higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE (VOCATIONAL)

ENGINEERING FABRICATION: SHEET METAL WORK
NQF LEVEL 4

(6031024)

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09:00–12:00

This question paper consists of 7 pages.

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DEPARTMENT OF HIGHER EDUCATION AND TRAINING
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE (VOCATIONAL)
ENGINEERING FABRICATION: SHEET METAL WORK
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 black or blue pen.
5. Write neatly and legibly.

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SECTION A

QUESTION 1

Complete the following sentences by writing only the missing word or words next to the question number (1.1–1.10) in the ANSWER BOOK.

1.1 CNC machines are computer … controlled.

1.2 The symbol ... in CNC programming means that the workpiece must be finished by grinding.

1.3 A … is a quick free-hand drawing to show a general idea.

1.4 Fans are used to move ... around.

1.5 Gas cylinders can be stored in the … position.

1.6 A transition piece is a duct fitting that changes the … of a duct without changing the direction.

1.7 Acetylene gas cylinders contain … gas under pressure.

1.8 The welding work area must always be well ventilated, and all fumes must be …

1.9 A rigid fibrous duct board is fibreglass insulation board that has a surface layer of … foil.

1.10 Air velocity is the … at which air travels in a given direction.

(10 × 1) **[10]**

QUESTION 2

Choose a term from COLUMN B that matches a description in COLUMN A. Write only the letter (A–F) next to the question number (2.1–2.5) in the ANSWER BOOK.

COLUMN A		COLUMN B	
2.1	Non-ferrous metals	A	to protect the welder's eyes from ultra-violet rays
2.2	Heel radius	B	is the program that tells the computer how to do a particular job
2.3	Helmet	C	the radius of the arc that forms the elbow heel
2.4	Air-conditioner	D	does not rust or corrode easily
2.5	A post-processor	E	heats or cools the air
		F	splatters can be prevented

(5 × 1) **[5]**

TOTAL SECTION A: 15

SECTION B

QUESTION 3

3.1 Rigid fibrous duct board makes long-lasting, light ducts that have two advantages.

State TWO advantages of rigid fibrous duct board. (2 × 2) (4)

3.2 Explain what is meant by the term, *thermal acquisition ductwork*. (2)

3.3 Before a draughtsman can prepare a plant layout drawing, certain information is needed.

State FIVE such pieces of information needed. (5)

3.4 Describe the following terms for air diffusion terminals within the duct work layout:

3.4.1 Interior zone

3.4.2 Mechanical ventilation

3.4.3 Lower zone

(3 × 2) (6)

[17]

QUESTION 4

4.1 Define the TWO terms below that deal with air movement technology:

4.1.1 Humidification

4.1.2 Mixing chamber

(2 × 2) (4)

4.2 Transition elbows are very useful because they change the duct size in elbows.

Name TWO other function of transition elbows. (2 × 2) (4)

4.3 List FIVE main pre-operational checks/tests that must be carried out on TIG welding equipment before a welding machine is operated. (5)

4.4 Before a pickling and passivating process, one must use alkaline cleaner.

State ONE reason for using alkaline cleaner. (2)

4.5 Ventilation and fume extraction should not be confused when welding.

Define the term, *fume extraction*, in relation to welding. (2)

[17]

QUESTION 5

5.1 5.1.1 Of the three main possible shielding gases, argon, is mostly preferred because of its excellent cleaning properties.

State THREE other characteristics that elevates argon above other gasses. (3)

5.1.2 Name TWO other shielding gases that one would use when operating a TIG welding machine. (2)

5.2 Study FIGURE 1 and FIGURE 2 below and answer the questions that follow.

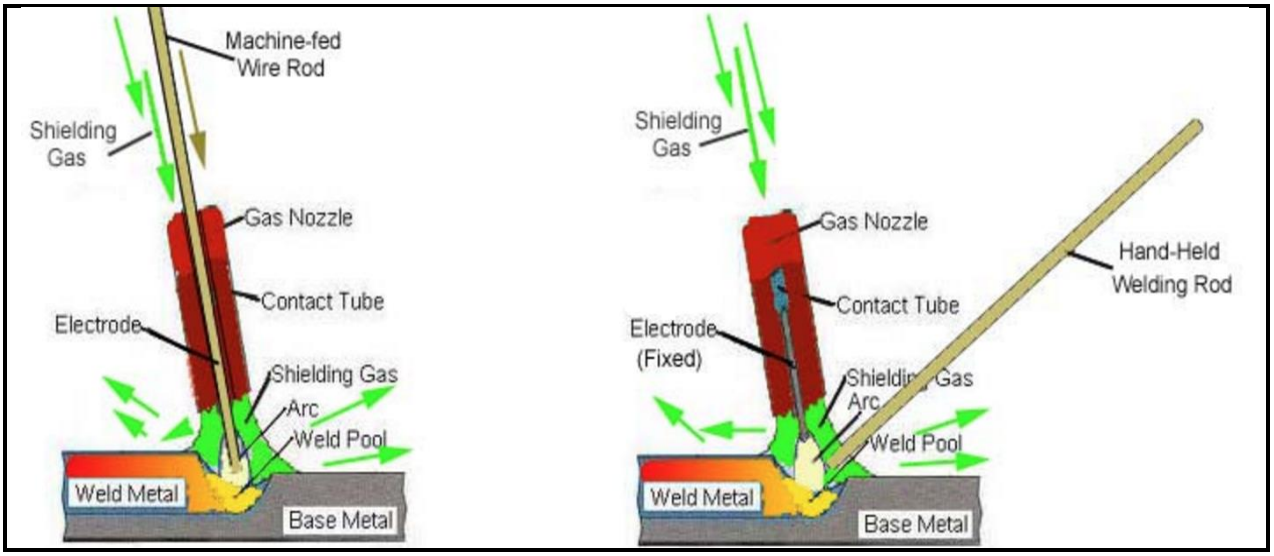


FIGURE 1 **FIGURE 2**

5.2.1 Which ONE of FIGURE 1 or FIGURE 2 represents a TIG welding process? (1)

5.2.2 Write the acronym TIG in full. (3)

5.2.3 Which ONE of the welding processes above would you use in welding thin materials? Provide TWO reasons for your answer. (3)

5.3 State SIX ways to store gas cylinders according to worksite safety regulations. (6)
[18]

QUESTION 6

6.1 The acronym, CNC, is popular in industries these days.

Write the acronym, CNC, in full. (3)

6.2 State THREE linear axis used in CNC lathe machines with reference to the right-hand rule. (3)

6.3 Name at least FOUR components of a CNC lathe machine that are identical to a normal NC machine. (4)

6.4 The definition, 'A three dimensional drawing method used to show one side of an object flat on, while also showing two of the other sides of the object', refers to a drawing.

6.4.1 What drawing does the above definition refer to? (1)

6.4.2 How does the definition in QUESTION 6.4 differ from an isometric drawing? (2)

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6.5 Briefly define the following toolpath generated by a CAM system of a CNC machine.

6.5.1 Point to point

6.5.2 Continuous path

(2 × 2) (4)

6.6 CNC welding machines allow complete control over certain aspects during the welding process. Name THREE of these aspects. (3)

6.7 As a regular CNC machine operator, what would you do to back-up the programme stored in the CNC computer? (3)

6.8 On a CNC lathe most workpieces are clamped using a chuck, but smaller workpieces and long workpieces present challenges.

Indicate how one would deal with the following:

6.8.1 Smaller workpieces

6.8.2 Long workpieces on a CNC lathe when clamping

(2 × 2) (4)

6.9 Study FIGURE 3 below and answer the questions that follow.

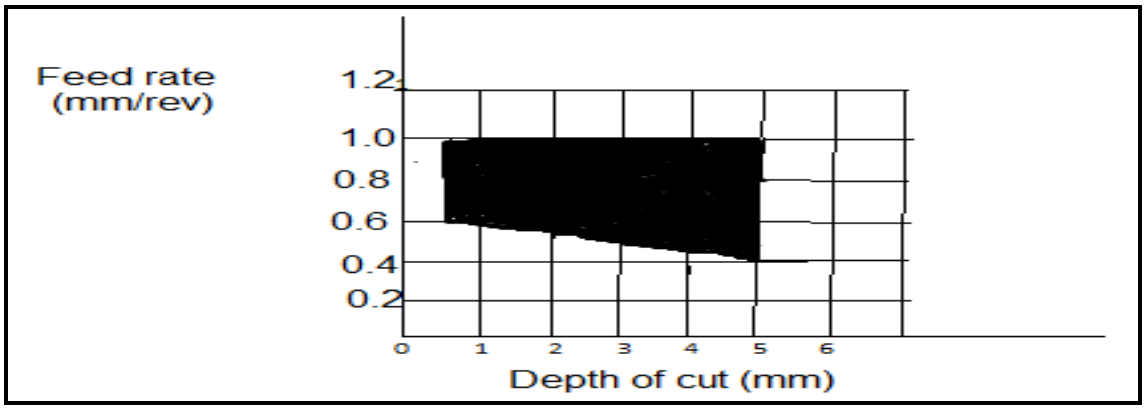


FIGURE 3

6.9.1 Identify the maximum depth that this insert can cut to.

6.9.2 Identify the feed rate range for this insert.

6.9.3 If the depth cut is 2,5 mm what would the range of the feed rate be?

(3 × 2) (6)

[33]

TOTAL SECTION A: 85
GRAND TOTAL: 100

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