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higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

T1820(E)(N14)T
NOVEMBER EXAMINATION

NATIONAL CERTIFICATE

WELDERS' THEORY N2

(11022082)

14 November 2013 (X-Paper)
09:00–12:00

Candidates will need drawing instruments.

Nonprogrammable calculators may be used.

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

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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 Name TWO steel sections that a radial power saw is specifically designed to cut. (2)

1.2 State TWO safety precautions that must be observed when changing the grinding wheel on a pedestal grinding machine. (2)

1.3 FIGURE 1, DIAGRAM SHEET 1 (attached), shows an abrasive cut-off machine. List the components which correspond to the letters indicated in the drawing. Write only the letter (A–D) and the name of the component next to the question number (1.3) in the ANSWER BOOK. (4)

1.4 Name the minimum distance and the maximum distance, in millimetres, between the tool rest and the grinding wheel of a pedestal grinder. (2)
[10]

QUESTION 2: JOINING OF ROLLED STEEL SECTIONS

2.1 Illustrate, by means of a freehand drawing, how you would push the end of a cylinder apart when it overlaps. (3)

2.2 What are advantages of a well-designed *jig* in a welding shop? (2)

2.3 What is a gusset plate and why is it used in structural steel connections? (2)
[7]

QUESTION 3: GENERAL PIPE WORK

3.1 Calculate the length of a 90° pipe bend. The centre-to-face (C–F) distance is 438 mm. (4)

3.2 Illustrate, by means of a freehand drawing, what is meant by the term *two hole top* when referring to flanges. (4)
[8]

QUESTION 4: DEVELOPMENT

FIGURE 3, DIAGRAM SHEET 2 (attached), shows a front view and top view of a twisted square-to-square transformer. Use the triangulation method to develop the pattern of the transformer. Write the EXAMINATION NUMBER on the sheet given and place in the ANSWER BOOK. **[15]**

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QUESTION 5: STEEL STRUCTURES

FIGURE 2, DIAGRAM SHEET 1 (attached), shows a roof truss. List the parts that correspond to the letters indicated in the drawing. Write only the letter (A–E) and the name of the component next to the QUESTION 5 in the ANSWER BOOK. **[5]**

QUESTION 6: METALS

6.1 Name the THREE groups under which stainless steel is classified. (3)

6.2 State TWO advantages of oxy-acetylene fusion welding of grey cast iron. (2)

6.3 What is the function of peening a cast iron weld while it is still hot? (2)

6.4 What type of electrodes are used to decrease cracking, when welding a medium carbon steel? (2)

6.5 Briefly describe the difference between *ferrous metals* and *non-ferrous metals.* (4)

6.6 Name the TWO forms of carbon that are present in cast iron. (2)
[15]

QUESTION 7: GAS WELDING AND CUTTING

7.1 Briefly describe how the *magic eye* works on a profile-cutting machine. (3)

7.2 What chemical process is involved in oxy-acetylene cutting? (2)

7.3 Sketch a freehand drawing of THREE types of torch movements that may be used in oxy-acetylene welding. (3)

7.4 Briefly explain the meaning of the term *brazing.* (2)

7.5 What precaution that must be observed when vertical down welding is done. (2)
[12]

QUESTION 8: ARC WELDING

8.1 What diameter of electrodes will be used to weld the plates of the following thickness:

8.1.1 Less than 5 mm

8.1.2 5 mm to 8 mm

8.1.3 8 mm and over

(3 × 2) (6)

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8.2 What are the TWO main types of arc welding machines? (2)

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

8.3.1 Single square butt to be welded on arrow side

8.3.2 Double-U groove

(2 × 2) (4)

8.4 What are THREE components of the tungsten inert gas (TIG) welding system? (3)
[15]

QUESTION 9: WELD TESTING

9.1 Name TWO basic types of impact testing. (2)

9.2 Name THREE components of ultrasonic testing of weld joints. (3)
[5]

QUESTION 10: HEAT TREATMENT

10.1 Briefly explain the effect of the following heat treatment processes on steel:

10.1.1 Normalising

10.1.2 Annealing

(2 × 2) (4)

10.2 What TWO methods would you use in the case of hardening of steel? (2)

10.3 What TWO factors must be considered before commencing any heat treatment? (2)
[8]

TOTAL: 100

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DIAGRAM SHEET 1

ABRASIVE CUT-OFF MACHINE

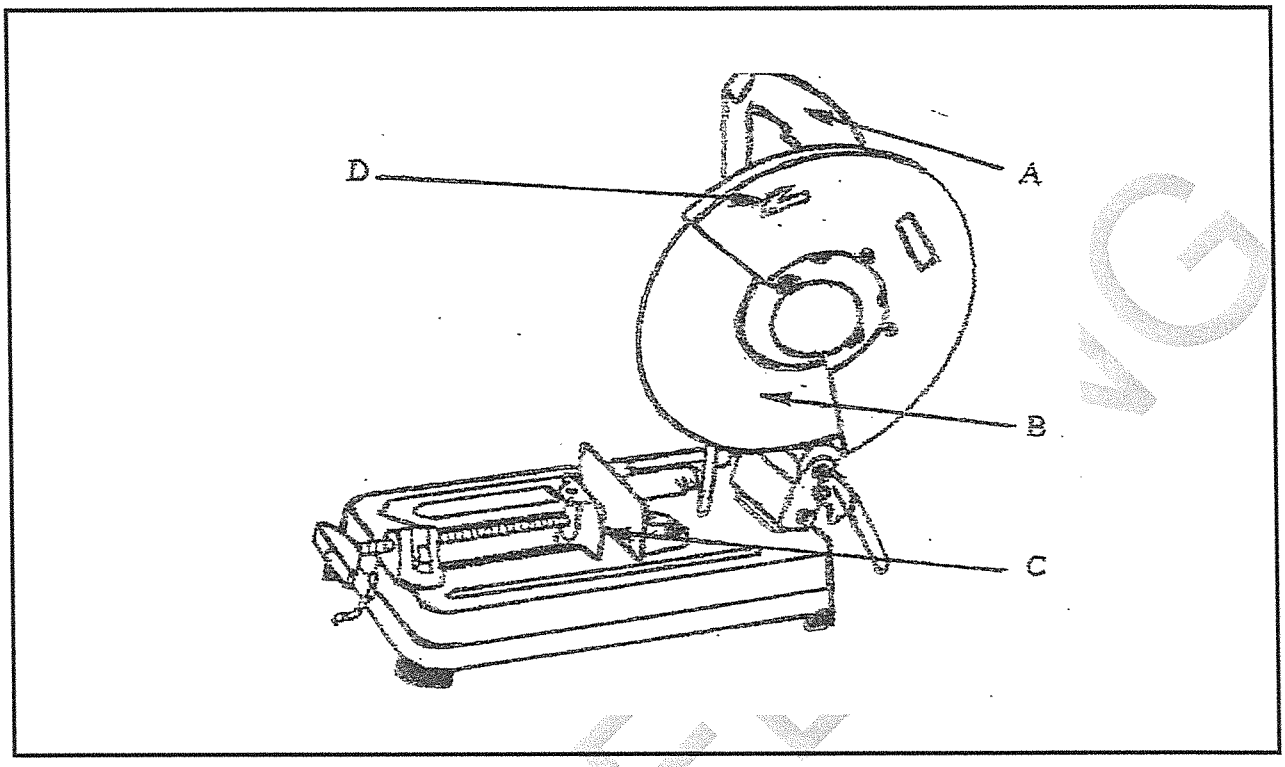

FIGURE 1

ROOF TRUSS

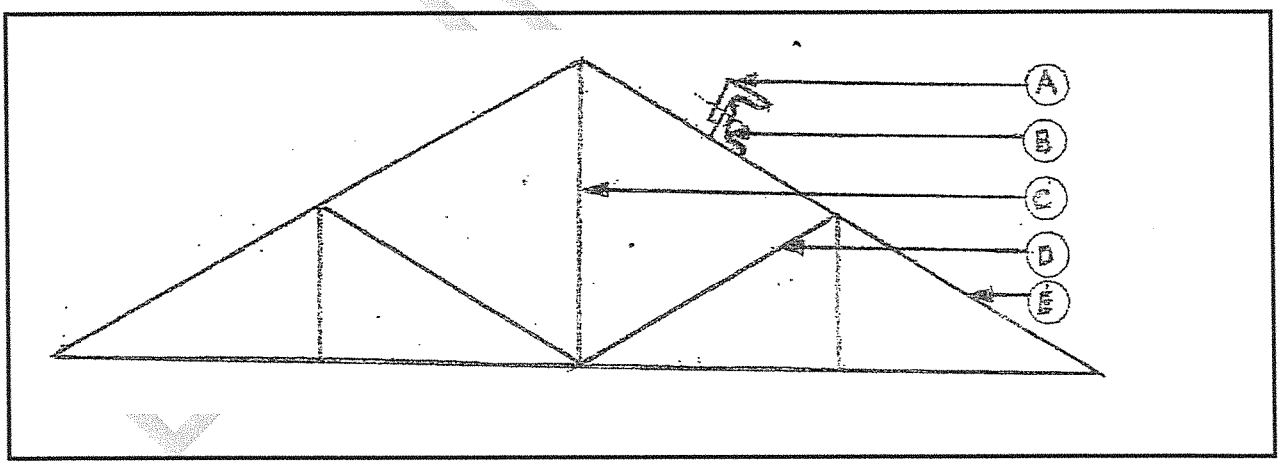

FIGURE 2

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DIAGRAM SHEET 2 **EXAMINATION NUMBER:**

TRIANGULATION METHOD
TWISTED SQUARE-TO-SQUARE TRANSFORMER

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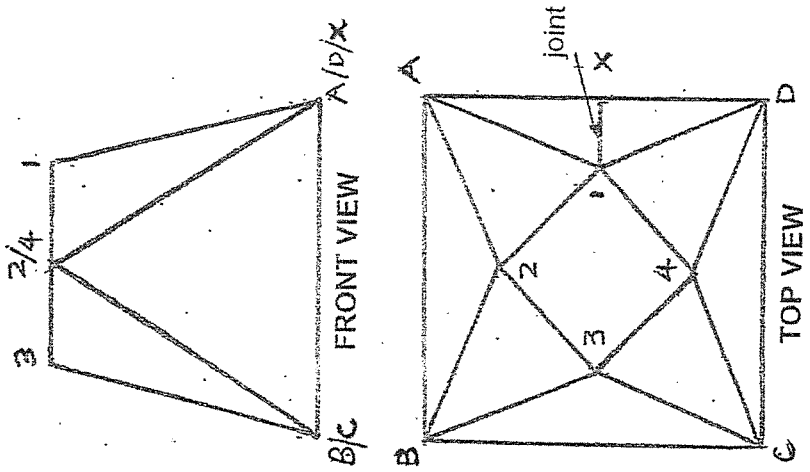

FIGURE 3

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