higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE

WASTE-WATER TREATMENT PRACTICE N3

20 April 2021

This marking guideline consists of 5 pages.

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QUESTION 1

1.1 1.1.1 It is the formation of bubbles in a liquid by the movement of a propeller through it. (2)

1.1.2
- Atmospheric pressure must exceed the net positive suction head.
- The suction pipe should be as short as possible.
- Minimise friction and velocity losses in the suction pipe.
- Since one cause of cavitation is the release of dissolved gases, the suction pipe must rise continuously towards the pump and all pockets, in which released gases may collect, must be avoided.
- A flooded suction should be provided or if this is not possible, the suction lift should be as small as possible.
- Prevent air from entering the suction.
- Eliminate turbulence as far as possible. (Any 5 × 1) (5)

1.2
- Handle
- Valve stem
- Packing
- Packing nuts
- Valve body
- Washer (6)

1.3 A safety valve is a valve that opens automatically to relieve excessive pressure – especially in a boiler,✓✓ while a relief valve is a valve that automatically opens when pressure in a container reaches a dangerous level.✓✓ (2 × 2) (4)

1.4 Butterfly valve (1)

1.5 It is all the water on the earth's surface, like seas and lakes, and also water above the earth's surface, such as clouds. (2)

1.6
- Water released from storage
- Water emerging from underground reservoirs
- Rainfall that remains after losses due to soil infiltration, evaporation and transpiration (3)

[23]

QUESTION 2

2.1 2.1.1 Magnesium
2.1.2 Calcium
2.1.3 Neon
(3 × 2) (6)

2.2
- Nucleus: Central part of an atom which consists of protons and neutrons which are positively charged
- Electrons: Are found around the nucleus and are negatively charged

(3 × 2) (6)

2.3
- Protozoa are much larger than the bacteria and identification is usually microscopic. Some may be amorphous e.g. amoeba.
- Protozoa are aerobic organisms plentiful in still water where large numbers of bacteria are present and as parasites in animals.
- Some protozoa are also pathogenic, e.g. those which cause amoebic dysentery and malaria. Under adverse conditions they form cysts which are similar to spores of bacteria. (3 × 2) (6)

2.4
- Chemical
- Physical
- Bacteriological requirements (3)

2.5
- Bad odours
- Fly breeding (2)

2.6
- No expensive equipment needed
- No disinfection needed
- Able to treat or handle unsettled and settled sewage without problems
- Economical to construct and maintain
- Algae which grow on the ponds aid in oxidation (Any 4 × 1) (4)

[27]

QUESTION 3

3.1
- A mixture of saline matter in solution
- Nitrogenous matter
- Carbonaceous matter in solution and suspension
- Together with a certain amount of grit and mineral matter (4)

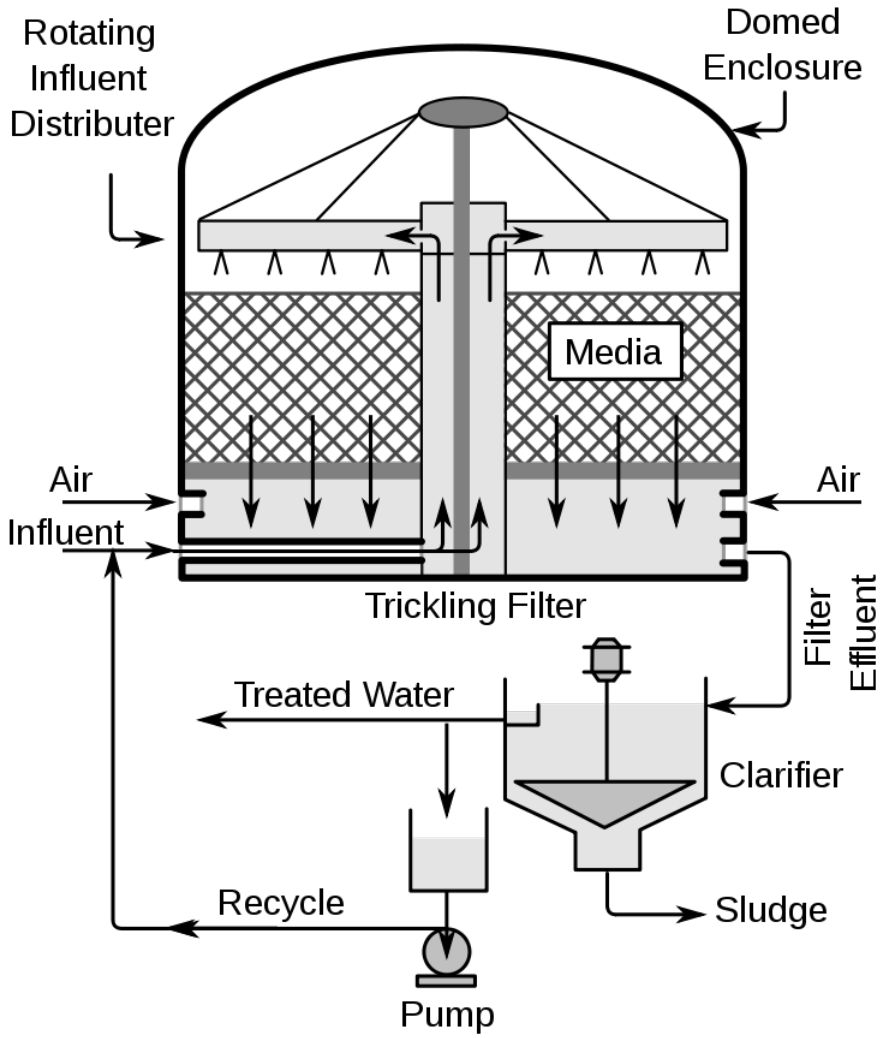
3.2 If the flow velocity is not great enough, deposits of solids will occur with accompanying blockages and odours developing (3)

3.3 Used as a means of access for inspection and cleaning (2)

3.4 Large objects which have collected or been placed in sewers at manholes, like sand and grit, grease or other miscellaneous objects (2)

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3.5



(Allocate ONE mark for any TEN correct labels) (10)

3.6
- Screened raw sewage
- Screened raw sewage with night soil and conservancy tank waste
- Settled sewage
- Other organic industrial waste with or without domestic sewage, provided nutrients are present (4)

[25]

QUESTION 4

4.1 4.1.1

- Chlorine is a dangerous toxic gas which requires a gas mask for handling
- It is a yellowish-green colour approximately 2,5 times denser than air with a molecular weight of 70,906
- Chlorine in its dry form is not corrosive to most metals but only corrosive when mixed with water, which leads to the formation of hydrochloric and hypochlorous acid
- From a 68 kg cylinder approximately 1 kg/h may be extracted and about 7 to 10 kg may be extracted from a ton cylinder before freezing problems occur
- One volume of liquid chlorine confined in a container under pressure yields about 450 volumes of gas
- It is a strong oxidising agent reacting with most elements and compounds
- The vapour is a respiratory nitrate which could cause serious injury if exposure to a high concentration occurs (7)

4.1.2

- Always have the protective domes in position when transporting chlorine
- Cylinders should always be handled with care to prevent damage to the cylinder
- Always use a crane to lift the cylinder up stairs
- Always fasten cylinders when transporting, irrespective of whether full or empty
- Obtain a wall chart on the safe handling of chlorine cylinders and place it in a spot where the information can be accessible to everyone (5)

4.2

- A mixture that is relatively odour free
- Readily dewaterable
- Capable of being disposed of without causing nuisance
- Good methane gas formation (4)

4.3

- Soil must be such that it protects groundwater and is at least 450 mm above the maximum ground water table
- Surrounding areas must be graded to prevent surface water from entering
- Depth should not be more than 600 mm
- At least two lagoons should be provided (4)

4.4

- Work and maintenance planning
- Prediction and forecasting
- Analysing breakdown
- Cost budgeting
- One's own protection
- Design of new plants and for comparing results with those of similar plants

(Any 5 × 1) (5)

[25]

TOTAL: 100

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