higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE (VOCATIONAL)

ENGINEERING FABRICATION - BOILERMAKING
NQF LEVEL 3

(6031013)

9 March 2018 (X-Paper)
09:00–12:00

This question paper consists of 7 pages.

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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. Write neatly and legibly.

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QUESTION 1

1.1 A welder must have a good knowledge of the meaning of welding symbols.

Make a neat drawing of a welding symbol element and indicate the following basic and supplementary welding symbols on the drawing:

1.1.1 Fillet weld – other side of the arrow

1.1.2 Fillet weld – on the arrow side

1.1.3 Weld pitch – 75 mm

1.1.4 Weld length – 25 mm

1.1.5 Weld all around

1.1.6 Field weld

(7 × 1) (7)

1.2 Different steel sections are used in the industry.

Draw a neat, sectional view of an H-beam, indicating the following:

1.2.1 Flange

1.2.2 Depth

1.2.3 Web

(4 × 1) (4)

1.3 FIGURE 1 illustrates the floor plan of a floor that has to be painted.

Calculate the total area to be painted and give the answer in m^2. The sizes are indicated in metres.

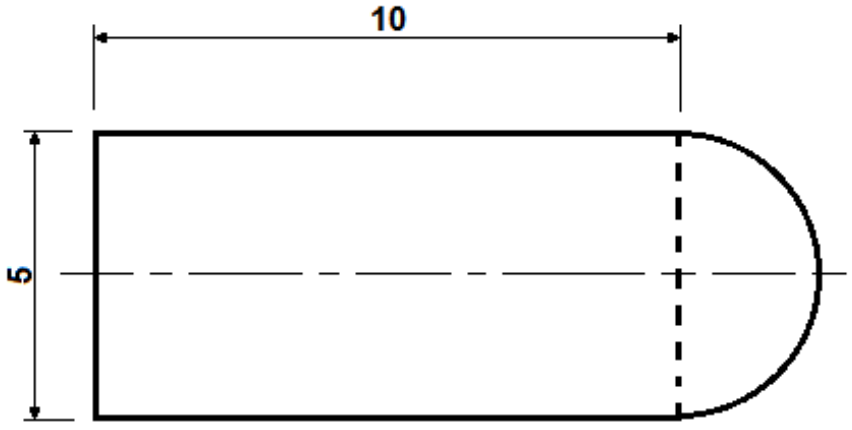


FIGURE 1 (6)

1.4 Draw an angle with two lines, intersecting at about 30º. Bisect the angle, creating a middle line. Make use of the caliper method to do the construction. (2)

1.5 Which marking-off tool can be used to scribe a line parallel to the side of a straight workpiece? (1)

[20]

QUESTION 2

2.1 Gas metal arc welding is a very useful welding process.

Describe FOUR advantages of this type of welding process. (4)

2.2 Specific welding joints are used to weld components together.

Make neat drawings of the following joints:

2.2.1 Single-V-groove joint

2.2.2 Double-bevel groove joint

2.2.3 Inside-corner single-J-groove joint

2.2.4 V-groove edge joint

(4 × 2) (8)

2.3 It is crucial to set the wire feed of the GMAW process correctly.

Explain in THREE steps how this setting can be ensured. (3)

2.4 Safety while welding is very important.

Name THREE personal protective clothing that can be worn by the welder. (3)

2.5 TIG welding has certain limitations.

Describe FOUR disadvantages of TIG welding. (4)

2.6 Defects during welding must be prevented at all cost.

Name FIVE defects that can occur if the process is not done efficiently. (5)

2.7 Make a neat drawing to illustrate angular distortion during a welding process. (2)

2.8 Name ONE substance that can be used to clean materials before welding commences. (1)

[30]

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QUESTION 3

3.1 Make the following calculations with regard to steel tank manufacturing. The inside diameter is 500 mm and the plate thickness is 10 mm.

3.1.1 Mean diameter (3)

3.1.2 Outside diameter (4)

3.2 Name the THREE motions of overhead travelling cranes. (3)

3.3 During the lifting process of equipment, crane drivers must rely on hand signals because communication can be problematic or can cause misunderstanding.

Give the meaning of the hand signal instruction shown in FIGURE 2.

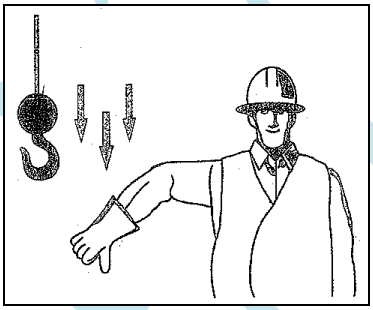


FIGURE 2 (1)

3.4 Crane conditions must be inspected regularly to secure safety.

Name FOUR components that should be inspected before and after a lifting process. (4)

3.5 State the TWO factors that should be taken into consideration when selecting the correct lifting equipment, such as slings. (2)

3.6 Proper stacking and storing of materials helps to prevent fires and accidents.

State FOUR safety factors when stacking materials. (4)

3.7 Proper housekeeping can save the lives of the workers.

State FOUR benefits of good housekeeping. (4)

[25]

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QUESTION 4

4.1 FIGURE 3 shows a 20 mm thick mild steel plate that is rolled into a curved bracket.

Calculate the total length of the bracket.

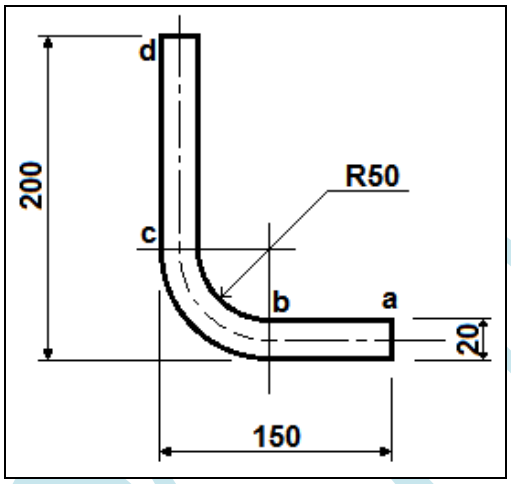


FIGURE 3 (12)

4.2 True length determinations are vital during developments especially when developing hoppers and chutes. Some true length lines can be indicated on a figure, where others must be determined through construction.

FIGURE 4 indicates a labelled hopper. State whether the lines mentioned below are TRUE LENGTHS or NOT TRUE LENGTHS. Write only 'true length' or 'not true length' next to the question number (4.2.1–4.2.2) in the ANSWER BOOK.

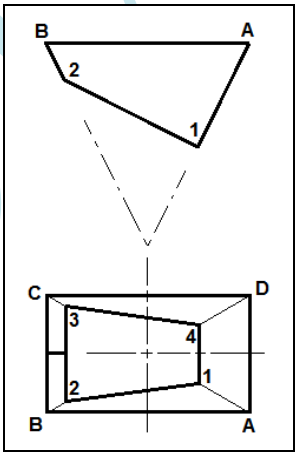


FIGURE 4

4.2.1 Line AB

4.2.2 Line A1

(2 × 2) (4)

4.3 State any FIVE safety procedures to be followed before commencing with work on a bending machine. (5)

4.4 Name the FOUR components of the bending machine indicated in FIGURE 5 by writing the answer next to the question number (4.4.1–4.4.4) in the ANSWER BOOK.

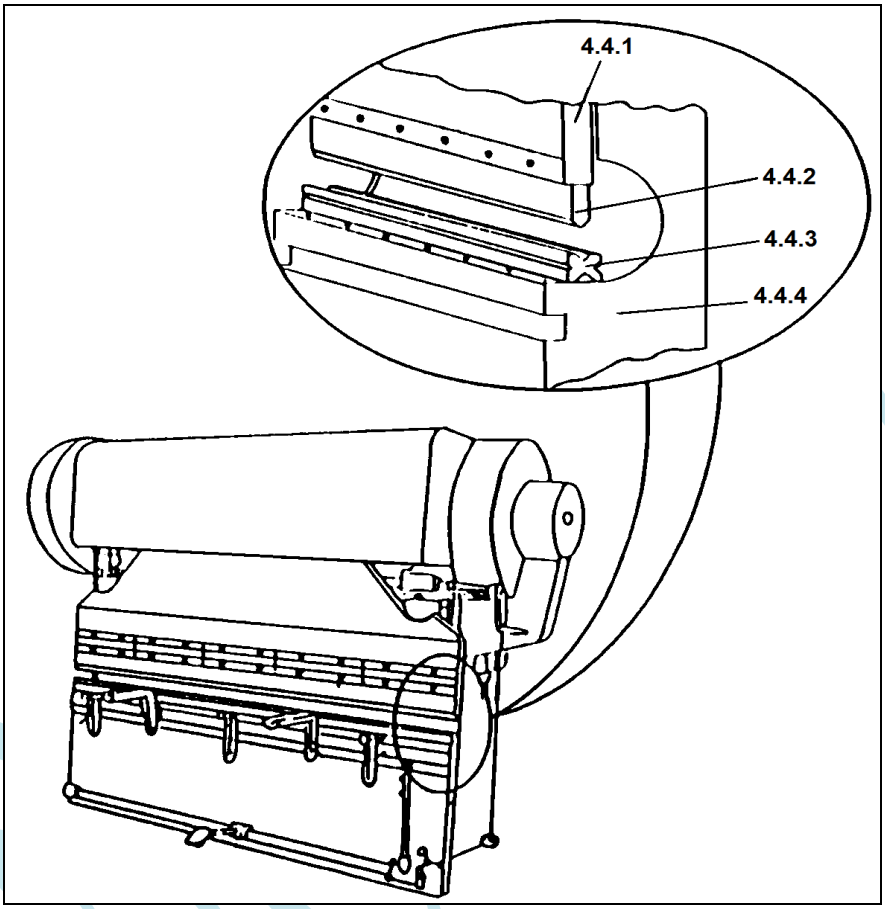


FIGURE 5 (4)

[25]

TOTAL: 100

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