



higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE
CHEMICAL PLANT OPERATION N5

(8050015)

8 July 2022 (X-paper)
09:00–12:00

Drawing instruments and nonprogrammable calculators may be used.

This question paper consists of 4 pages and 1 table.

189Q1A2208

DEPARTMENT OF HIGHER EDUCATION AND TRAINING
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CHEMICAL PLANT OPERATION N5
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 section on a new page.
 5. Use only a black or blue pen.
 6. Write neatly and legibly.
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QUESTION 1

Choose an item from COLUMN B that matches a description in COLUMN A. Write only the letter (A–G) next to the question number (1.1–1.5) in the ANSWER BOOK.

COLUMN A		COLUMN B	
1.1	Velocity decreases as kinetic energy is transferred to a moving blade	A	heat
1.2	A vertical cylinder with a conical bottom	B	radial-flow turbine
1.3	A turbine in which only part of the pressure drop occurs in the nozzle	C	axial flow
1.4	Type of acid that produces a sodium, copper and nitro compound that can be used for photoengraving	D	reaction turbine
1.5	Form of energy that flows from a system to its surrounding	E	nitric acid
		F	sulphuric acid
		G	cyclone

(5 × 1)

[5]**QUESTION 2**

- 2.1 Define the following terms:
- 2.1.1 Heat of reaction (2)
- 2.1.2 Hess's law (3)
- 2.1.3 Kinetic energy (2)
- 2.2 Determine the enthalpy change of 10 mol of air between 600 °C and 1 100 °C. (5)
- 2.3 Identify THREE factors influencing the efficiency of an impulse-reaction turbine. (3)
- [15]**

QUESTION 3

- 3.1 Give the combustion reaction of tetrachloromethane (CCl₄). (3)
- 3.2 Briefly describe the advantages and disadvantages of a closed-gas turbine. (6)
- 3.3 Sketch a rotary cup atomiser burner. (5)
- 3.4 Name the THREE blades in a two-arm kneader and describe the purpose of each. (3 × 2) (6)

[20]