



higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE CHEMICAL PLANT OPERATION N5

(8050015)

**16 November 2020 (X-paper)
09:00–12:00**

This question paper consists of 4 pages.

085Q1E2016


DEPARTMENT OF HIGHER EDUCATION AND TRAINING
REPUBLIC OF SOUTH AFRICA
NATIONAL CERTIFICATE
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. Sketches must be large, neat and fully labelled.
 5. Write neatly and legibly.
-


QUESTION 1

Indicate whether the following statements are TRUE or FALSE by writing only 'True' or 'False' next to the question number (1.1–1.5) in the ANSWER BOOK.

- 1.1 A gas burner is a premix burner in which a proportional mixer uses air velocity to draw in a measured amount of gas.
- 1.2 Potential energy is the energy of an object due to its position or state of tension. 
- 1.3 Steam that is heated to a temperature (t_{su}) higher than the saturation temperature is called saturated steam.
- 1.4 In an impulse turbine, the entire available pressure drop from supply to exhaust occurs across the nozzles.
- 1.5 Heat of reaction refers to the difference in energy between the products of the reaction and the reactants.

(5 × 1)

[5]**QUESTION 2**

- 2.1 Draw a labelled diagram of an open cycle gas turbine system. (9)
- 2.2 Explain the operation of the following:
- 2.2.1 Helical conveyor centrifuge  (6)
- 2.2.2 Nozzle discharge centrifuge (4)
- 2.2.3 Tumbling mixers (6)

[25]**QUESTION 3**

- 3.1 The analysis of the waste gas from a burner fuelled with natural gas (essentially pure C_2H_6) is as follows: $N_2 = 75$ mol per cent; $O_2 = 12.5$ mol per cent; $CO_2 = 5$ mol per cent and $H_2O = 7.5$ mol per cent.

What is the ratio of moles of air to the moles of natural gas fed to the burner? (10)

- 3.2 Draw a labelled diagram of a disk centrifuge.  (8)

- 3.3 Define *Kopp's rule*. (2)

[20]