higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE (VOCATIONAL)

PROCESS TECHNOLOGY
NQF LEVEL 2

(6050342)

10 November 2022 (Y-paper)
13:00–16:00

This question paper consists of 6 pages.

249Q1N2210

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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 black or blue pen.
6. Write neatly and legibly.

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QUESTION 1

Various options are given as possible answers to the following questions. Choose the correct answer and write only the letter (A–D) next to the question number (1.1–1.5) in the ANSWER BOOK.

1.1 A type of valve that is suitable for controlling the flow of low-pressure fluid through large passages:

A Plug valve
B Gate valve
C Ball valve
D Butterfly valve

1.2 Which ONE of the following factors is a cause of poor sedimentation performance?

A Inlet velocity
B Pressure
C Filtration rate
D Thickening

1.3 A type of a weld that connects two parts together by adding extra material to it:

A Weld neck
B Flanges
C Fillet weld
D Socket weld

1.4 A pump where a piston, diaphragm or other device is used to push fluid:

A Reciprocating pump
B Positive-displacement pump
C Piston pump
D Pulsating pump

1.5 A/An … is the fluid that has passed through the filter.

A ionic solution
B concentration
C particulate matter
D filtrate

(5 × 1) **[5]**

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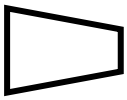
QUESTION 2

2.1 Name FOUR types of control-valve symbols in a process-flow diagram. (4)

2.2 Explain the main purpose of a process-flow diagram. (2)

2.3 Name each of the following symbols used in a PFD:

2.3.1 

2.3.2 

2.3.3

(3 × 1) (3)

2.4 What is the main purpose of piping and fittings? (2)

2.5 List FOUR types of common piping materials. (4)

2.6 List THREE welding processes used to manufacture welded pipes. (3)

[18]

QUESTION 3

3.1 Indicate whether the following statements are TRUE or FALSE by writing only 'True' or 'False' next to the question number (3.1.1–3.1.5) in the ANSWER BOOK.

3.1.1 Reciprocating means that something is moving backwards and forwards.

3.1.2 When operating single-acting piston pumps, on stroke two**,** the plunger moves downwards and forces the discharge valve to close.

3.1.3 *Rotary* pumps cannot handle high-viscosity fluids efficiently.

3.1.4 A *centrifugal compressor* is a dynamic unit used for liquid transfer in many process applications.

3.1.5 A bursting or ruptured disc is a pressure-relief device that will burst and provide an instantaneous full relief by allowing the compressed gas to escape to another system.

(5 × 1) (5)

3.2 Give FIVE applications of fans in industries. (5)

3.3 Draw a labelled diagram of a basic *positive pressure-pneumatic* conveying system. (6)

3.4 Give THREE reasons for the failure of seals. (3)

[19]

QUESTION 4

4.1 Explain TWO aspects to be kept in mind in order to ensure safety of the environment when storing products.

(2 × 2) (4)

4.2 State FOUR safety measures to follow when transporting containers. (4)

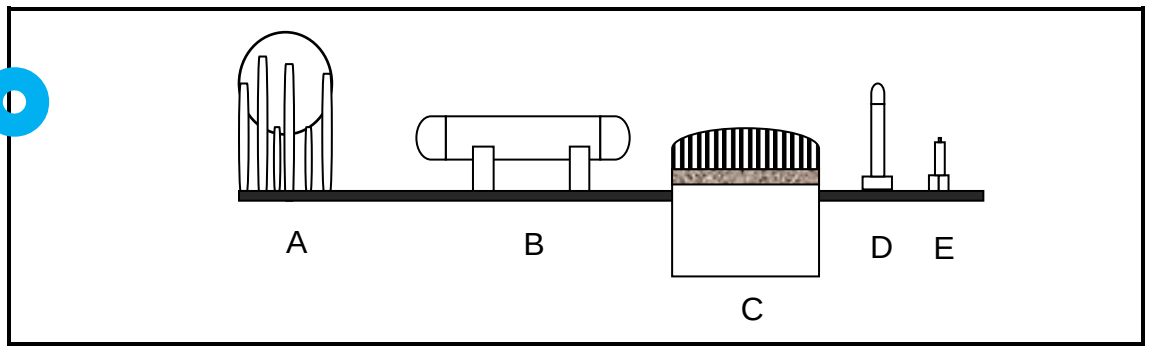
4.3 Give FOUR advantages of *horizontal* tanks. (4)

4.4 State THREE functions of tank ventilation systems. (3)

4.5 The figure below shows the various shapes and sizes of pressure gas tanks.

Name each shape by writing only the answer next to the letter (A–E) in the ANSWER BOOK.

(5 × 1) (5)



[20]

QUESTION 5

5.1 Explain the fundamental purpose of separation processes in industries. (3)

5.2 List the FIVE steps to follow in chronological order when purifying water in a typical municipal water-treatment plant. (5)

5.3 Define the term *screening*. (2)

[10]

QUESTION 6

6.1	Briefly explain FOUR groups of *liquid-solid separation* processes.	(4 × 2)	(8)
6.2	State THREE main objectives of *liquid-solid separation*.	(3 × 2)	(6)
6.3	Draw a schematic diagram of a *rapid sand* filter system.		(6)
6.4	Describe what a *diffuser* is.		(2)
6.5	Explain the operation of a *Krystal-type cooling* crystalliser.		(6)
			[28]
		TOTAL:	**100**

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