higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE (VOCATIONAL)

ENGINEERING FABRICATION - BOILERMAKING
NQF LEVEL 3

(6031013)

16 November 2022 (X-paper)
09:00–12:00

Requirements: ONE sheet A4 drawing paper.

Drawing instruments and calculators may be used.

This question paper consists of 9 pages.

385Q1N2216

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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. Start each question on a new page.
5. Use only a blue or black pen.
6. Write neatly and legibly.

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QUESTION 1

Choose a description from COLUMN B that matches a term in COLUMN A. Write only the letter (A–J) next to the question number (1.1–1.10) in the ANSWER BOOK.

COLUMN A		COLUMN B	
1.1	Pickling	A	handheld file
1.2	Prevent spatter	B	must always be sharp to provide clear lines
1.3	Used for burr removal	C	reduces high cylinder pressure
1.4	Reference line	D	also known as a universal beam
1.5	Rolled-steel joist	E	shorten the arc
1.6	Circumference	F	the removal of surface oxides from metals
1.7	Most important setting on a GMAW machine	G	the foundation for marking a weld symbol
1.8	Gas regulator	H	consists of three rollers through which a flat sheet of metal is rolled
1.9	Points of a scriber	I	wire speed
1.10	Plate roll-forming machine	J	the distance measured around a circle or pipe

(10 × 1) **[10]**

QUESTION 2

2.1 List THREE points or information that a welder can obtain from a welding symbol. (3)

2.2 Draw and label FOUR different profiles of structural steel sections that are most commonly used in boiler making. (4)

2.3 Establishing datum points in the fabrication of structural steel sections is important.

Explain *datum points.* (2)

2.4 Name the THREE heads of the combination set and state the function of each head. (3)

2.5 Jigs are made of structural steel sections and are welded or fixed in position on the setting-out floor.

Name ONE purpose of a jig used in structural steel work. (2)

2.6 Quality control of welding is maintained by minimising weld defects through welder testing and welder certification.

Discuss FOUR aspects of the welding quality control plan. (4)

[18]

QUESTION 3

3.1 Using unsafe tools and equipment can lead to accidents. Complete the following phrases relating to protection when working with hazardous tools in the workshop:

3.1.1 Treat every cut

3.1.2 Remove all burrs

3.1.3 Use a brush

3.1.4 Cutting large pieces

(4 × 1) (4)

3.2 List FOUR pieces of information that can be obtained from a job card. (4)

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3.3 Label any SIX parts in FIGURE 1 below, which shows a typical GMAW action. Write the answer next to the letter (A–I) in the ANSWER BOOK. (6)

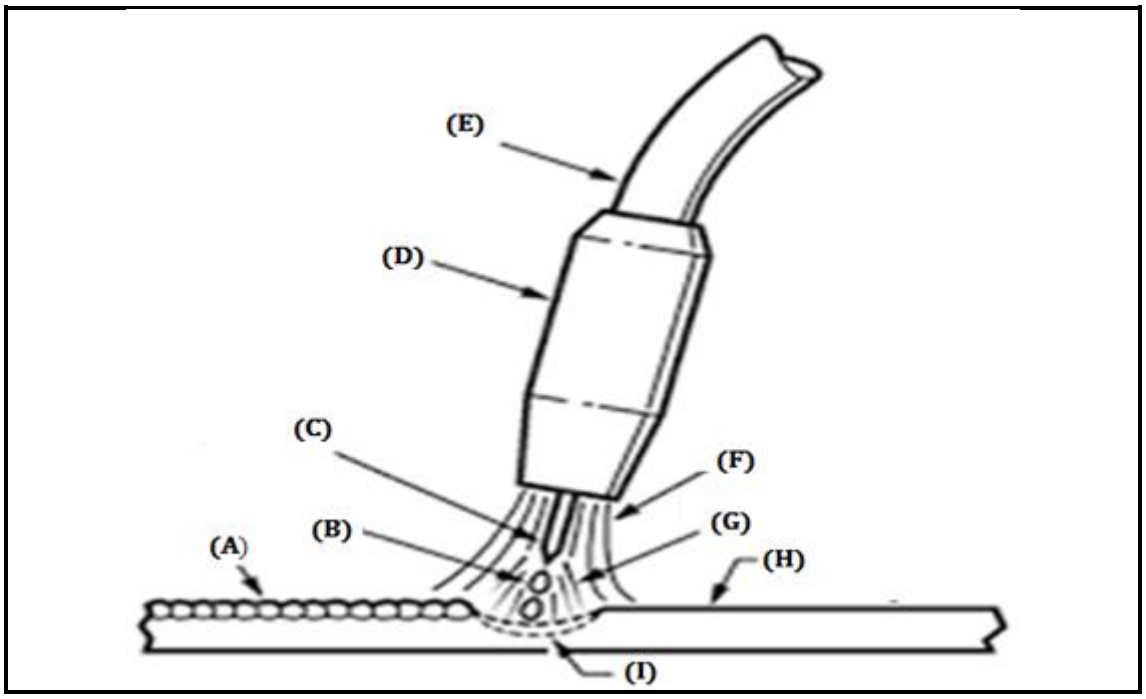


FIGURE 1

3.4 List any TWO defects that can be identified in a welding joint. (2)

3.5 List TWO actions that could be taken to prevent spatter. (2)

3.6 Unsafe working conditions must be reported to the supervisor and technicians before accidents occur. Write the possible solutions of the following cases of malfunctioning of a welding machine:

3.6.1 Arc is unstable

3.6.2 No shielding gasses

3.6.3 No feeding of electrode

3.6.4 Electrode wire bends

(4 × 1) (4)

3.7 On arrival at the company where you were placed during the college recess, the supervisor showed you materials that needed pre-cleaning before welding could commence.

What would you use to clean the following dirt you found on the materials?

3.7.1 Paint

3.7.2 Rust

3.7.3 Oil

3.7.4 Sand

(4 × 1) (4)

[26]

QUESTION 4

4.1 Define the following terms used when bending materials in the workshop:

4.1.1 Tolerance

4.1.2 Allowance

(2 × 1) (2)

4.2 State FOUR roles of a supervisor when laying out and marking off a steel shell. (4)

4.3 List TWO types of cranes used in the engineering industry. (2)

4.4 State the THREE motions of an overhead crane. (3)

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4.5 FIGURE 2 below shows a steel tank with an outside diameter of 1 200 mm that has to be manufactured using a 16-mm plate. A stiffening ring has to be manufactured using a 20 × 100 mm flat bar.

Calculate the following measurements. Answers must be converted to metres.

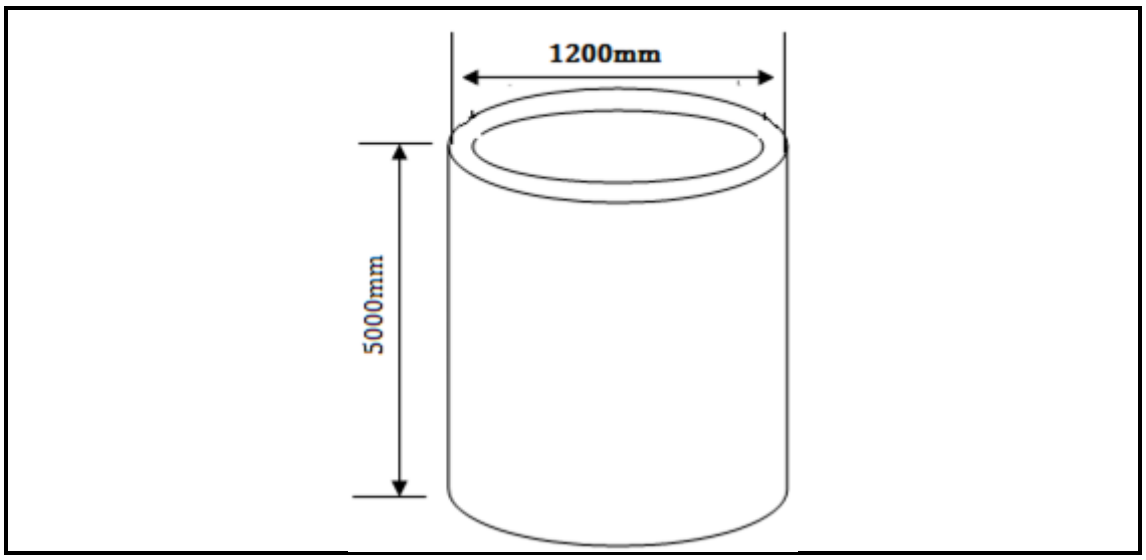


FIGURE 2

4.5.1 The true length of the plate required for the tank (3)

4.5.2 The true length of the flat bar for the stiffening ring (3)

4.5.3 The area of the flat bar required for the stiffening ring (3)

4.5.4 The internal volume of the tank (3)
[23]

QUESTION 5

5.1 FIGURE 3 below shows an angle plate that has to be manufactured.

Calculate the total length of the bracket. Convert the answer to metres. (6)

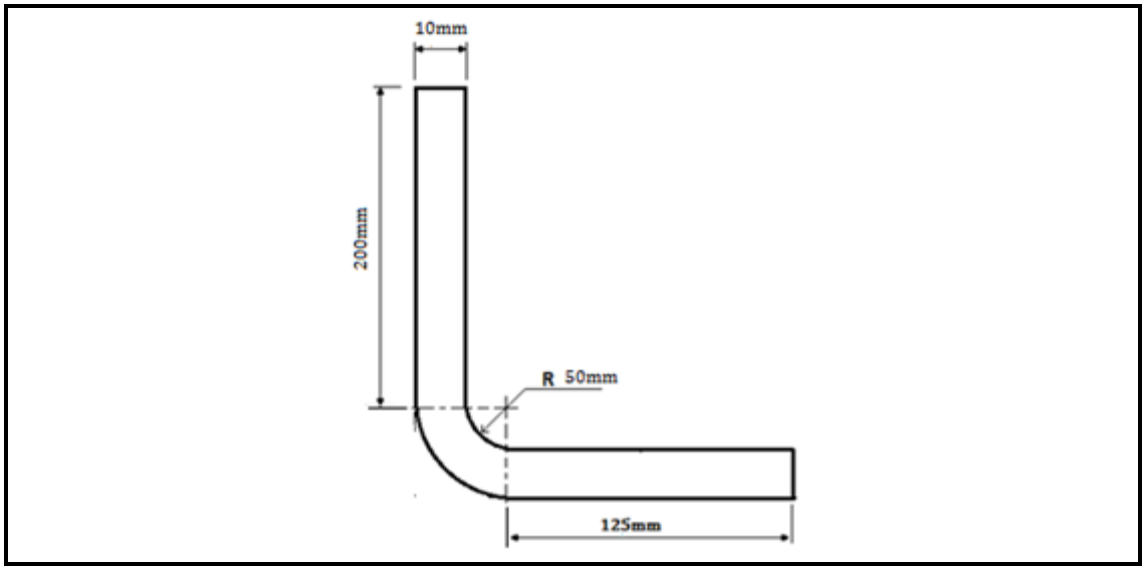


FIGURE 3

5.2 FIGURE 4 below shows the given views of a pyramid. Use the radial line method and do the construction in the ANSWER BOOK using the given measurements to determine the true length of XA. (4)

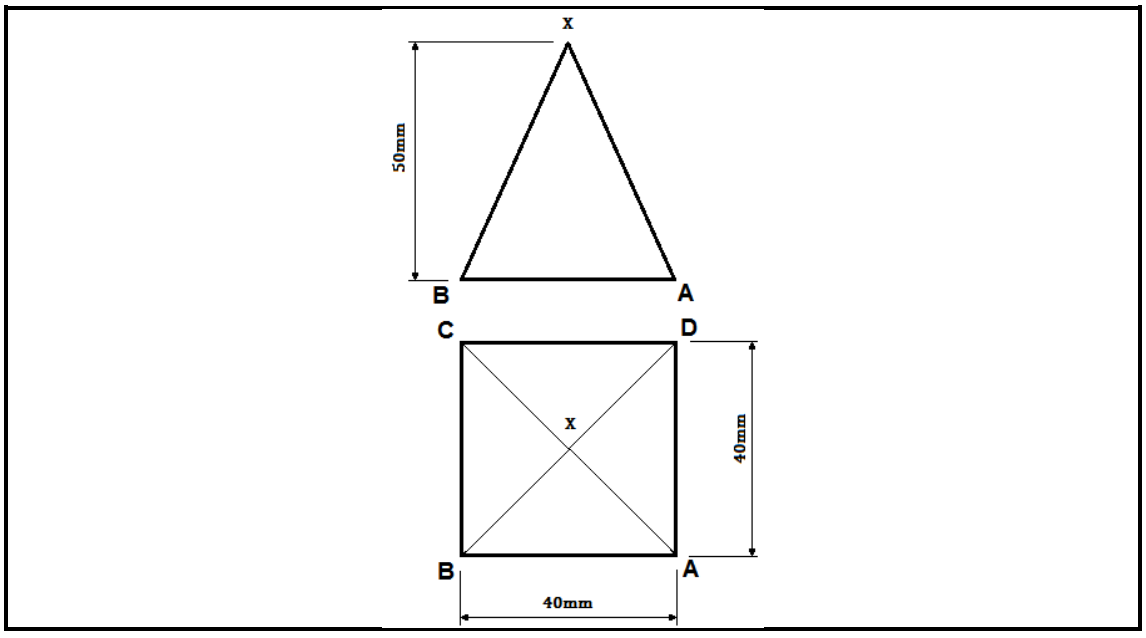


FIGURE 4

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5.3 State SIX important safety points that you have to conform to as outlined in the Occupational Health and Safety Act with regard to using cutting equipment and tools. (6)

5.4 State ONE function of each of the following parts of the bending brake:

5.4.1 Clamping handles

5.4.2 Balance weight

5.4.3 Adjustable stop gauge

5.4.4 Two-position handles

(4 × 1) (4)

5.5 List THREE irregularities that could be identified on a completed transition piece regarding the welding. (3)

[23]

TOTAL: 100

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