higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE

WASTE-WATER TREATMENT N3

10 APRIL 2018

This marking guideline consists of 5 pages.

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QUESTION 1

1.1 siemens or electrical potential is measured in volts or Electrical conductivity is measured in atomic carbon chains

1.2 syphon

1.3 hydrosphere

1.4 atomic mass or mass number

1.5 Bacteria

(5 × 2) **[10]**

QUESTION 2

2.1
- Carbon
- Oxygen
- Sulphur
- Hydrogen
- Nitrogen
- Phosphorus

(6)

2.2 2.2.1 Vibrio cholera
2.2.2 Salmonella typhii
2.2.3 Shigella dysenteriae

(3 × 2) (6)

2.3 SABS 241 of 1994 or SANS 241-1:2015 (3)

2.4 Faecal matter and urine are discharged into a chemical solution✓ in a suitable container✓ where it is decomposed✓ or retained odourless.✓ The contents of the closet can be buried or used in making compost or treated further as it may contain pathogenic organisms.✓ (5)

[20]

QUESTION 3

3.1
- Needle valves
- Diaphragm valves
- Check valves
- Safety and release valves (4)

3.2 3.2.1 This is the smallest part ✓ of an element which is able to exist alone or in combination with other atoms of the same or a different kind ✓ and still have the characteristics of the original element.

3.2.2 This is a substance which may be decomposed into two or more simpler substances.

3.2.3 This is a method of describing a concentration of a solution, or an expression of the number of moles of solute per litre of solution.
(3 × 2) (6)

3.3 3.3.1 Thermophiles or thermophyllic bacteria

3.3.2 Autotrophs or autotrophic bacteria

3.3.3 Facultative anaerobes
(3 × 2) (6)

3.4 These latrines are an improvement on the conventional pit latrines.✓ The structure of a VIP is built only partially over the pit to provide space for an external ventilation pipe to be fitted.✓ The pipe keeps the latrine odour-free by creating a strong draft through it.✓ The pipe is covered with a gauze screen to keep insects out.✓ (4)
[20]

QUESTION 4

4.1
- OA
- COD
- BOD
- TOC (4)

4.2 This is a flow velocity of 1 m/s that prevents any serious deposits from forming in the sewer. (2)

4.3 4.3.1 Sunlight kills pathogenic bacteria and stimulates the growth of algae which produce oxygen during daytime and thus aid in the oxidation of unstable matter.

4.3.2 Currents speed up re-aeration thus reducing recovery time. Slow currents favour the settling of solids with resulting clarification, algae growth and O_2 production.

4.3.3 Low temperatures slow down or stop the activities of organisms.

4.3.4 A large volume of water with sufficient dissolved oxygen may prevent the obvious degradation of a stream's quality or may even retain aerobic conditions.

4.3.5 With sedimentation, coarse solids settle and form sludge banks where anaerobic decomposition occurs.

(5 × 2) (10)

4.4
- Bar screens
- Fixed bar racks
- Mechanically raked screens
- Static or rotary screens (4)

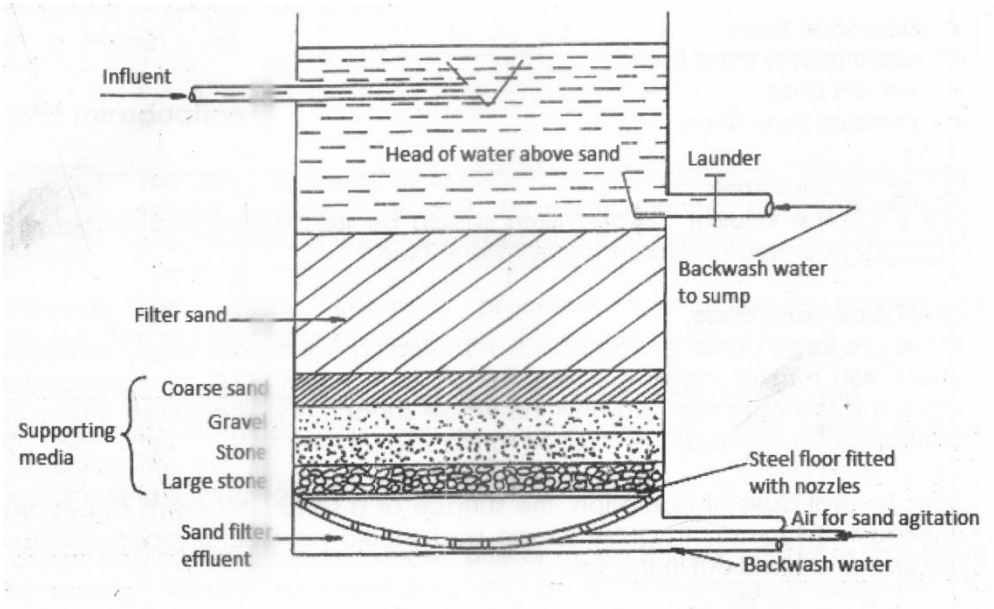
4.5
- Incineration
- Burial (2)

4.6 Sedimentation permits separate treatment of the solid and liquid fractions in the sewage✓, reducing the load on the biological aerobic liquid treatment stage✓ and thereby allowing the sludge to be treated anaerobically✓. (3)

[25]

QUESTION 5

5.1



(13)

5.2
- It must be able to destroy all kinds and numbers of pathogens within a practicable period of time in all water temperatures, compositions, concentrations and condition variations.
- It must not be toxic to man, animal or nature after discharge to water sources.
- It must be reasonable in cost, be safe, and be easy to store, handle and apply.
- It should persist long enough in water to carry out its task.
- The rate of application and concentration in the treated water should be easily measurable. (5)

5.3
- pH
- % Ash
- % Volatile solids reduction
- Volatile solids
- Total suspended solids (5)

5.4
- Final polishing of effluents
- Improves the bacterial quality of effluent
- Acts as a buffer in the event of a breakdown at the treatment plant

(Any 2 × 1) (2)
[25]

TOTAL: 100

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