only 'Unsafe act' or 'Unsafe condition' next to the question number (1.1–1.5) in the ANSWER BOOK.

1.1 Poor lighting

1.2 Defective tools and equipment

1.3 Failure to use protective equipment

1.4 Unguarded machinery

1.5 Working without permission

(5 × 1) **[5]**

QUESTION 2

2.1 Name THREE types of punches used in metalwork. (3)

2.2 Complete the following paragraph with regard to a hammer. Write only the missing term next to the question number (2.2.1–2.2.2) in the ANSWER BOOK.

The head of a hammer is made of (2.2.1) … steel. The hammer head is fitted to a wooden shaft, which is normally made of (2.2.2) … (2 × 1) (2)

2.3 Describe the angle of presentation with regard to chisels. (2)

2.4 State the function of each of the following marking-off tools:

2.4.1 Scriber

2.4.2 Outside callipers

2.4.3 Try square

2.4.4 Trammel

2.4.5 Bevel gauge

(5 × 1) (5)

2.5 Calculate the hypotenuse side of a rectangular 10 mm steel plate, with 120 mm vertical sides and 185 mm horizontal sides.

HINT: $V^2 = R^2 - H$ (3)

[15]

QUESTION 3: DEVELOPMENTS (PARALLEL-LINE METHOD)

Use the ADDENDUM (attached) to answer the questions. Make use of drawing instruments.

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 34 mm diameter branch pipe. (2)

3.4 Develop the pattern of the branch pipe with the aid of drawing instruments. (4)

[10]

QUESTION 4

4.1 State the following with regard to cast iron:

4.1.1 Metal properties

4.1.2 Any TWO uses

(2 × 2) (4)

4.2 Define the following metal properties:

4.2.1 Ductility

4.2.2 Toughness

(2 × 1) (2)

4.3 Write out in full the following abbreviations:

4.3.1 DRG

4.3.2 MATL

(2 × 1) (2)

4.4 Calculate the back mark of the following profiles:

4.4.1 Angle iron with a 50 mm flange

4.4.2 A rolled steel channel with an 80 mm flange

(2 × 2) (4)

[12]

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QUESTION 5

5.1 State FOUR safety precautions which must be considered before and during the use of the following machinery:

5.1.1 Punch, shear and cropping machine

5.1.2 Angle grinder

(2 × 4) (8)

5.2 Indicate whether the following statements are TRUE' or 'FALSE. Choose the answer and write only 'True' or 'False' next to the question number (5.2.1–5.2.2) in the ANSWER BOOK.

5.2.1 When using an angle grinder, do not use the screen to protect fellow workers from the stream of sparks.

5.2.2 The bare hand may be used to remove drill shavings from the drill bits.

(2 × 1) (2)

[10]

QUESTION 6

6.1 Name THREE types of rivet heads that are used in the structural steel workshop. (3)

6.2 Explain the uses of the following fastening devices:

6.2.1 Black bolts

6.2.2 Countersunk bolts

(2 × 2) (4)

6.3 Calculate the length of the rivet that is required to rivet two 18 mm thick plates together. Use a 25 mm diameter rivet. (3)

[10]

QUESTION 7

7.1 Complete the following sentences, with reference to oxyacetylene gas welding. Write only missing term 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 an oxygen cylinder is (7.1.2) ... Right-hand thread fittings are for (7.1.3) ... gas cylinders and (7.1.4) ... cylinders have left-hand thread fittings.

It is necessary to keep acetylene gas cylinders in a/an (7.1.5) … position when they are being transported. (5 × 1) (5)

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7.2 Name FIVE personal protective equipment that should be worn when doing gas welding. Give a reason why each 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 after doing oxyacetylene gas welding. (1)
[15]

QUESTION 8

8.1 State SIX safety precautions that should be considered before, during and after arc welding. (6)

8.2 State FOUR advantages of using a gas welding machine. (4)

8.3 Briefly explain the following welding terms:

8.3.1 Earthing

8.3.2 Straight polarity

(2 × 1) (2)

8.4 Briefly explain the purpose in coating the electrodes with a flux. (3)
[15]

QUESTION 9

The following data refers to a mild steel cylinder:

Internal diameter	=	620 mm
Thickness	=	8 mm
Height	=	1 020 mm

Calculate the following:

9.1 The external stiffening ring

9.2 The internal stiffening ring that should be formed from a 10 mm round bar

(2 × 4) **[8]**

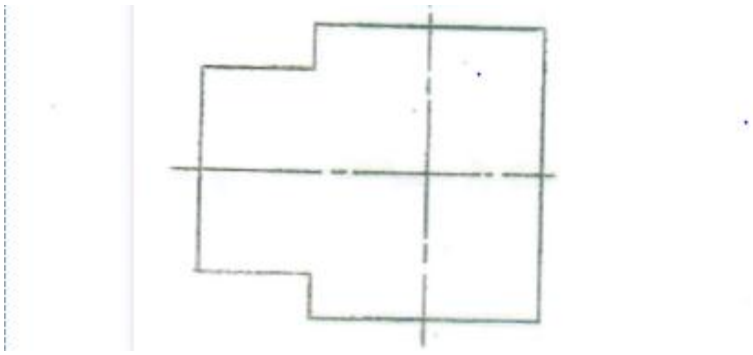
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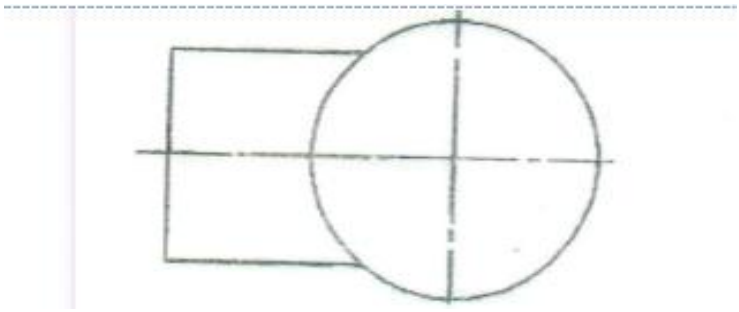
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EXAMINATION NUMBER:

ADDENDUM

QUESTION 3





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