higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE

WATER AND WASTE-WATER TREATMENT PRACTICE N2

(8120022)

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

Drawing instruments may be used.

This question paper consists of 5 pages.

177Q1E2330

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DEPARTMENT OF HIGHER EDUCATION AND TRAINING
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE
WATER AND WASTE-WATER TREATMENT PRACTICE N2
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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QUESTION 1

1.1 Define each of the following terms:

1.1.1 Stabilisation

1.1.2 Backwash

1.1.3 Bacteria

1.1.4 Filtration

1.1.5 Coagulant

1.1.6 Detention time

1.1.7 Turbidity

1.1.8 Algae

1.1.9 Disinfection

1.1.10 pH

(10 × 2) (20)

1.2 Name FIVE factors that influence the stability of water. (5)

1.3 Briefly explain the purpose of testing for oxygen absorption (OA) and indicate how it is done. (2)

[27]

QUESTION 2

2.1 List SIX benefits of waste-water treatment with chlorine. (6)

2.2 Briefly explain each of the following:

2.2.1 Phosphate removal

2.2.2 Storing of ferric chloride

(2 × 4) (8)

[14]

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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 Organic substances in water normally cause colour in water.

3.1.2 The presedimentation stage can settle out sand, grit and gravel from raw water.

3.1.3 Flow measurement is the quantification of bulk fluid movement.

3.1.4 Chlorine is relatively expensive and not readily available.

3.1.5 Composite samples give a more representative sample of the characteristics of the water at a plant over a longer period.

(5 × 1) (5)

3.2 Explain *flocculation* with reference to flash mixing, floc formation and floc conditioning. (9)

[14]

QUESTION 4

4.1 A Dortmund sedimentation tank has a cone depth of 3 m, a total depth of 11 m and a radius of 3,5 m. Effluent is entering the tank at a flow rate of 0,5 m^3/s.

Calculate:

4.1.1 The volume of the tank (4)

4.1.2 The time (in minutes) it will take to fill up the sedimentation tank calculated in QUESTION 4.1.1 (4)

4.2 Name and describe THREE properties of raw sludge. (8)

4.3 Describe the four different zones in breakpoint chlorination. (6)

4.4 Explain the THREE different reticulation or pipe systems. (3)

[25]

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QUESTION 5

5.1 Draw and label a sketch of each of the following:

5.1.1 Venturi tube (5)

5.1.2 Hydrostatic sludge removal (7)

5.2 Name SEVEN basic water-quality tests that must be carried out at regular intervals in a waste-water treatment plant. (7)

5.3 Briefly explain the term *sludge volume index*. (1)

[20]

TOTAL: 100

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