higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

# MARKING GUIDELINE

## NATIONAL CERTIFICATE

## WATER AND WASTE-WATER TREATMENT PRACTICE N2

**23 November 2022**

**This marking guideline consists of 5 pages.**

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## QUESTION 1

1.1 Total viable organisms
1.2 Preliminary treatment/Pre-treatment
1.3 Secondary treatment
1.4 Activated sludge
1.5 Sampling

(5 × 2) **[10]**

## QUESTION 2

2.1

| Parameter | General standard | Special standard |
|---|---|---|
| **Suspended solids** | 2.1.1 25 mg/ℓ✓ | 2.1.2 10 mg/ℓ✓ |
| **Faecal coliforms** | 2.1.3 nil per 100 mℓ✓ | 2.1.4 nil per 100 mℓ✓ |
| **Mercury** | 2.1.5 0,02 mg/ℓ✓ | 2.1.6 0,02 mg/ℓ✓ |
| **Arsenic** | 2.1.7 0,5 mg/ℓ✓ | 2.1.8 0,1 mg/ℓ✓ |

(8 × 1) (8)

2.2 $\text{Height} = 25 \text{ metres}$

$\text{Diameter} = 14 \text{ metres} = r = \frac{D}{2} = \frac{14}{2} = 7 \text{ m}$✓

$\text{Therefore: Volume} = \text{Area} \times \text{Height}$

$= \pi r^2 h$✓

$= 3{,}14 \times 7 \times 7 \times 25$✓✓

$= 3\,846{,}5 \text{ m}^3$✓✓ (6)

2.3
- Liquids like aluminium sulphates, flocculation etc.
- Solids Aluminium sulphate etc.
- Suspensions (lime that need stirrer) (3)

2.4
- Electrically driven paddle or propeller
- Orifice in a pipeline causing head loss
- Vortex created in a conical chamber over a weir (3)

**[20]**

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## QUESTION 3

3.1 Sodium hypochlorite is a clear light yellow liquid✓ commonly used under various brand names as a household bleach.✓ The industrially available product has a strength of 15% to as low as 3,5% for household use.✓ It is not a fire hazard but it is a very corrosive liquid.✓ It is not stable and loses its strength during storage.✓ (5)

3.2 A – Source
B – Screen
C – Pump
D – Flowmeter
E – Flocculant
F – Rapid mixing
G – Flocculation
H – Sedimentation
I – Sludge to sludge lagoons
J – Sand filter
K – Sand filter backwash water
L – Chlorination
M – pH correction
N – Clear water reservoir
O – Pump
P – Storage reservoir
Q – Distribution (Any 15 × 1) (15)
**[20]**

## QUESTION 4

4.1 4.1.1 Coagulation removes small particles made up of microbes, silt✓ and other suspended material in the water.✓ (2)

4.1.2 Clarification occurs in a large basin where water is again allowed to flow very slowly.✓ Sludge, a residue of solids and water, accumulates at the bottom of the basin and is pumped or scraped out for eventual disposal.✓ (2)

4.1.3 The filtration process removes suspended matter✓ which can consist of floc, micro-organisms, algae, silt, iron and manganese precipitates from groundwater sources,✓ as well as precipitants which remain after the softening process.✓ These suspended materials are filtered out when water passes through beds of granular material, usually composed of layers of sand, gravel, coal, garnet or related substances.✓ (4)

4.1.4 During disinfection, disease-causing organisms are destroyed or disabled.✓ Chlorine is the most common disinfectant because it is practical, effective and economical.✓ (2)

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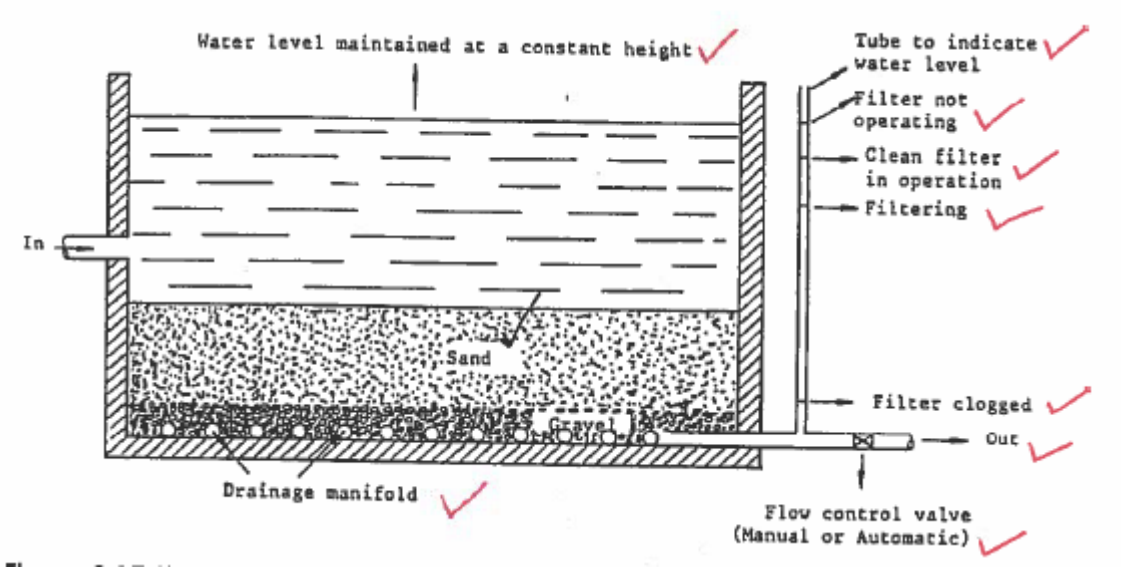
4.2




(10)
**[20]**

## QUESTION 5

5.1
- Clear water✓ flows over the effluent weir and goes to disinfection.✓
- Activated sludge✓ is pumped from the bottom and goes back to the reactor and return as activated sludge.✓
- Scum✓ is skimmed off the surface and also returns to the reactor with the returned activated sludge.✓ (3 × 2) (6)

5.2 Sludge consists of water,✓ organic solids✓ and inorganic matter/solids.✓ (3)

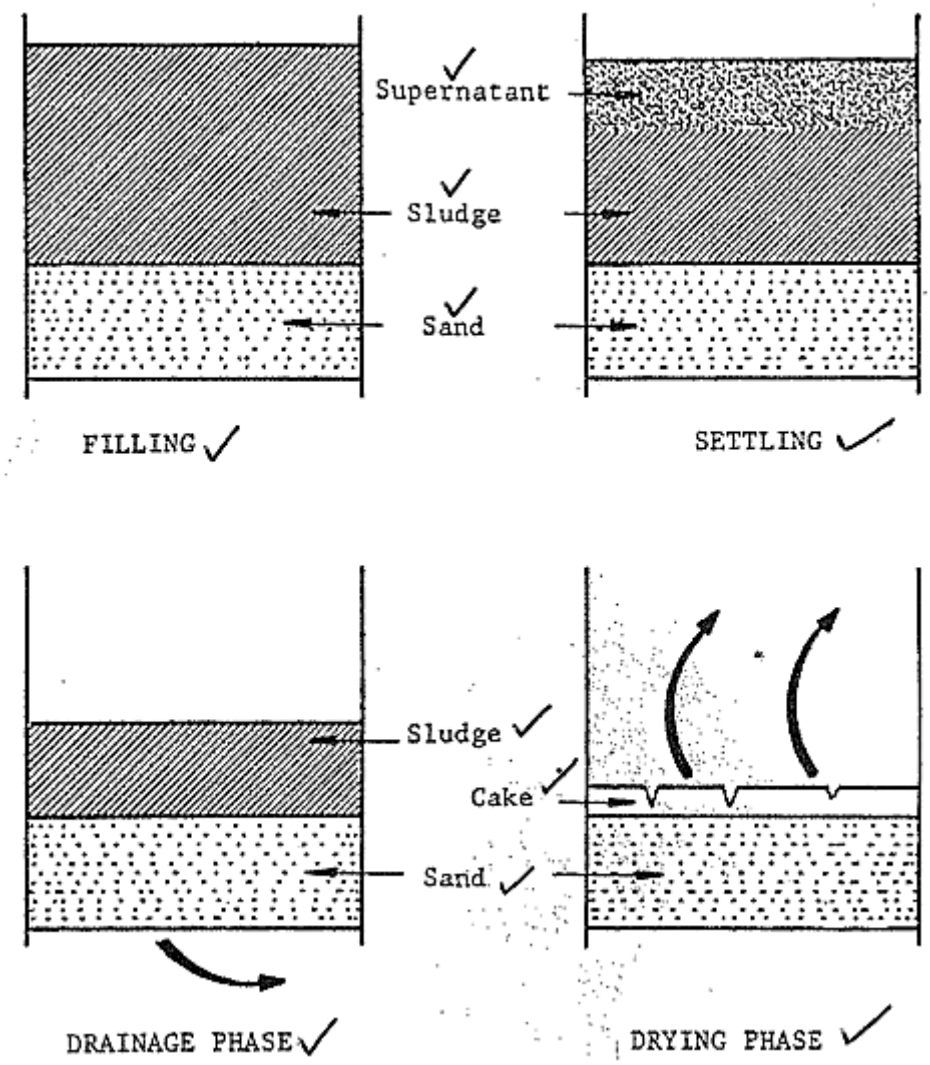
5.3 Anaerobic fermentation is the introduction of micro-organisms that flourish without free oxygen✓ to gradually decompose organic compounds induced✓ by the action of living organisms or the introduction of chemical agents.✓ (3)

5.4 In spot sampling a dipper is used to take one sample of mixed liquor or effluent. This is not normally representative and only gives an idea of what is happening at the time of sampling. A composite sample is composed of many grab spot samples taken over a certain period of time. The total sample collected is then mixed and heated. (3 + 3) (6)

5.5
- Coarse-bubble system
- Fine-bubble system (2)

**[20]**

**QUESTION 6**




**[10]**

**TOTAL: 100**

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