higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE

WASTE-WATER TREATMENT PRACTICE N3

(8120003)

11 August 2021 (X-paper)
09:00–12:00

This question paper consists of 6 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. Start each section on a new page.
5. Use only black or blue pen.
6. Write neatly and legibly.

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SECTION A

QUESTION 1

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

1.1 1 m^3 equals …

A 10^3 cm^3.
B 10^7 mm^3.
C 10^9 mm^3. ◉
D None of the above-mentioned

1.2 The area of a circle can be expressed as …

A ½ radius × circumference.
B 2π × radius.
C $\pi(d^2/4)$.
D None of the above-mentioned

1.3 … is the formula for pressure per unit area exercised by water at a depth of one meter. ◉

A Density × volume × gravity
B Density × gravity × head
C Relative density × gravity
D Force per unit area

1.4 Algae serves as food for …

A mosquitoes.
B fish. ◉
C zooplankton.
D bacteria.

1.5 The bacteria … converts nitrite ions to nitrates during nitrification.

A Nitrosomonas
B Heterotrophs
C Nitrobacter
D Bacillus ◉

(5 × 1) **[5]**

QUESTION 2

Choose an item from COLUMN B that matches a description in COLUMN A. Write only the letter (A–J) next to the question number (2.1–2.5) in the ANSWER BOOK.

COLUMN A		COLUMN B	
2.1	Valves that open under the influence of pressure	A	thermophilic
2.2	Pump that is not damaged by sand	B	butterfly valve
2.3	Bacteria that perform well at 55 ˚C	C	submersible pump
2.4	The process where water turns into vapour	D	condensation
2.5	It is expressed as the number of moles per volume	E	mesophilic
		F	airlift pump
		G	pressure relief valve
		H	concentration
		I	evaporation
		J	density

(5 × 1) **[5]**

QUESTION 3

Indicate whether the following statements are TRUE or FALSE by writing only 'True' or 'False' next to the question number (3.1–3.5) in the ANSWER BOOK.

3.1 Grit can be removed at the detritus channel.

3.2 Ammonium hydroxide is a strong alkali.

3.3 The chemical symbol for aluminium is Al.

3.4 Eutrophication is the enrichment of water reserves with sulphur.

3.5 Reclamation is a common demineralisation process. (5 × 2) (10)

[10]

TOTAL SECTION A: 20

SECTION B

QUESTION 4

4.1 Define the following terms:

4.1.1 Power

4.1.2 Flow rate

4.1.3 Condensation

(3 × 2) (6)

4.2 Differentiate between *permanent* and *temporary hardness*. (2 × 2) (4)

4.3 Write down the chemical formulae of the following:

4.3.1 Calcium carbonate

4.3.2 Sodium hydroxide

(2 × 2) (4)

4.4 List SIX uses of activated carbon. (6)

[20]

QUESTION 5

5.1 The main purpose of primary sedimentation is to permit separate treatment of the solid and liquid fractions in sewage.

5.1.1 Define *sedimentation*. (2)

5.1.2 List FIVE factors affecting the sedimentation process. (5)

5.1.3 What causes the offensive smell in the sedimentation or settling process? (3)

5.1.4 Name TWO chemicals that are used to remove phosphate from sewage. (2)

5.2 Desludging is an important operation as the efficiency of both the sludge treatment and biological treatment processes are dependent on it.

Explain the problems that can be encountered if the sludge has:

5.2.1 Too much water

5.2.2 Too little water

(3 × 2) (6)

5.3 Name the tool that is used to remove scum. (2)

[20]

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QUESTION 6

6.1 Draw a labelled sketch illustrating the biological process in a filter bed. (10)

6.2 Name any TWO types of settling tanks. (2)

6.3 List FOUR types of records to be kept on a biofilter. (4)

6.4 What are the standards of the following as set for biofilter efficiency?

6.4.1 pH

6.4.2 NH_4

(2 × 2) (4)
[20]

QUESTION 7

7.1 Write down a reaction where an organic carbon is oxidised to gaseous CO_2 (3)

7.2 Explain what MLSS is. (3)

7.3 List SIX methods of disinfection. (6)

7.4 Name FOUR classes of fire and give an example of each. (4 × 2) (8)
[20]

TOTAL SECTION B: 80
GRAND TOTAL: 100

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