higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

T1740**(E)**(A10)T

NATIONAL CERTIFICATE

WASTE-WATER TREATMENT PRACTICE N3

(8120003)

10 April 2019 (X-Paper)
09:00–12:00

This question paper consists of 4 pages.

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DEPARTMENT OF HIGHER EDUCATION AND TRAINING
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE
WASTE-WATER TREATMENT PRACTICE N3
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.

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QUESTION 1

1.1 Convert the following to SI units:

1.1.1 1 000 000 cm^3

1.1.2 1 000 000 mg

(2 × 2) (4)

1.2 Calculate the volume of a cylinder with a diameter of 4 m and a height of 7 m. (4)

1.3 Calculate the density of iron (III) chloride if the mass of an empty volumetric flask is 550 g and a flask filled with one litre $FeC\ell_3$ at 20 °C is 2 000 g. (3)

1.4 Name FOUR types of valves found at a sewage plant. (4)

1.5 For which purposes will you recommend centrifugal pumps? (3)

1.6 Give the advantages of Archimedean screw pumps. (4)

1.7 Provide the equation that illustrates the denitrification process that takes place in an activated sludge system to remove organic matter under anaerobic conditions. (3)

[25]

QUESTION 2

2.1 Rewrite the sentence below by choosing the correct word between brackets.

Algae are small (one-cell/multiple-cell) plants. It contains (chlorophyll/ chloroform) and uses (sunlight/oxygen) to break down (carbon dioxide/ oxygen) and set free (oxygen/nitrogen). (5)

2.2 List THREE water-borne diseases and give the effect of each on human health. (3 × 2) (6)

2.3 What advantages do stabilisation ponds have over other conventional sewage-treatment plants? (5)

2.4 Give FIVE reasons for installing flowmeters in a waste-water-treatment plant. (5)

2.5 What is the difference between *on-the-spot* and *composite* sampling? (2 + 2) (4)

[25]

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QUESTION 3

3.1 Define each of the following:

3.1.1 HRT

3.1.2 Actual HRT

(2 × 2) (4)

3.2 Name FOUR requirements for the biological removal of phosphates. (4)

3.3 Briefly discuss the main causes of high sludge levels in sedimentation tanks. (5)

3.4 Name FOUR types of sand filters that can be used to remove suspended solids from waste water. (4)

3.5 State FIVE physical properties of chlorine as a gas. (5)

3.6 Arrange the following terms in the correct order to illustrate the aquatic food chain:

large fishes – algae – small fishes – zooplankton – phosphorus and nitrogen (5)

[27]

QUESTION 4

4.1 What is the purpose of using a balancing tank before a sedimentation tank? (2)

4.2 Name FOUR aeration methods that can be used in an activated-sludge plant. (4)

4.3 Give TWO advantages and TWO disadvantages of a slow sand filter. (2 + 2) (4)

4.4 Briefly explain *breakpoint chlorination*. (3)

4.5 What are the FOUR main responsibilities of employees under the Occupational Health and Safety Act (OHASA)? (4)

4.6 Give SIX reasons why it is important to keep proper records at a waste-water treatment plant. (6)

[23]

TOTAL: 100

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