higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE

WATER AND WASTE-WATER TREATMENT PRACTICE N1

8 AUGUST 2019

This marking guideline consists of 5 pages.

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QUESTION 1

1.1
- Clear
- Odourless
- Tasteless (3)

1.2
- The Department of Water Affairs must control the country's water resources.
- Water resources must be controlled to keep it free from pollution.
- Water usage must be controlled. (3)

1.3
- Temperature
- Wind speed
- Surface area
- Humidity (4)

1.4
- It has a high dissolving power, e.g. water + atmospheric CO_2 $\longrightarrow$ carbonic acid.
- More substances are able to dissolve in water than in any other substance.
- Elements like calcium and magnesium dissolve in water and form hard water which forms scale in pipes.
- Bromine and magnesium dissolved in water help to nourish aquatic organisms. (4)

1.5
- Lower freshwater extraction from rivers and aquifers
- Less impact from septic tank and treatment-plant infrastructure
- Topsoil nitrification
- Reduced energy use and chemical pollution from treatment
- Groundwater recharge
- Increased plant growth
- Reclamation of nutrients
- Better quality of surface and ground water when preserved by the natural purification in the top layers of soil rather than by being recycled by water treatment (Any 7 × 1) (7)

[21]

QUESTION 2

2.1
- Groundwater is rainwater stored in very old and hard rock formations.
- It originates from rainwater that falls on the earth and sinks beneath the surface through porous soils onto a bedrock.
- It is water found beneath the earth's surface often between saturated soil and rock
- and it supplies wells and springs.
- Some of the seepage water will penetrate downwards far enough to become part of the saturated reservoir of freshwater that underlies earth.
- Groundwater may come to the surface as a spring or vlei. (6)

2.2
- Position of water table
- Configuration of land surface
- Nature and structure of rock material (3)

2.3
- Replace the worn parts of a valve.
- Check and regularly service all valve fittings.
- Check valve seals and replace if faulty.
- Replace filters.
- Test pressure points. (Any 4 × 1) (4)

2.4
- Replace worn parts on the reservoir.
- Check and regularly service all equipment in the reservoir.
- Check the tank and reservoir seals and replace if faulty.
- Replace the filters of the reservoir.
- Check pipelines connected to the reservoir.
- Test pressure points.
- Check if there are leaks and fix. (7)

[20]

QUESTION 3

3.1
3.1.1 True
3.1.2 False
3.1.3 False
3.1.4 True
3.1.5 True
(5 × 1) (5)

3.2
3.2.1 The force that pulls an object to the centre (2)

3.2.2 A disease-causing organism (1)

3.2.3 The soft, thick substance left behind when waste or sewage has been cleaned and treated (2)

3.2.4 Enrichment of water by the addition of nutrients (2)

3.2.5 Water which is reused in a factory for example where pump water is needed (2)

3.3
- The chemical and microbial content of natural water which is mostly influenced by geology and ecology
- Chemicals added or removed during hard-water/soft-water treatment
- Inputs and reactions that occur during the distribution and storage of water (3)

3.4
- Unsuitable where the water table is high
- Soil too unstable to dig or ground is very rocky
- No ventilation pipe so there are often odour problems
- Insect infestation is common (Any 3 × 1) (3)

[20]

QUESTION 4

4.1
- Humus
- Plant matter
- Sand
- Debris
- Salt and clay
- Microorganisms (Any 5 × 1) (5)

4.2
- Chlorine is added and broken down by a reduction substance
- Formulation of chloramines and chlorine organic compounds
- Breaking down of chloramines and chlorine organic compounds
- Breakpoint-free residual chlorine and a small amount of chlorine organic compounds that were not destroyed (4)

4.3
- Waste-water aeration in the presence of a microbial suspension
- Solid-liquid separation following aeration
- Discharge of clarified effluent
- Washing of excess biomass
- Return of remaining biomass to the aerator (5)

4.4
- Biological filler
- Activated sludge
- Clarifier
- Humus tank (4)

4.5
- Carbon dioxide
- Methane gas
- Inoffensive grey alkaline sludge (3)

[21]

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QUESTION 5

5.1 It passes through:
- To the aeration tank as return sludge
- To the digester
- Directly to the drying beds (3)

5.2
- Low temperatures reduce the growth rate of nitrifying bacteria.
- A pH of less than 7 and more than 9 reduces the growth rate of nitrifying bacteria.
- A lack of oxygen causes nitrifying bacteria to become dormant.
- Chemicals destroy nitrifying bacteria. (4)

5.3
- Falling into treatment tanks
- Falling off treatment tanks
- Can be gassed with chlorine or sulphur dioxide
- Chemicals can splash into eyes
- Fingers can crush in machinery
- Back injuries
- Slipping on wet walkways
- Tools or parts being repaired can drop on a person's head
- Confined spaces can cause death
- A person can be electrocuted (Any 8 × 1) (8)

5.4
- People must be informed about safety precautions, rules and guidelines and these guidelines must be followed to ensure safety.
- Safety equipment signs must be put up.
- Safety kits for first aid and firefighting equipment must be provided. (3)

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TOTAL: 100

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