higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE (VOCATIONAL)

ENGINEERING FABRICATION – BOILER MAKING
NQF LEVEL 3

(6031013)

27 November 2023 (X-paper)
09:00–12:00

REQUIREMENTS: A4 drawing sheet

Drawing instruments and calculators may be used.

This question paper consists of 7 pages.

371Q1N2327

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DEPARTMENT OF HIGHER EDUCATION AND TRAINING
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NATIONAL CERTIFICATE (VOCATIONAL)
ENGINEERING FABRICATION – BOILER MAKING
NQF LEVEL 3
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. Use only a black or blue pen.
5. Write neatly and legibly.

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QUESTION 1

1.1 Choose an item from COLUMN B that matches an item in COLUMN A. Write only the letter (A–F) next to the question number (1.1.1–1.1.5) in the ANSWER BOOK.

COLUMN A		COLUMN B	
1.1.1	Pickling	A	hand-held file disc grinder
1.1.2	Profile cutter	B	The body shape will be disturbed or distorted.
1.1.3	Burr removal	C	also known as a universal beam
1.1.4	Do not drop or dump the transition piece after welding.	D	can form shapes like circles and do straight cutting
1.1.5	Rolled steel joist	E	may be foot operated
		F	removal of surface oxides from metals

(5 × 1) (5)

1.2 Complete the following sentences by writing only the missing word or words next to the question number (1.2.1–1.2.5) in the ANSWER BOOK.

1.2.1 Valves are also pressure … fittings.

1.2.2 A gas regulator reduces high cylinder …

1.2.3 Points of a … must always be sharp to provide clear lines when marking off.

1.2.4 … is the length of pipe needed to make the offset.

1.2.5 Air is used to pressure test vessels because it does not …

(5 × 1) (5)
[10]

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QUESTION 2

2.1 List FOUR types of information that can be obtained from a welding symbol. (4)

2.2 Explain the term *cold-formed sections* as it relates to structural steel. (2)

2.3 Define each of the following types of metals and give an example of each:

2.3.1 Ferrous metals

2.3.2 Nonferrous metal

(2 × 2) (4)

2.4 Give ONE purpose of a jig in structural work. (2)

2.5 Give ONE use of each of the following tools:

2.5.1 Engineering blue spray

2.5.2 Chalk line

(2 × 2) (4)

2.6 Make a neat, labelled drawing of a dot-and-centre punch showing the angles of both punches. (4)

[20]

QUESTION 3

3.1 List FOUR defects that can be found in a welding joint. (4)

3.2 State THREE ways to prevent spatter. (3)

3.3 Explain how to test the strength of a weld after welding using a hammer. (3)

3. 4

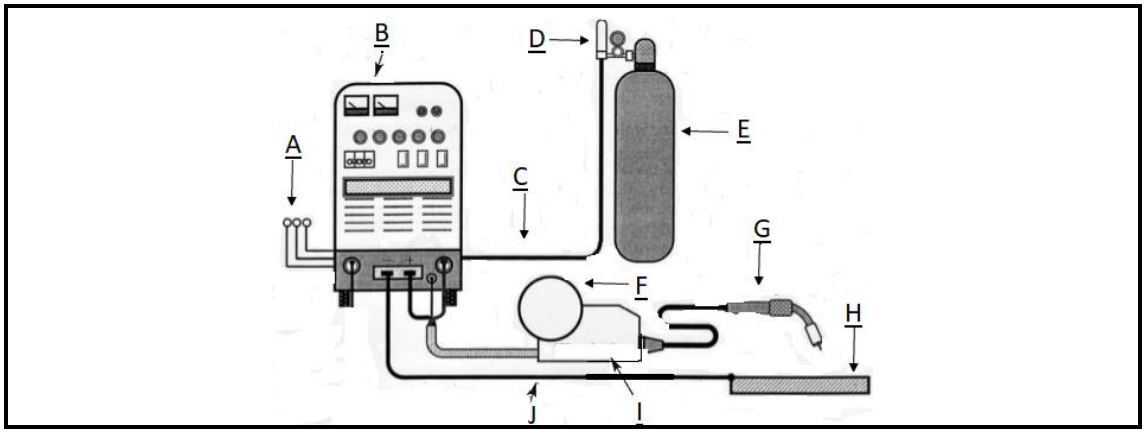


FIGURE 1

Label any FIVE components of the GMAW setup shown in FIGURE 1 by writing only the answer next to the letter (A–J) in the ANSWER BOOK. (5 × 1) (5)

3.5 State SIX safety precautions that must be adhered to when dealing with electrical equipment. (6)

3.6 State FOUR procedures to follow when a gas cylinder is leaking. (4)
[25]

QUESTION 4

4.1 FIGURE 2 shows a steel tank that must be manufactured using a 10 mm plate. A stiffening ring must also be manufactured using a 20 × 80 mm flat bar.

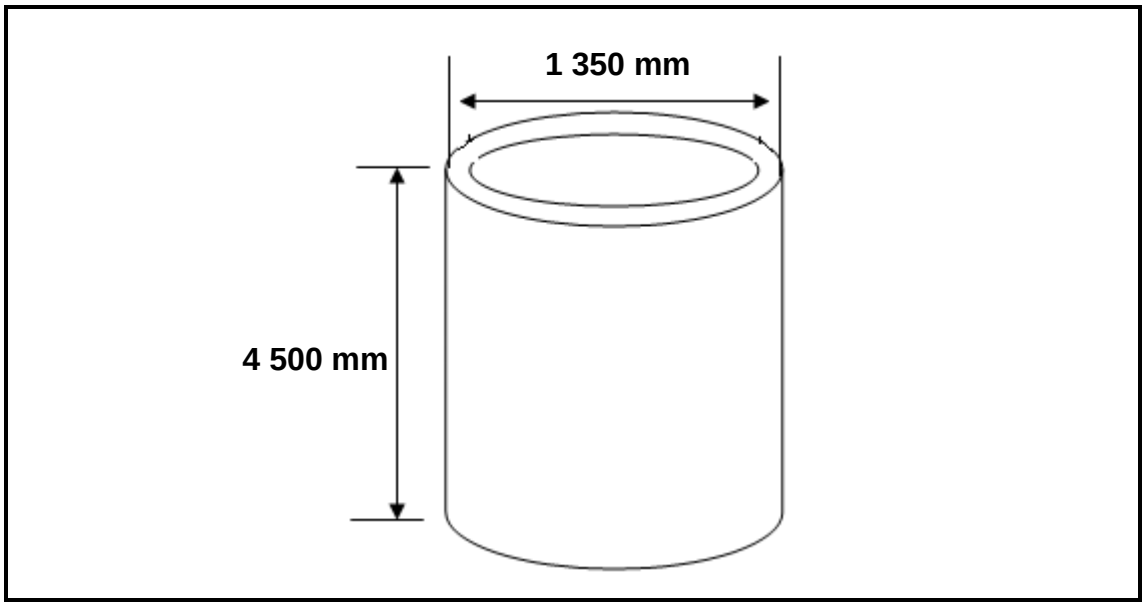


FIGURE 2

Calculate each of the following and give the answers in meters:

4.1.1 The true length of the plate required for the tank

4.1.2 The true length of the flat bar for the stiffening ring

4.1.3 The internal volume of the tank

(3 × 3) (9)

4.2 State THREE points to consider after completing the fabrication process. (3)

4.3 Name THREE types of lifting cranes used in engineering. (3)

4.4 FIGURE 3 shows vernier callipers.

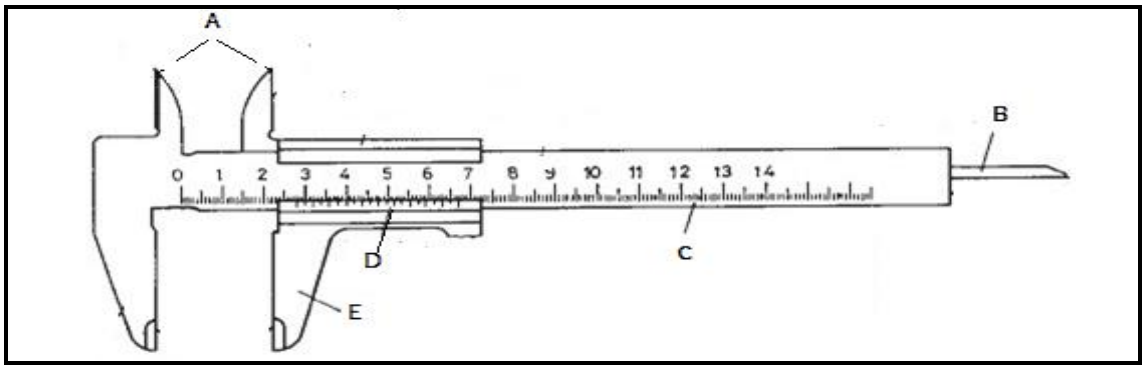


FIGURE 3

Label any THREE components of the vernier callipers by writing only the answer next to the letter (A–E) in the ANSWER BOOK. (3 × 1) (3)

4.5 Draw a pressure vessel and show its FOUR main components. (4)
[22]

QUESTION 5

5.1 FIGURE 4 shows an angle plate that must be manufactured.

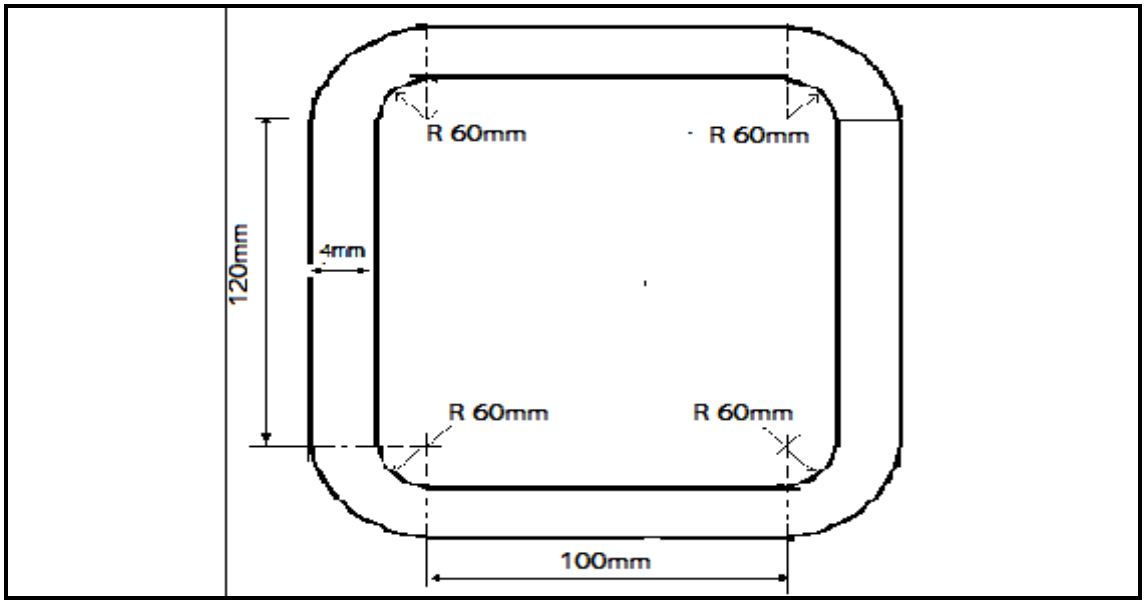


FIGURE 4

Calculate the total length of the bracket and convert the answer to metres. (5)

5.2 Name the THREE methods of development used in surface patterns. (3)

5.3 State FIVE points to consider when using clamping tools while feeding a plate into the bending brake machine. (5)

5.4 State FIVE safety precautions that must be adhered to when operating a bending machine. (5)

5.5 Give ONE use of each of the following components of a transition piece:

5.5.1 Pipes

5.5.2 Flanges

(2 × 1) (2)

5.6 State the corrective measure to take in order to avoid each of the following transition piece irregularities:

5.6.1 Failure to remove slag

5.6.2 Porosity

5.6.3 Cracks

(3 × 1) (3)

[23]

TOTAL: 100

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