

higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

T1080(E)(A16)T
APRIL EXAMINATION

NATIONAL CERTIFICATE

METAL WORKERS' THEORY N1

(11022061)

16 April 2015 (Y-Paper)
13:00–16:00

REQUIREMENTS: Drawing instruments

Calculators may be used.

This question paper consists of 7 pages and 2 diagram sheets.

DEPARTMENT OF HIGHER EDUCATION AND TRAINING
REPUBLIC OF SOUTH AFRICA
NATIONAL CERTIFICATE
METAL WORKER'S 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. Keep ALL the subsections of questions together.
 5. Show ALL the calculation steps where calculations should be done.
 6. QUESTION 3 must be answered on SUPPLEMENT A and then be handed in.
 7. Use $\pi = 3,142$.
 8. Write neatly and legibly.
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QUESTION 1

Describe if the following is regarded as 'Unsafe conditions' or 'Unsafe acts'.

- 1.1 Machine unguarded.
- 1.2 No personal protective equipment.
- 1.3 Unsafe speed of working.
- 1.4 Working without authority.
- 1.5 Overcrowding.

(5 × 1)

[5]**QUESTION 2**

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

- 2.1.1 Centre punch
- 2.1.2 Flat file
- 2.1.3 Sledge hammer
- 2.1.4 Hacksaw
- 2.1.5 Barrel drift

(5 × 1)

(5)

2.2 State the correct marking-off tool that should be used in the following:

- 2.2.1 Measuring the outside diameter of the shaft.
- 2.2.2 Marking the centres of the holes before it is punched.
- 2.2.3 Marking-off from the templates.
- 2.2.4 Marking-off bevels on steel sections.
- 2.2.5 To check the accuracy of small jobs for marking off angles, channels and flat bars.

(5 × 1)

(5)

2.3 Make neat sketches of the following steel profiles:

- 2.3.1 Unequal leg angle iron
- 2.3.2 Universal beam

(2 × 1)

(2)

- 2.4 Calculate the hypotenuse of a right-angled triangle with the following measurements:

The vertical side = 245 mm

The horizontal side = 328 mm

HINT: $R^2 = H^2 + V^2$

(3)
[15]

QUESTION 3

Use FIGURE 1, DIAGRAM SHEET 1 (attached) to answer this question. Drawing instruments must be used.

FIGURE 1 shows a T- piece between two unequal diameter steel pipes.

- 3.1 Draw the line of penetration between the two pipes. (2)
- 3.2 Calculate the circumference of the 32 mm diameter pipe. (2)
- 3.3 Develop the shape of the hole in the main pipe. (2)
- 3.4 Develop the pattern of the branch pipe. (4)

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

Hand in DIAGRAM SHEET 1 on completion.

[10]

QUESTION 4

- 4.1 Name TWO uses of each of the following metals:

4.1.1 Stainless steel

4.1.2 Aluminium

(2 × 2) (4)

- 4.2 Define the following:

4.2.1 Ductility

4.2.2 Malleability

4.2.3 Fusibility

(3 × 1) (3)

4.3 State the full meaning of the following:

4.3.1 GALV

4.3.2 PCD

(2 × 1) (2)

4.4 Give THREE types of steel profiles commonly used in metalwork.

(3)
[12]

QUESTION 5

5.1 State the function of each of the following machinery:

5.1.1 Horizontal bending rolls

5.1.2 Guillotine

5.1.3 Pedestal drilling machine

5.1.4 Punching machine

5.1.5 Bending press

(5 × 1) (5)

5.2 Mention FIVE safety precautions that should be considered before and during the use of a pedestal drilling machine.

(5)
[10]

QUESTION 6

6.1 State FOUR types of rivet heads used in assembly work.

(4)

6.2 Tabulate the formulae used to calculate the following:

6.2.1 Pitch

6.2.2 Landing

(2 × 1) (2)

6.3 Describe the function of each of the following fastening devices:

6.3.1 Black bolts

6.3.2 Countersunk bolts

(2 × 2) (4)
[10]

QUESTION 7

- 7.1 Arrange the following gas welding apparatus in order of its assembly purpose:
- 7.1.1 Flashback arrestor
 - 7.1.2 Acetylene gas cylinder
 - 7.1.3 Welding torch
 - 7.1.4 Pressure regulator
 - 7.1.5 Welding hose
- (5 × 1) (5)
- 7.2 Without the aid of a sketch, describe the leftward welding technique. (4)
- 7.3 Mention FOUR factors that would be considered to rectify backfire during gas welding process. (4)
- 7.4 Describe how to test for gas leaks during LP-Gas cutting process. (2)
- [15]**

QUESTION 8

- 8.1 Define *shielded arc welding process*. (2)
- 8.2 List SIX protective clothing that should be worn during arc welding and give reasons. (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 (8.3.1–8.1.3) in the ANSWER BOOK.
- 8.3.1 Slag protects the weld from atmospheric pollution.
 - 8.3.2 Low current results in good welding joint.
 - 8.3.3 Porosity is the result of incorrect welding rod.
- (3 × 1) (3)
- 8.4 State FOUR disadvantages in using a direct current welding machine. (4)
- [15]**

QUESTION 9

FIGURE 2 on DIAGRAM SHEET 2 shows a pipe clamp. The flat bar of 75 mm wide and 12 mm thick is used to form 40 clamps.

Calculate the length of material required to manufacture 20 clamps.

[8]**TOTAL: 100**

DIAGRAM SHEET 1

FIGURE 1

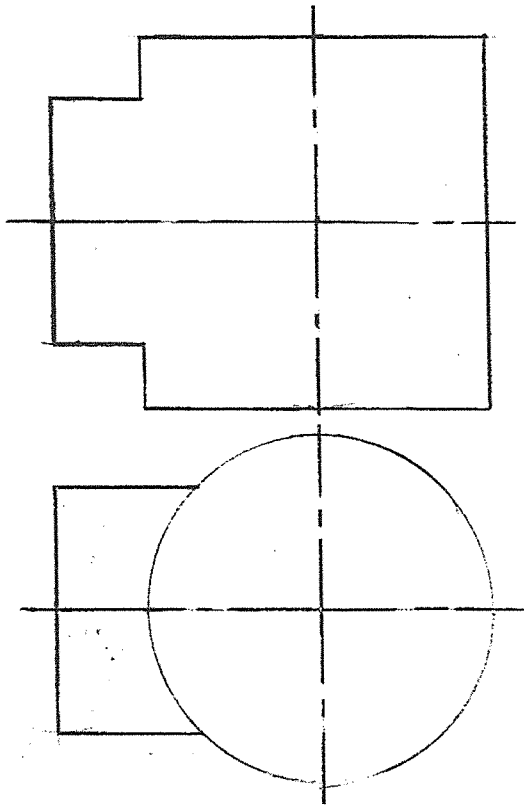


DIAGRAM SHEET 2

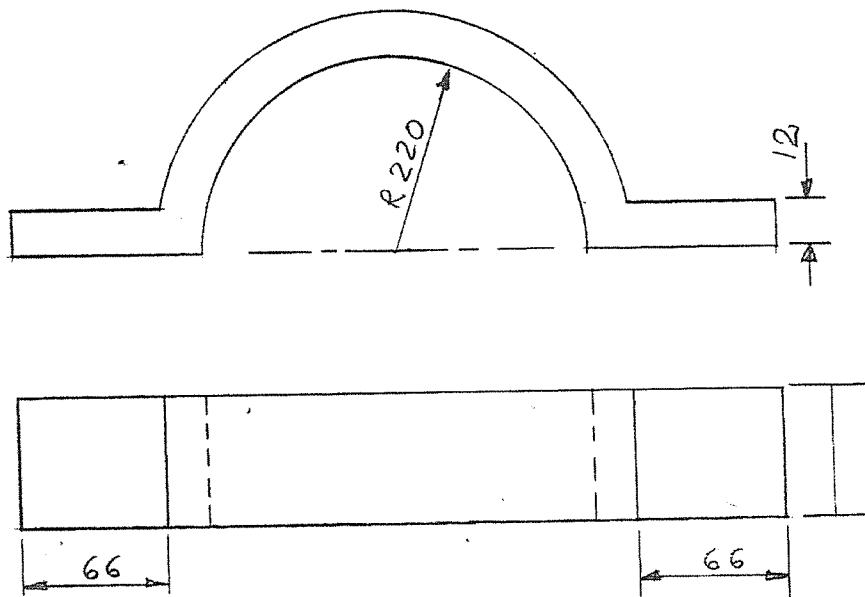


FIGURE 2

ENGINEER