



**higher education
& training**

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE

**WATER AND WASTE-WATER TREATMENT
PRACTICE N2**

31 JULY 2018

This marking guideline consists of 6 pages.

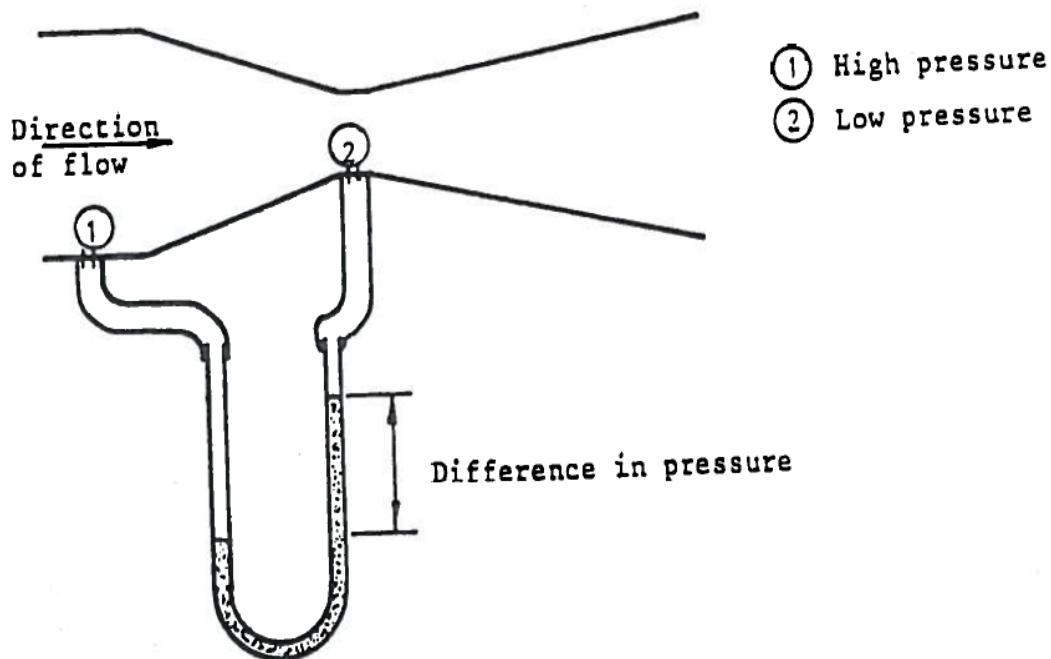
QUESTION 1

- 1.1 True
 1.2 True
 1.3 False
 1.4 True
 1.5 True

(5 × 1)

[5]**QUESTION 2**

2.1



(FOUR marks for labelling and ONE mark for diagram)

(5)

- 2.2
- Flow is not obstructed
 - No head loss
 - No clogging
 - Can handle sludge
 - No small openings which can clog
 - Measures flow in either direction
 - Accurate over a wide range
- (Any 5 × 1) **(5)**

- 2.3
- 90° V-notch
 - Rectangular
 - Cipoletti
- (3)**

- 2.4
- To treat the amount of water needed
 - To be able to add the correct amount of chemicals
 - To calculate retention times
 - To determine unit costs
 - To determine water losses through the plant
- (5)
- 2.5
- Lime
 - Sodium carbonate
- (2)
- [20]**

QUESTION 3

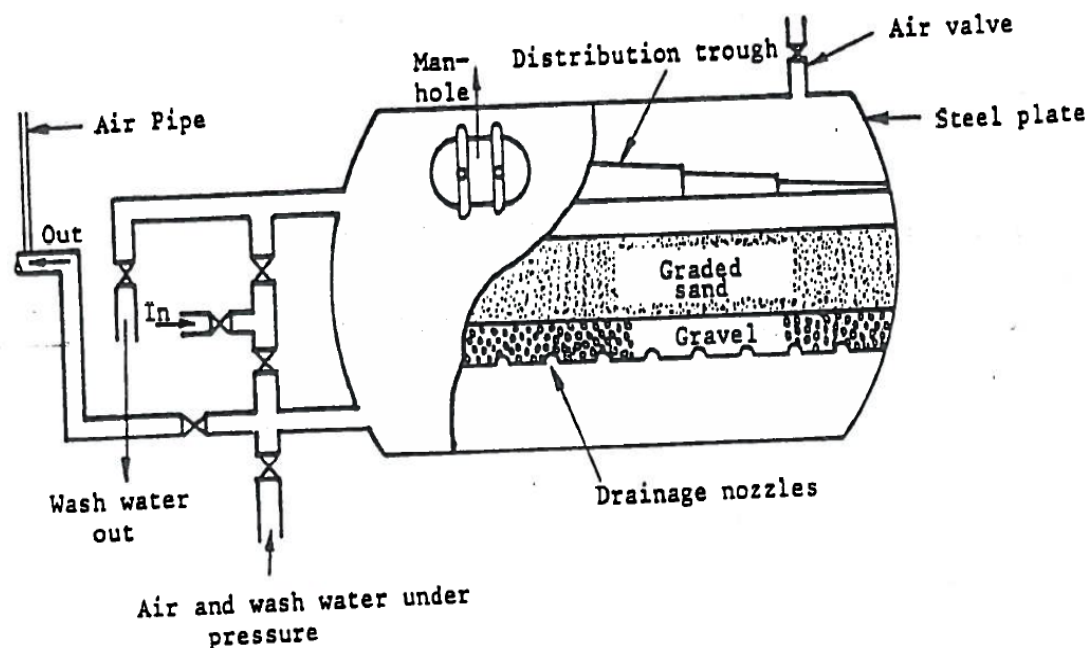
- 3.1 3.1.1 $V_p = A \times L$ ✓
- $$= \frac{\pi d^2}{4} \times L$$
- $$= \frac{\pi (1.5^2)}{4} \times 2500$$
- $$= 4\,417,865 \text{ m}^3$$
- (4)
- 3.1.2 Time to fill = $\frac{\text{volume}}{\text{Pump capacity}}$ ✓
- $$= \frac{4\,417,865}{0.15}$$
- $$= 29\,452,433 \text{ s}$$
- $$= 8,18 \text{ hours}$$
- (6)
- 3.2
- Activated sludge
 - Trickling filters
 - Rotating biological contractors
 - Humus tanks
 - Aeration
 - Clarifiers
- (Any 5 × 1) (5)
- 3.3 Circular radial flow tanks are also called mechanical shallow tanks and are commonly used in South Africa. Flow takes place from a central inlet to a peripheral weir ✓. The tank floor has a 7,5 to 15 degree slope from the side wall to the central sludge hopper ✓. Sludge is withdrawn by a rotating bridge ✓ with sludge scrapers which scrape sludge to the central hopper ✓ from where it is usually automatically discharged. Scum scrapers also attached to the bridge remove scum to a trough slightly above TWL. ✓
- (5)
- [20]**

QUESTION 4

- 4.1
- Aluminium sulphate
 - Ferric chloride
 - Lime
 - Floccotan
- (4)
- 4.2
- Liquids
 - Solids followed by solutionising
 - Suspensions
- (3)
- 4.3
- Clear water:✓ flows over effluent weir and goes to disinfection✓
 Activated sludge:✓ pumped from the bottom and goes back to the reactor as the return activated sludge✓
 Scum:✓ skimmed off the surface and also returns to the reactor with the returned activated sludge✓
- (6)
- 4.4
- Size, shape and weight of the floc
 - Temperature and thus the viscosity of the water
 - Design of the inlet and the outlet works
 - Average effective time available for sedimentation
 - Effective depth of the tank
 - Area of the tank
 - Rate of overflow
 - Rate of flow
- (Any 7 × 1) (7)
- [20]**

QUESTION 5

5.1

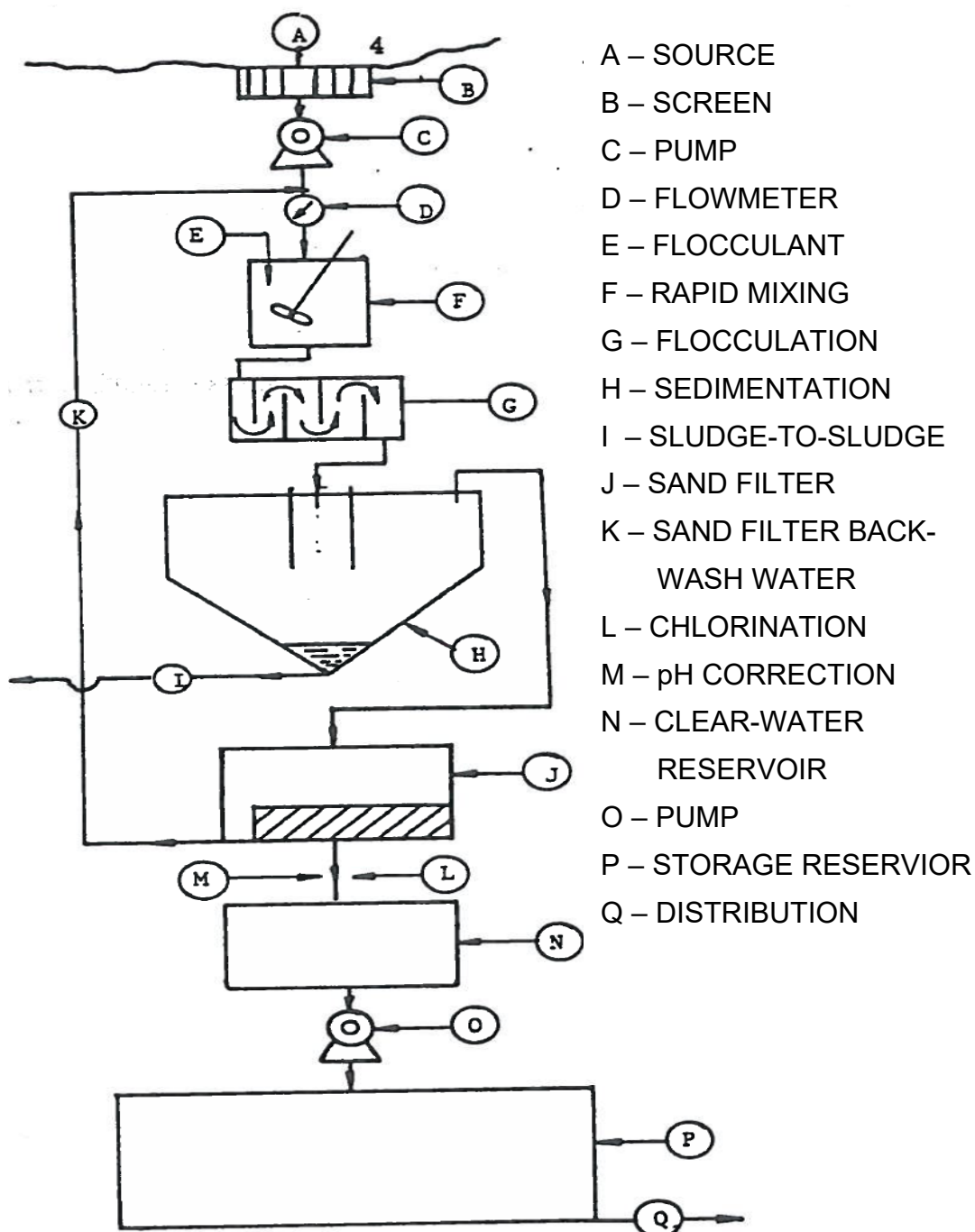


(NINE ticks for labellings and ONE mark for a diagram) (10)

- 5.2 Filtration is a chemical and physical process✓ to clarify water by removing✓ suspended and colloidal particles from water✓ by passing it through a porous medium, normally sand.✓ (4)
- 5.3 5.3.1 Prechlorination is applied where tastes and odours are to be removed✓ and also for the control of algae.✓ It should not be applied when organic flocculants such as poly-electrolytes or floccotan are used.✓ (3)
- 5.3.2 Postchlorination involves the chlorination of the final purified water✓ to ensure it is disinfected and free from harmful bacteria.✓ This can be done at the treatment plant or at points along the distribution system such as reservoirs.✓ (3)
- [20]**

QUESTION 6

6.1



(Any 15 × 1) [15]

TOTAL: 100