higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

T1640(E)(A17)T
APRIL EXAMINATION

NATIONAL CERTIFICATE

WELDERS' THEORY N2

(11022082)

17 APRIL 2015 (Y-Paper)
13:00–16:00

Candidates will need drawing instruments.

Nonprogrammable calculators may be used.

This question paper consists of 5 pages and 2 diagram sheets.

ENGINEERING

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DEPARTMENT OF HIGHER EDUCATION AND TRAINING
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE
WELDERS' THEORY N2
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. Freehand drawings must be done in pencil and must be neat and reasonably large.
5. Write neatly and legibly.

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QUESTION 1: MACHINES

1.1 Briefly describe the working principle of the radial power saw. (4)

1.2 State THREE safety precautions to be observed when working with each of the following machines:

1.2.1 Nibbling machine (3)

1.2.2 Bending machine (3)
[10]

QUESTION 2: JOINING OF ROLLED STEEL STRUCTURES

2.1 FIGURE 1, on DIAGRAM SHEET 1, shows a cylinder with open ends.

Describe, with the aid of a freehand drawing, how to pull the ends together for tack welding. (3)

2.2 Briefly describe the difference between an assembly aid and a jig. (4)
[7]

QUESTION 3: GENERAL PIPE WORK

3.1 Illustrate by means of a freehand drawing, what is meant by the term 'two hole top' when referring to flanges. (4)

3.2 Calculate the length of a 45° bend where center-to- -face (C-F) distance is 330 mm. (4)
[8]

QUESTION 4: DEVELOPMENT

FIGURE 3, DIAGRAM SHEET 2, shows a rectangular to round transition piece. Use the triangulation method to develop the pattern of the transition piece on DIAGRAM SHEET 2. Write your examination number on the sheet and place it in the ANSWER BOOK. **[15]**

QUESTION 5: STEEL STRUCTURES

Calculate the length of the rafter of a roof truss if the span is 20 m and rise is 4 m. **[5]**

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QUESTION 6: METALS

6.1 State THREE uses of high carbon steel. (3)

6.2 Why must there be no abrupt motion when arc welding copper? (2)

6.3 Explain the effect when steel is alloyed with each of the following elements:

6.3.1 Chrome

6.3.2 Silicon

6.3.3 Manganese

(3 × 2) (6)

6.4 Why should medium carbon steel be allowed to cool slowly after welding? (2)

6.5 State TWO uses of grey cast iron. (2)
[15]

QUESTION 7: GAS WELDING AND CUTTING

7.1 Name the TWO components from which acetylene is manufactured. (4)

7.2 State the harmful effects of the following gas cutting and welding:

7.2.1 Laminated plates (2)

7.2.2 Flakes (scales) (2)

7.3 Draw freehand TWO possible weld defects that may occur when welding horizontally using oxy-acetylene weld. (4)
[12]

QUESTION 8: ARC WELDING

8.1 Briefly describe the term 'reverse polarity' in direct current welding. (2)

8.2 Name the TWO methods used to strike an arc. (2)

8.3 Make a neat freehand drawing of the welding symbol for each of the following:

8.3.1 Single J-butt joint to be welded on the arrow side (2)

8.3.2 Single V-butt to be welded on the other side (2)

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8.4 FIGURE 2 DIAGRAM SHEET 1 shows the arrangement of the tungsten inert gas (TIG) welding system.

Name any THREE parts that correspond to the numbers indicated on the following drawing. (4)

8.5 Briefly describe the operation of the gas feed unit in metal inert gas (MIG) welding. (3)
[15]

QUESTION 9: WELD TESTING

9.1 Briefly describe the guided bend test on welds. (3)

9.2 What type of test is mainly designed to determine the qualification of welders? (2)
[5]

QUESTION 10: HEAT TREATMENT OF STEEL

10.1 Briefly explain the change of the structure of a steel when heated from the cooling stage to the lower critical temperature and then to the upper critical temperature. (4)

10.2 Briefly describe the pearlite structure of steel. (4)
[8]

TOTAL: 100

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DIAGRAM SHEET 1

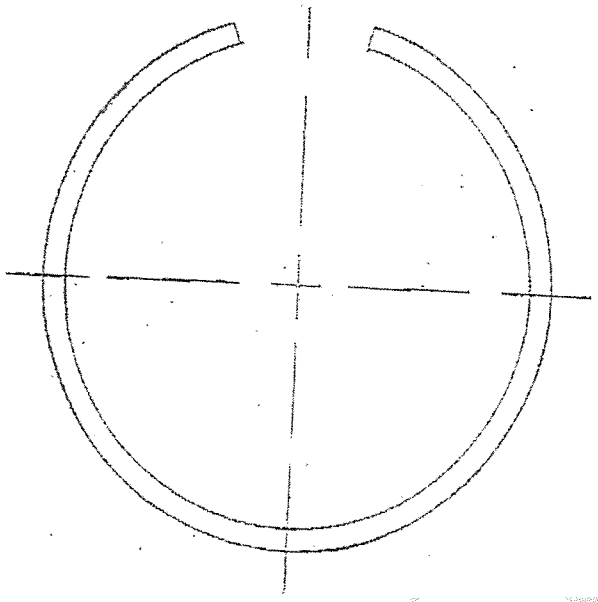

FIGURE 1

DIAGRAM SHEET 2

QUESTION 4: DEVELOPMENT

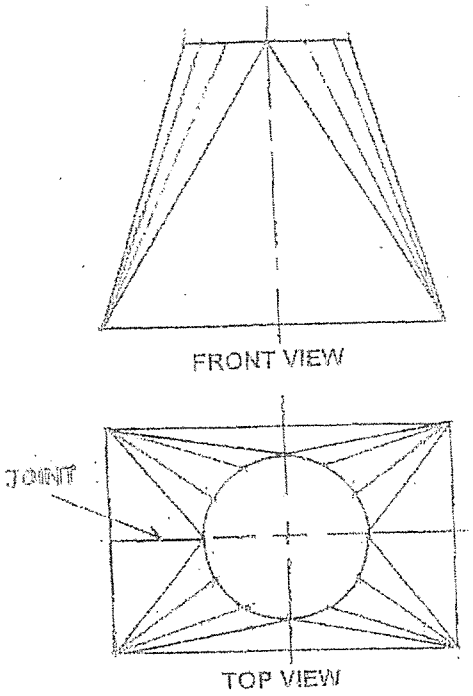

FIGURE 2

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DIAGRAM SHEET 3

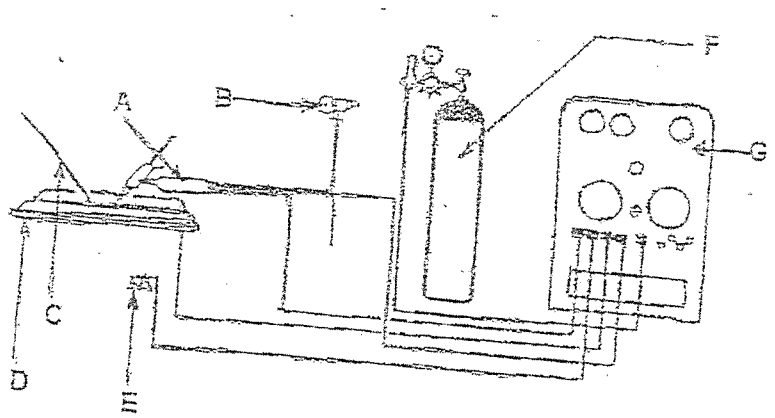

FIGURE 3

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