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Q : 31) In water treatment, rapid gravity filters are adopted to remove:

A : Dissolved organic substances

B : Dissolved solids and gases

C : Floating solids and dissolved inorganic solids

D : Bacteria and colloidal solids

Rapid Sand filter की जानकारी

$C_u = 1.2 - 1.6$

$D_{10} = (0.30 - 0.50)$ mm

(2-5) % water used for Backwashing

Rate of filtration (3000-6000) $l/m^2/hr$

$\frac{L}{B} = 1.25 \text{ to } 1.33$

Bacterial Removal efficiency = 80-90%

operation trouble

(1) Air Binding ⇒ Backwashing

(2) Mud ball formation = Compressed air

(3) Cracking of filter ⇒ temp, weight of gravel.

Q : 32) The area of the openings in screen should be such that the velocity of flow through them does not exceed

A : 0.75 to 1 m/s

B : 1.5 to 3 m/s

C : 3 to 5 m/s

D : 5 to 6 m/s

Screening → Coarse screen & fine screen.

Coarse Screen are in the form of bars spaced at 20–100 mm c/c inclined to 3·6 V : 1H

⇒ fine screen in the form of wire mesh with opening less than 10mm.

Q : 33) Match the following:

List-I	List-II
A. Dead end system	P. It is suitable for cities with rectangular layout, where the water mains and branches are laid in rectangles.
B. Grid Iron system	Q. The area is divided into different zones. The water is pumped into the distribution reservoir kept in the middle of each zone.
C. Ring system	R. It is suitable for old towns and cities having no definite pattern of roads.
D. Radial system	S. The supply main is laid all along the peripheral roads and sub-mains branch out from the mains.

A : A-P, B-S, C-P, D-R

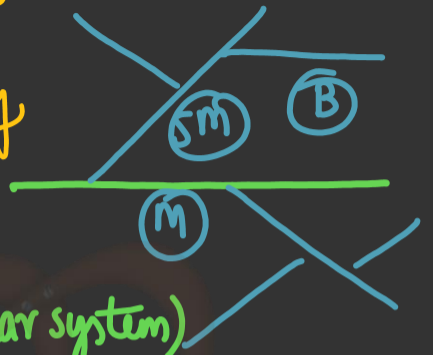
B : A-Q, B-S, C-R, D-P

C : A-R, B-S, C-R, D-Q

D : A-S, B-R, C-P, D-Q

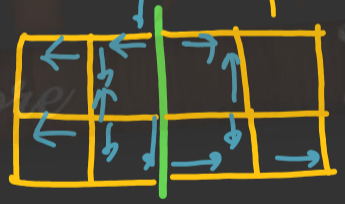
Dead End System:- (Tree system)

Economy & simplicity



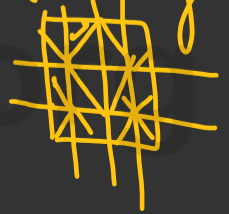
Grid iron System:- (Reticular system)

Equal pressure and multiple flow paths.



Ring system:-

Both Economy & Resonably equal pressure



Radial system :-

Zonal distribution

↳ Higher service Head & efficient water distribution

Q : 34) A town is required to treat 4.2 m^3/min of raw water fir daily domestic supply. Flocculating particles are to be produced by chemical coagulation. A column analysis indicated that an overflow rate of 0.2 mm/sec will produce satisfactory particle removal in a setting basin at a depth of 3.5 m. The required surface area (in m^2) for setting is:

A : 200

B : 350

C : 420

D : 840

Q : 35) For proper slow mixing in the flocculator of water treatment plant, the temporal mean velocity gradient G needs to be of the order of

A : 1.5 to 10 S^{-1}

B : 100 to 200 S^{-1}

C : 20 to 70 S^{-1}

D : 250 to 350 S^{-1}

temporal mean velocity

$$G = \sqrt{\frac{P}{\mu V}}$$

Gtd = It is a parameter which is a measured Conjution opportunity.

G↑ td↓ ⇒ Small & dense flocs

G↓ td↑ ⇒ large & light flocs.

For design 20 to 75/sec

Q : 36) The short circulating occurring in a sedimentation tank is represented by

A : Surface loading

B : Displacement efficiency

C : Recirculation ratio

D : Detention time

Q : 37) A rectangular tank 15m × 6m × 3m has to treat 2 million litres of water per day. The determination time of the tank should be:

A : 3.24 hours

B : 5.63 hours

C : 12.0 hours

D : 24 hours

Q : 38) Total kjeldahl nitrogen is the:

A : Summation of organic an ammonical Nitroe

B : Summation of organic and albuminoid nitrogen

C : Summation of organic and free nitrogen

D : Difference of organic and ammonical nitrogen

Nitrogen Content :-

presence of o-m

(a) Free ammonia ⇒ indicate Recent pollution

(b) Organic ammonia (Albuminoid)
⇒ indicates quantity of Nitrogen before decomposition

(c) Nitrite → Indicate partly decomposed condition.

(d) Nitrate ⇒ indicate old pollution (fully oxidised)

Q : 39) A floatation unit is usually provided to remove :

A : Suspended solids

B : Oil and grease

C : Grit

D : Stones

Q : 40) The purpose of recarbonation after lime-soda process of water softening is:

A : Removal of excess soda from water

B : Removal of non-carbonate hardness

C : Conversion of precipitates to soluble from

D : Recovery of excess lime

⇒ Lime Remove entire Caborate Hardness

NCH — Soda ash

Draw Back

→ Large ppt in the ith form of $CaCO_3$.

Water Softening :-

Lime soda process :-

$$Ca(HCO_3)_2 + Ca(OH)_2 \longrightarrow 2CaCO_3\downarrow + 2H_2O$$

$$Mg^{2+} + \begin{cases} 2Cl^- \\ SO_4^{2-} \\ 2NO_3^- \end{cases} + Ca(OH)_2 \longrightarrow Mg(OH)_2\downarrow + Ca\begin{cases} 2Cl^- \\ SO_4^{2-} \\ 2NO_3^- \end{cases}$$

Further $CuCl_2 + Na_2CO_3 \longrightarrow CaCO_3\downarrow + 2NaCl$

Q : 41) The maximum depth of sedimentation tank is limited up to

A : 2 m

B : 3 m

C : 4 m

D : 6 m

Depth of tank = 4m

Not affect the efficiency of tank.

Sedimentation tank

↳ to Remove Suspended Solid.

Data

	OFR
Plain Sedimentation	15,000 - 30,000 $l/m^2/day$
Sedimentation with Coagulation	30,000 - 40,000 $l/m^2/day$

td

Plain sedimentation ⇒	3-4 hrs
Sedimentation with Coagulation ⇒	2-2.5 hrs

$Y_B = 4$

Q : 42) In primary setting tank, suspended solids are reduced from

A : 10 to 20%

B : 20 to 40%

C : 40 to 70%

D : 70 to 90%

Q : 43) Consider the following statements regarding removal of impurities from water:

1. Settleable solids are removed by filtration.
2. Volatile solids are removed through sedimentation
3. Dissolved solids are removed through reverse osmosis.
4. Colloidal solids are removed by coagulation.

Which of the above statements are correct?

A : 1 and 2 only
B : 3 and 4 only
C : 2 and 3 only
D : 1 and 4 only

Q : 44) When the recirculation ratio of trickling filter for sewage treatment is R, then the hydraulic recirculation factor is

A : $\frac{1-R}{1+R}$

B : (1 + R)

C : (1 – R)

D : $\frac{1+R}{1-R}$

Q : 45) In double filtration, the name of the first filter is

A : Roughing filter

B : Pressure filter

C : Rapid sand filter

D : Gravity filter

Dual Media filter ⇒ To increas the infiltration Rate

30-60cm — large Antharacite grain (G_s=1.55)

→ Smaller grain (G_s - 2.65)

Q : 46) Effective size to be used in rapid sand gravity filter is

A : 0.15 – 0.30 mm

B : 0.45 – 0.70 mm

C : 0.75 – 0.90 mm

D : 0.95 – 1.100 mm

Q : 47) The maximum permitted loss of head in a rapid sand filter is

A : 1 m

B : 2 m

C : 3 m

D : 4 m

Q : 48) For water purification in a city, it is decided to use rapid sand filter after sedimentation tanks, with the following data: Design loading rate per filter = 200 $m^3/m^2/day$; design flow rate = 0.5 m^3/s; surface area per filter = 55 m^2. The number of filter units required in the plant are:

A : 3

B : 5

C : 4

D : 2

Q : 49) The cleaning of slow sand filter is done by:

A : Scraping off top layers of sand and admitting water

B : Passing air through the filter

C : Passing a solution of air and lime through the filter

D : Reversing the direction off flow of water

Q : 50) Vacuum filters are used for:

A : Filtration of sewage

B : Filtration of sludge

C : Dewatering of sludge

D : Both filtration of sludge

Q : 51) Air binding in rapid sand filters is encountered when:

A : The water is subjected to prolonged aeration

B : The water contains high dissolved aeration

C : The filter bed compresses largely of course sand

D : There is excessive negative head

Q : 52) In which treatment unit is schmutzdecke formed:

A : Sedimentation tank

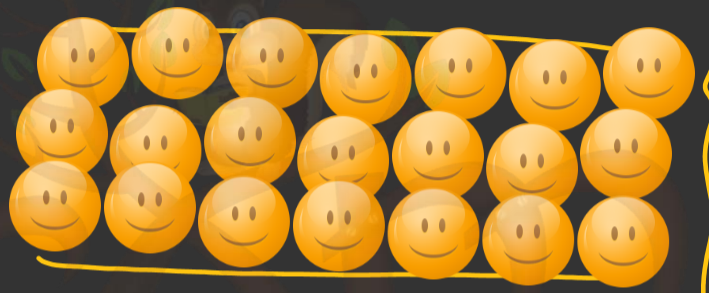
B : Rapid sand filter

C : Coagulation tank

D : Slow sand filter

Endogenous Respiration

Biological Metabolism's—



Schimutzdak

Autrophic Zone

(Food X Enagy from inorganic matter) growt Rate is slow

Metrotrophic Zone

Food X Exchange from Organic matter growth Rat is High.

Q : 53) Which of the following is incorrect regarding a slow sand filter:

A : Incoming water should not be treated by coagulants

B : Depth of water should be double the depth of filter sand

C : Loss of head is limited to a maximum of 1.2 m

D : Cleaning should not be done by back washing

Q : 54) The hydraulic loading for a high rate trickling filter varies between :

A : 110 to 330 M/L/ per hectare per day

B : 50 to 60 M.L. per hectare per day

C : 500 to 600 M.L. per hectare per day

D : 11 to 33 M.L. per hectare per day

Q : 55) The 'sag' in the dissolved oxygen curve results because:

A : It is a function of the rate of addition of oxygen to the stream

B : It is a function of the rate of depletion of oxygen from the stream

C : It is a function of the rate of both addition and depletion of oxygen from the stream

D : The rate of addition of oxygen is linear but the rate of depletion of oxygen is non-linear

Q : 56) The disinfection efficiency of chlorine in water treatment

A : Is not dependent on pH value

B : Is increased by increased pH value

C : Remains constant at all pH value

D : Is reduced by increased pH value

Chlorination:-

$Cl_2 + H_2O \underset{}{\overset{PH\,7.5}{\rightleftharpoons}} HOCl + HCl$ (HOCl: Hypochlorous acid.)

$HOCl \overset{PH\,7.8}{\underset{PH<7}{\rightleftharpoons}} H^+ + OCl^-$

$HOCl + OCl^- \Rightarrow$ Freely available chlorine.

$OCl^- = 0.80\,HOCl$

25 times lesser than free available chlorine.

$NH_3 + HOCl \xrightarrow{PH\,7.5} NH_2Cl + H_2O$

$NH_2Cl + HOCl \xrightarrow{PH\,(5\text{-}6.5)} NHCl_2 + H_2O$

$NHCl_2 + HOCl \xrightarrow{PH<4.4} NCl_3 + H_2O$

Q : 57) The main disadvantages of lime soda process of water softening is that:

A : It is unsuitable for turbid and acidic water

B : Zero hardness effluent can not be obtained

C : Excessive hard water can not be softened

D : Huge amount of precipitate is formed posing the problem of disposal

Q : 58) The compounds of chlorine commonly used for disinfection are

A : Chloramines

B : Bleaching powder

C : Both chloramines and bleaching power

D : None of these

Q : 59) The suitable method for disinfection of swimming pool water is

A : Ultra violet rays treatment

B : Lime treatment

C : By using potassium permanganate

D : Chlorination

Q : 60) Order 4 disinfectants in increasing order of their disinfection power?

A : Ozone < HOCl < Monochloramine < NCl_3

B : Ozone < NCl_3 < Monochloramine < HOCl

C : NCl_3 < HOCl < Monochloramine < Ozone

D : NCL_3 < Monochloramine < HOCL < Ozone

Result : SSC JE 2019

SELECTED CANDIDATES


MANU GOEL
(CPWD)


KESHAV KUMAR
(CPWD)


UDAYVEER
(CPWD)


ANKIT SHARMA
(NTRO)


SAURABH
(BRO)


SURAJ SINGH
(BRO)


ARPIT VERMA
(BRO)


YURESH SINGH
(BRO)


RANVIR KUMAR
(BRO)


SAURABH KUMAR MEENA
(BRO)


RAJIB DUTTA
(BRO)


PANKAJ GUPTA
(BRO)


AKASH TAYADE
(BRO)


DIVAKAR JINUGU
(BRO)

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