higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE (VOCATIONAL)

WELDING
NQF LEVEL 4

(6031034)

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

This question paper consists of 6 pages.

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DEPARTMENT OF HIGHER EDUCATION AND TRAINING
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE (VOCATIONAL)
WELDING
NQF LEVEL 4
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 blue or black pen.
5. The diagrams should be clear and neat, and a pencil may be used.
6. Write neatly and legibly.

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QUESTION 1

1.1 Various options are given as possible answers to the following questions. Choose the answer and write only the letter (A–D) next to the question number (1.1.1–1.1.10) in the ANSWER BOOK.

1.1.1 A burr is …

A the sharp edge remaining on the metal after cutting.
B an assembly of parts that are joined by welding.
C the science and technology of metals.
D the melting together of metals.

1.1.2 A weldment is …

A the sharp edge remaining on the metal after cutting.
B an assembly of parts that are joined by welding.
C the science and technology of metals.
D the melting together of metals.

1.1.3 Material fatigue is the …

A tendency of a material to fail after repeated stress at the same point.
B melting together of metals.
C warping of a structure.
D sharp edge remaining on metal after cutting.

1.1.4 A narrow slit that forms in metal as cutting progresses …

A Fusion
B Distortion
C Ferrous
D Kerf

1.1.5 An external or internal force applied on an object causes …

A quenching.
B metallurgy.
C fusion.
D stress.

1.1.6 Rapid cooling from a high temperature due to contact with fluids is called …

A fatigue.
B kerf.
C stress.
D quenching.

1.1.7 The science and technology of metals is known as …

A kerf.
B stress.
C quenching.
D metallurgy.

1.1.8 Fusion is the …

A science and technology of metals.
B sharp edge remaining on metal after cutting.
C melting together of metals.
D warping of a structure.

1.1.9 Distortion is …

A the sharp edge remaining on metal after cutting.
B the melting together of metals.
C the warping of a structure.
D a weld joint.

1.1.10 Metals in which iron is the major ingredient:

A Ferrous
B Alloys
C Non-ferrous
D Cast steel

(10 × 1) (10)

1.2 Name FIVE components that make up a shielded metal-arc welding (SMAW) setup as shown in FIGURE 1.

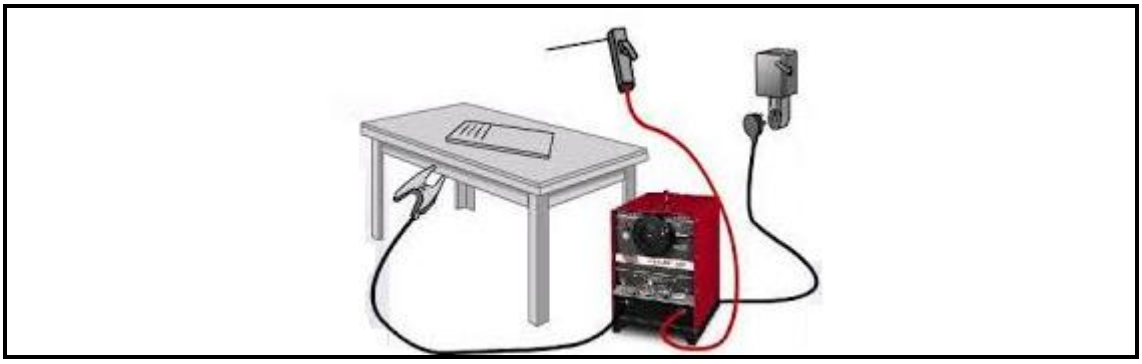

FIGURE 1 (5)

1.3 Shielded metal-arc welding (SMAW) is a common method used for welding pipes together.

Explain this type of welding process. (5)
[20]

QUESTION 2

2.1 There are two types of connections namely the direct-current electrode positive (DCEP) and direct-current electrode negative (DCEN).

Draw a neat diagram showing the layout of a direct-current electrode positive (DCEP) connection. (5)

2.2 State FOUR factors that should be considered when choosing the size of an electrode for shielded metal arc welding (SMAW). (4)

2.3 Name FIVE precautions that should be taken regarding fumes and gases released during the shielded metal-arc welding (SMAW) process. (5)

2.4 Spatter is a welding defect that may occur during the shielded metal-arc welding (SMAW) process.

2.4.1 State THREE causes of spatter. (3)

2.4.2 State THREE ways in which excessive spatter could be prevented. (3)

[20]

QUESTION 3

3.1 FIGURE 2 shows a gas tungsten-arc welding (GTAW) setup. Name the components indicated and write only the answer next to the letter (A–G) in the ANSWER BOOK.

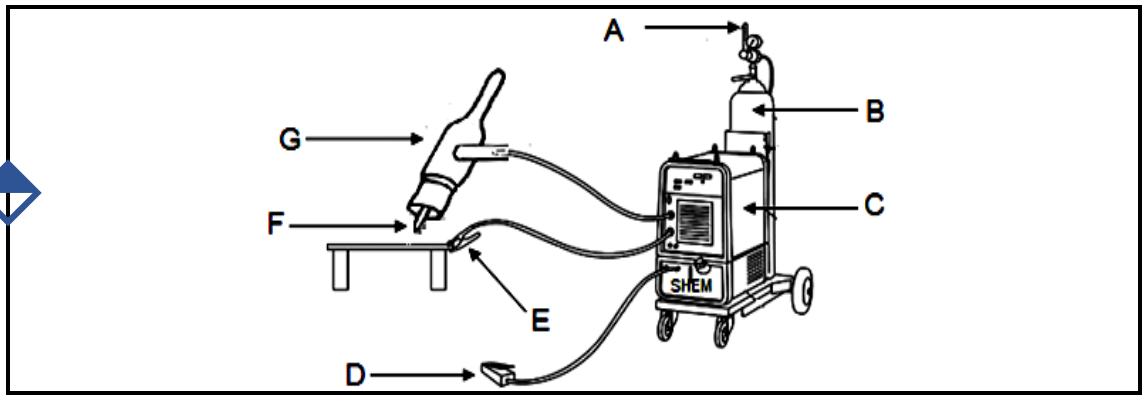

FIGURE 2 (7)

3.2 With out-of-position welds, gravity is the enemy and welders need to rely on their skill to use the force of the arc to direct the weld pool towards the joint. State FIVE ways to manipulate the weld pool and weld bead profile. (5)

3.3 Draw a neat, labelled diagram to show the difference between a tungsten electrode used for DC welding and one used for AC welding. (4)

3.4 State FOUR causes of excessive electrode consumption used during gas tungsten-arc welding. (4)

[20]

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QUESTION 4

4.1 Gas tungsten-arc welding (GTAW) is a welding process also known as tungsten inert gas (TIG) welding.

Copy the following table in the ANSWER BOOK and complete it by stating FIVE advantages and FIVE disadvantages of gas tungsten arc welding (GTAW).

	ADVANTAGES	DISADVANTAGES
4.1.1		
4.1.2		
4.1.3		
4.1.4		
4.1.5		

(5 × 2) (10)

4.2 State SEVEN steps required to set up the equipment before commencing with gas tungsten-arc welding (GTAW). (7)

4.3 Explain how shielding gas cylinders should be stored after use. (3)

[20]

QUESTION 5

5.1 FIGURE 3 shows different types of equipment that are used for metal inert gas (MIG) welding. Name the equipment by writing only the answer next to the question number (5.1.1–5.1.5) in the ANSWER BOOK.



FIGURE 3 (5)

5.2 Give the meaning of *wire stick-out*. (5)

5.3 A welder must select the correct electrode wire before metal inert gas (MIG) welding can take place. State FIVE factors to consider when selecting the correct electrode wire. (5)

5.4 Give FIVE causes of porosity when welding, using the metal inert gas (MIG) welding process. (5)

[20]

TOTAL: 100

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