

**S J C Institute of Technology, Chickballapur**  
**Department of Civil Engineering**  
**CO-PO and CO-PSO Mapping**

**Name of the Faculty:** Vathsala MN & Kamath GM

**Subject:** WATER SUPPLY AND TREATMENT ENGINEERING Sub code: 17cv64 - C313

**Semester:** VI

**Course Objectives:**

- Analyze the variation of water demand and to estimate water requirement for a community.
- Evaluate the sources and conveyance systems for raw and treated water.
- Study drinking water quality standards and to illustrate qualitative analysis of water.
- Design physical, chemical and biological treatment methods to ensure safe and potable water Supply..

**Course Outcomes:**

At the end of the course students should be able to:

<b>CO1</b>	Estimate average and peak water demand for a community.
<b>CO2</b>	Evaluate available sources of water, quantitatively and qualitatively and make appropriate choice for a community.
<b>CO3</b>	Evaluate water quality and environmental significance of various parameters and plan suitable treatment system.
<b>CO4</b>	Design a comprehensive water treatment and distribution system to purify and distribute water to the required quality standards.

<b>CO-PO Mapping</b>													<b>CO-PSO Mapping</b>	
	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PO8</b>	<b>PO9</b>	<b>PO10</b>	<b>PO11</b>	<b>PO12</b>	<b>PSO1</b>	<b>PSO2</b>
<b>CO1</b>	3	2					1	1				1	1	
<b>CO2</b>	2	3	1			2	1	2					1	1
<b>CO3</b>	3	2	1	1		1	1	3					1	1
<b>CO4</b>	3	3	3			2	2	1					1	1
<b>Avg</b>	2.75	2.5	1.66	1		1.67	1.67	1.75				1	1	1
<b>1: Slightly                      2: Moderately                      3: Substantially</b>														

**Justification:**

CO1: - The students can understand the basic needs of water supply. Pollution forecasting, water demand

for various needs adopted by the engineers to update in the field of water supply.

CO2: -students will have ability to identify to plan analyze design of sewer section by considering

external factors. Students will have ability to change and lifelong learning in the broad context of

technological change.

CO3: - The students will have ability to analyze complex problems but in reality students unable to take

decisions on treatment.

CO4:-The students gain knowledge about types of treatments with appropriate design consideration to

treat water supply.

**Justification for CO-PSO's:**

PSO1, PSO2:-The students able to estimate the quantity of water requirement along with good foundation in mathematics basic sciences technical.

Signature of Committee members


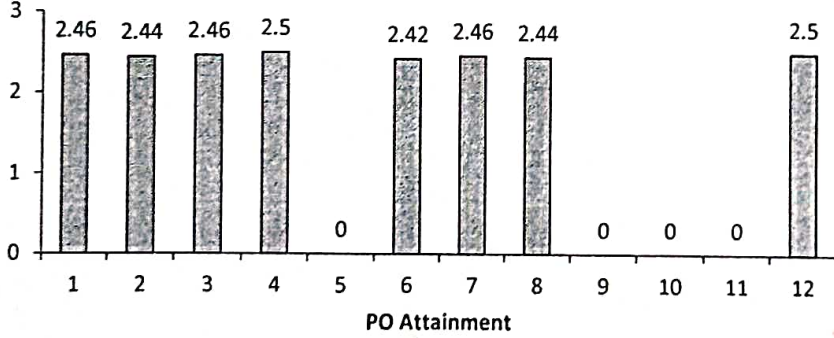
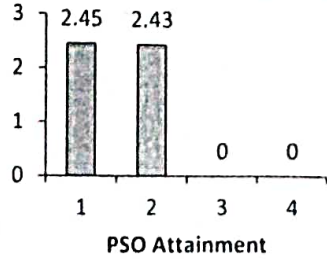
1. Mr. Ravindra MV

2. Ms. Vathsala MN

3. Mr. Kamath GM

Signature of the HOD

11/2/2020

SJCIT/NBA/ CO-PO-PSO REPT/ 2019-20		 <b>S J C INSTITUTE OF TECHNOLOGY</b> Chikkballapur - 562 101 Department of Civil Engineering													
Course Title		Water Supply and Treatment Engineering								Course Code		C313			
Subject Code		17CV64		Semester		6		Section		A & B		Emp.ID		1910/1449	
Faculty Name		Vathsala MN& Kamath GM								No.students		99			
Summary of CO attainments of Sub: 17CV64 Based on (AVERAGE-TYPE-1) Academic Year:2019-20															
CO	CID_CO	CIE			SEE			CES			TOT_Attainment				
		S_AT	T_ST	ATN	S_AT	T_ST	ATN	S_AT	T_ST	ATN	ATN	%	Status		
CO1	CO1	297	99	3	201	99	2	289	99	2.9	2.5	83	YES		
CO2	CO2	258	98	2.6	201	99	2	293	99	3	2.3	78	YES		
CO3	CO3	293	99	3	201	99	2	285	99	2.9	2.5	83	YES		
CO4	CO4	297	99	3	201	99	2	293	99	3	2.5	84	YES		
Summary of PO attainments of Sub: 17CV64 Based on (AVERAGE-TYPE-1) Academic Year:2019-20															
PO Number	1	2	3	4	5	6	7	8	9	10	11	12			
Direct ATNT(D)	2.41	2.39	2.41	2.45		2.37	2.41	2.39				2.45			
Indirect ATNT(ID)	2.95	2.96	2.98	2.9		2.98	2.96	2.94				2.9			
Total-ATNT	2.46	2.44	2.46	2.5		2.42	2.46	2.44				2.5			
ATNT TO SCALE	2.26	2.03	1.36	0.83		1.37	1.37	1.42				0.83			
															
															
Summary of PSO attainments in Year:2019-20															
PSO Number	1	2	3	4											
Direct ATNT(D)	2.4	2.39													
Indirect ATNT(ID)	2.95	2.97													
Total-ATNT	2.45	2.43													
ATNT TO SCALE	0.82	0.8													

Vathsala  
27/8/2021

Kamath GM  
27/8/2021

9	RO and Nano filtration process with merits and demerits.					15/7	CO4
10	RO and Nano filtration process with merits and demerits.					15/7	CO4
Textbook: and chapter :Water Treatment Engg							
Signatures	Faculty: <i>24/8/21</i>	#HOURS				Allotted	Taken
	HoD: <i>[Signature]</i> <i>20/8/21</i>					10	10
Remarks	Module - 4 is Completed						
MODULE - 5							
Lecture #	Topic	Mode of Delivery (Pls Tick ✓)				Date of Delivery	COs Covered
		1	2	3	4		
1	Collection and Conveyance of water:Types of pumps with working principles and different.		✓			22/7	CO4
2	numerical Problems.		✓			23/7	CO4
3	Design of the economical diameter for the rising main.		✓			3/8	CO4
4	Pipe appurtenances, Valves, Fire hydrants		✓			23/7	CO4
5	Pipe materials with their advantages and disadvantages. Factors affecting selection of pipe material		✓			12/8	CO4
6	Methods: Gravity, Pumping and Combined gravity and pumping system.		✓			27/7	CO4
7	Types of Distribution system.		✓			27/7	CO4
8	Types of Distribution system.		✓			27/7	CO4
9	Service reservoirs and their capacity determination plant units		✓			29/7	CO4
10	and distribution system with population forecasting for the given city.		✓			10/8	CO4
Textbook : and chapter : Water Treatment Engg							
Signatures	Faculty: <i>Vaibhava</i> <i>24/8/21</i>	#HOURS				Allotted	Taken
	HoD: <i>[Signature]</i> <i>20/8/21</i>					10	10
Remarks	Module - 5 is Completed						

**Text Books:**

1. Howard S. Peavy, Donald R. Rowe, George T, Environmental Engineering - McGraw Hill International Edition. New York, 2000

2. S. K. Garg, Environmental Engineering vol-I, Water supply Engineering – M/s Khanna Publishers, New Delhi 2010

3. B.C. Punmia and Ashok Jain, Environmental Engineering I-Water Supply Engineering, Laxmi Publications (P) Ltd., New Delhi 2010.

**Reference Books:**

1. CPHEEO Manual on water supply and treatment engineering, Ministry of Urban Development,



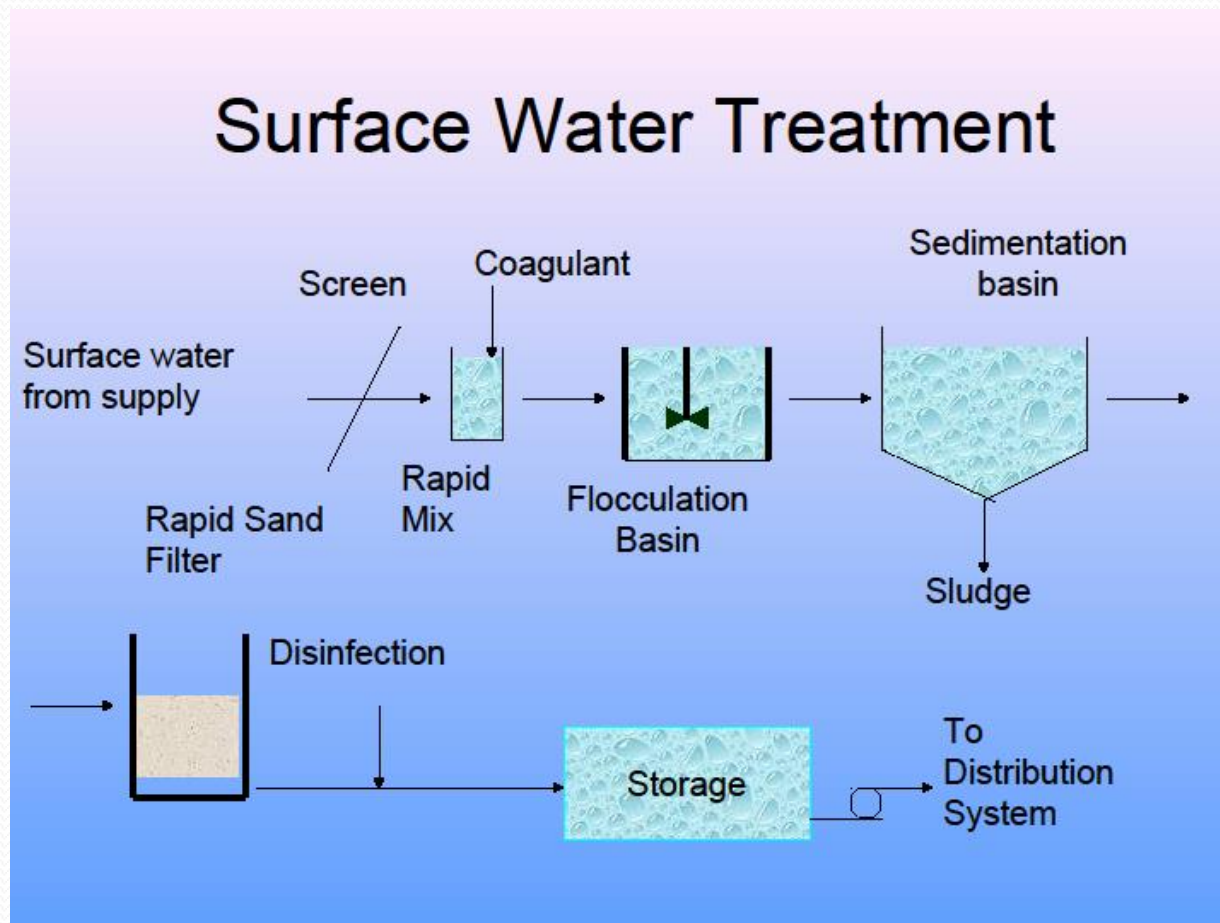
# Water Treatment

The complete process of removal of undesirable matter, in order to make the water acceptable for domestic or Industrial use, is commonly termed as treatment or purification of water.

# Objectives of Treatment of Water

- To make water odor & taste free
- To make it colorless
- To make the water safe & sparkling for drinking & domestic purposes
- To remove dissolved gases & turbidity
- To make it free from all objectionable impurities present in suspension, colloidal or dissolved form
- To remove harmful bacteria
- To remove hardness
- To make water suitable for a wide variety of industrial purposes.

# Water treatment flow chart



Process	Impurities Removed
1 Screening	Adopted to remove floating matter
2 Aeration	Removes objectionable tastes, odor & dissolved gases like CO <sub>2</sub> , H <sub>2</sub> S. DO is increased. Removes Fe, Mn.
3 Plain Sedimentation	Removes settleable suspended impurities heavier than water
4 Sedimentation with Coagulation	Used to cause the sedimentation of colloidal & very fine suspended particles. some bacteria are also removed
5 Filtration	colloidal & very fine particles escaped from sedimentation are removed. Micro-organisms are removed to large extent.
6 Disinfection	All remaining organisms including pathogens are destroyed
7 Miscellaneous a) Softening b) Activated Carbon treatment	a) Hardness is removed b) Taste & Odour are removed.

# screening process

## The purpose of screening process

- Restrict the entry of suspended solids such as garbage in the water treatment plant.
- Prevent pump, pipe and equipment from clogging or damage.
- Launched a water course for the next process.



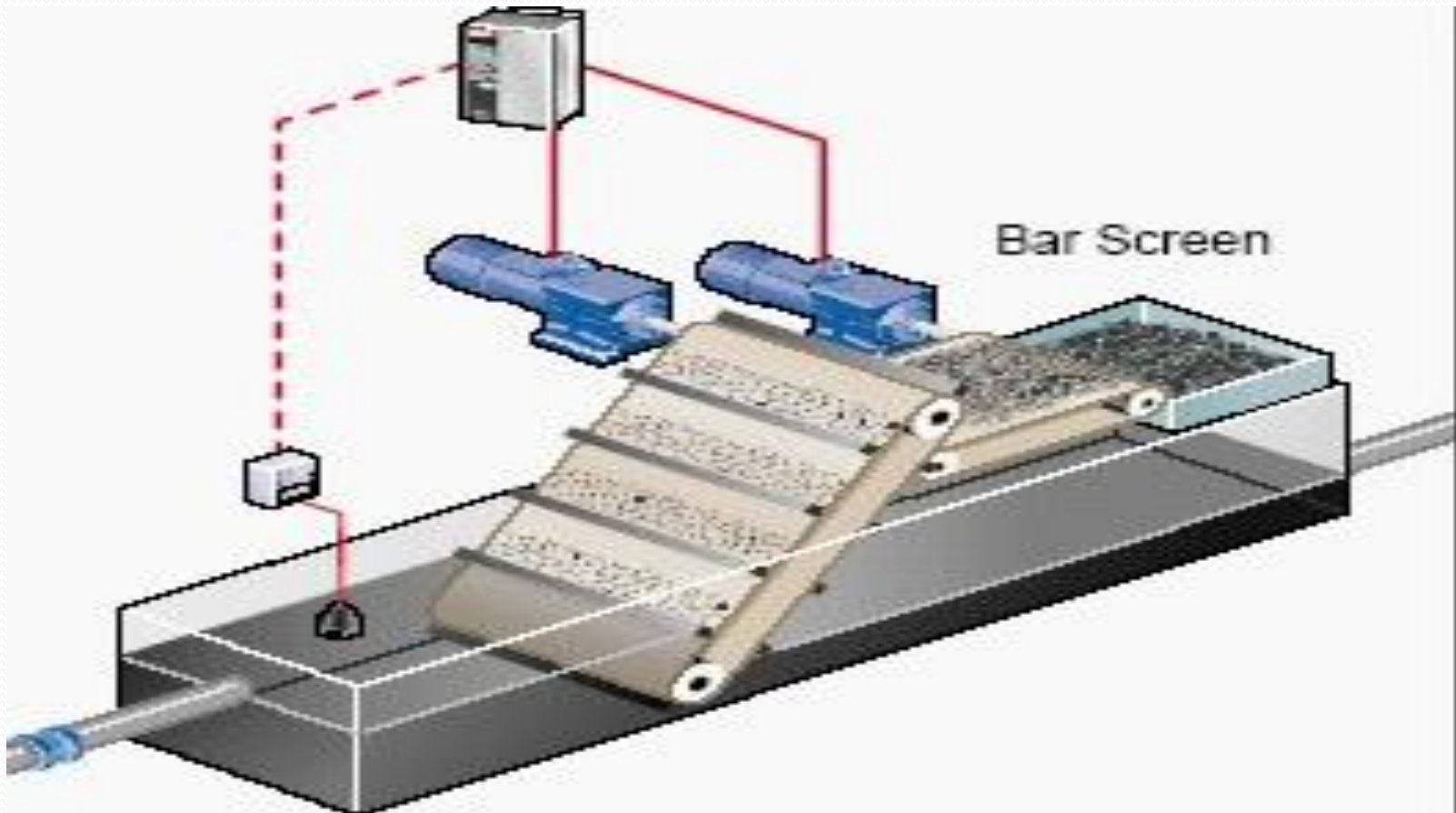
- Location :

Screens are generally provided in front of the pumps or Intake works,

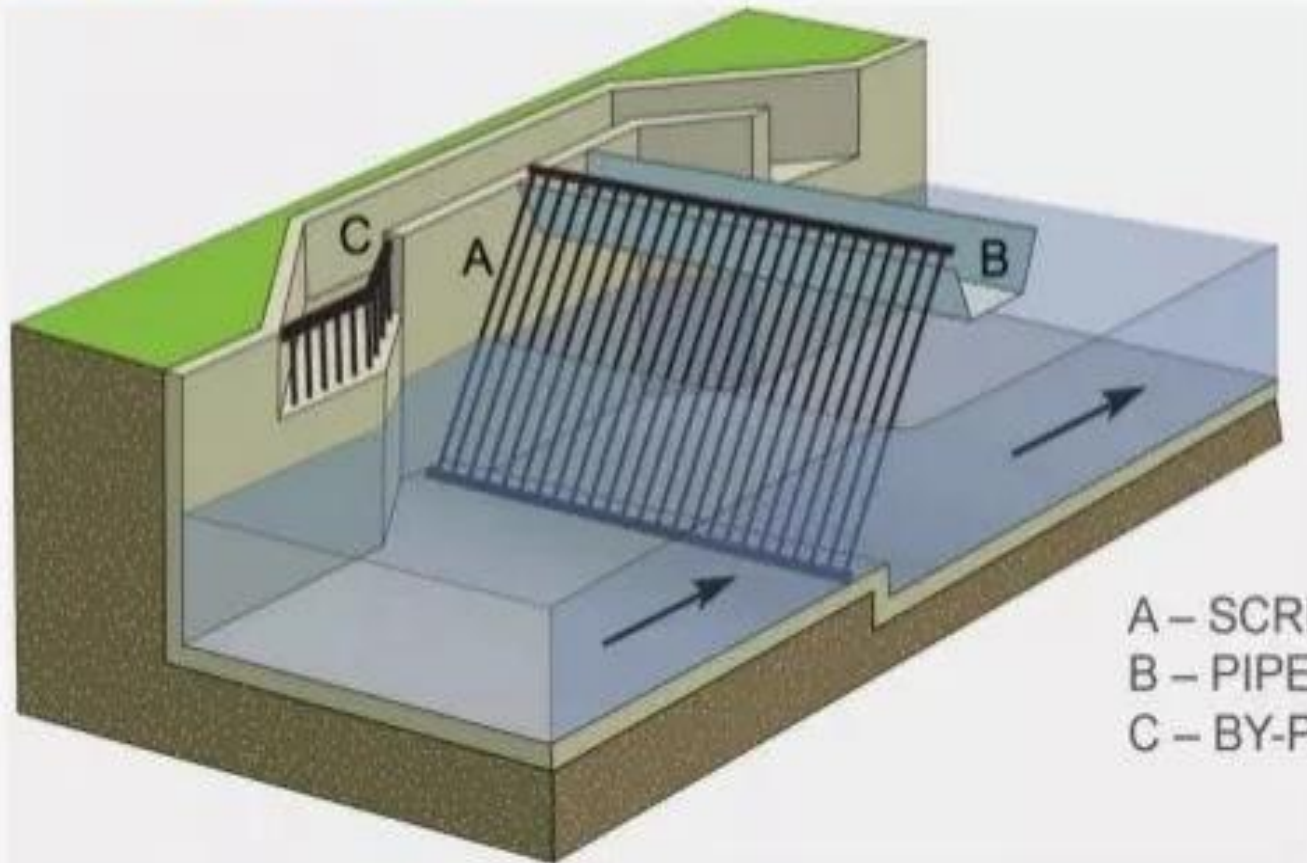
Types :

- 1.bar screen (coarse screen )
- 2.fine screen
- 3.medium screen


# Bar screen



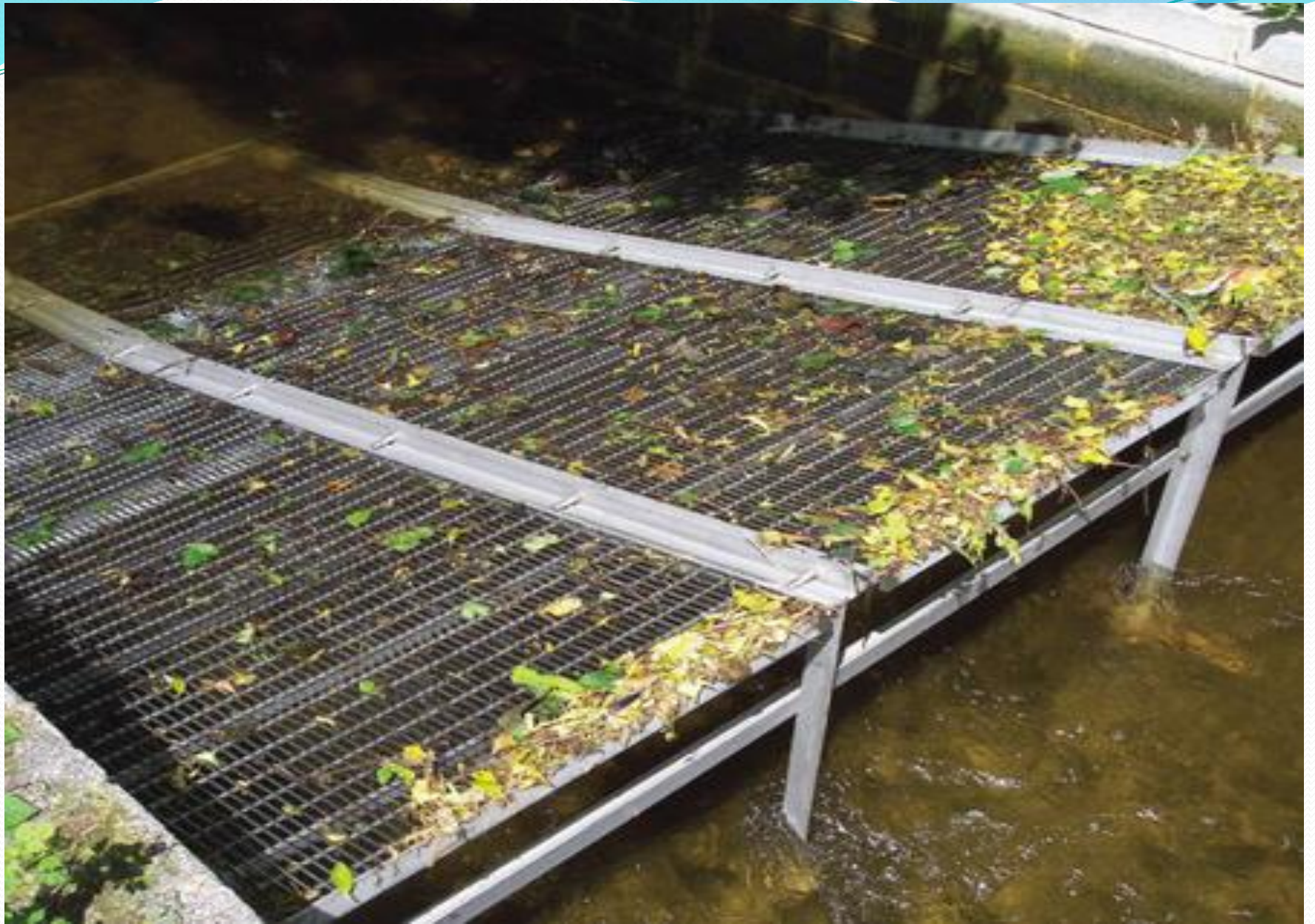
# Bar screens




A – SCREEN  
B – PIPE  
C – BY-PASS PIPE

- 
- It consist of parallel iron rods
  - placed vertically or at slight slope, at about **2.5 to 5 cm apart.**
  - The course screens are also now normally **kept inclined at about 45-60 degree**







- 
- **Fine screens:** They are usually made of **perforated plates or wire mesh** with opening not more than **6 mm square**.
  - Fine screens normally get clogged, and are to be cleaned frequently, hence avoided these days.





# Medium screen :

Similar to bar screen

Diff – space b/w bars 2-5 cm

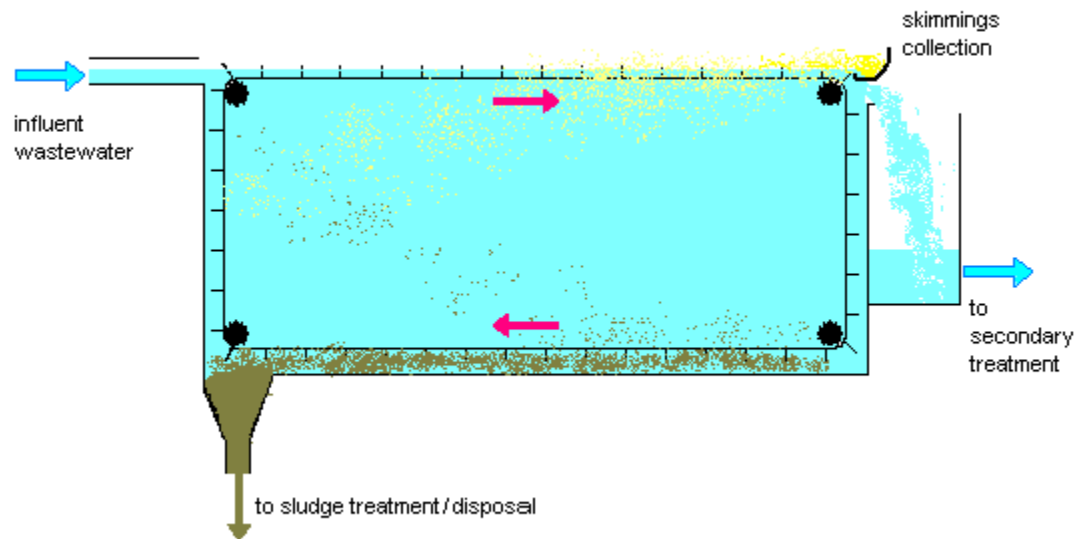
Bars are usually 10mm thick

# Plain Sedimentation

- 1. Most of suspended impurities present in water do have specific gravity greater than that of water.
- 2. In still water, these impurities will tend to settle down under gravity, although in normal raw supplies, they remain in suspension, because of turbulence in water.
- **The basin in which the flow of the water is retarded is called the settling tank or sedimentation tank or sedimentation basin or clarifier**

**Theoretical average time for which the water is detained in the tank is called the detention time.**

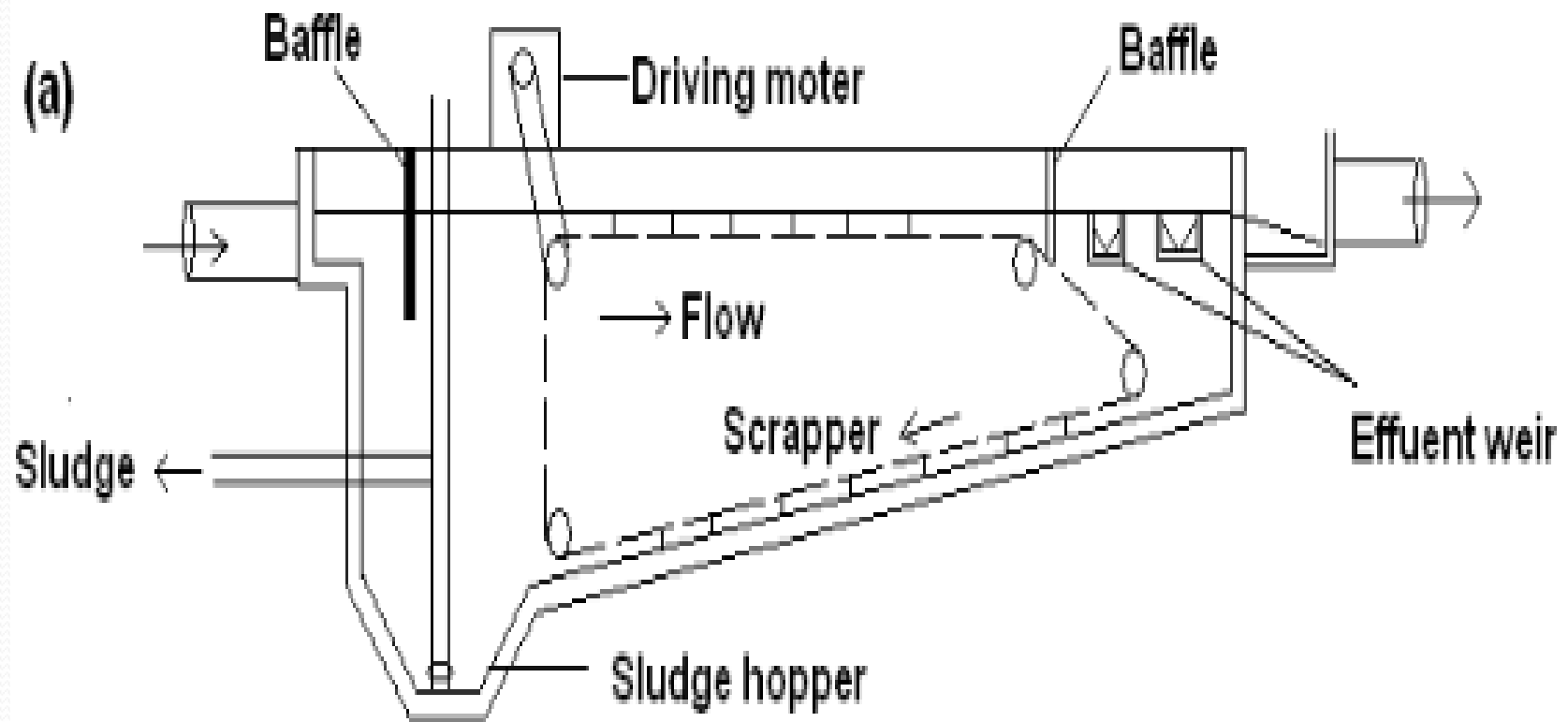
## Primary Settling Basin



# Types of Sedimentation Tank

- 1. based on shape :
  - a) rectangular b) circular c) hopper bottom tank
- 2. based on flow :
  - a) Fill and draw type b) continuous type

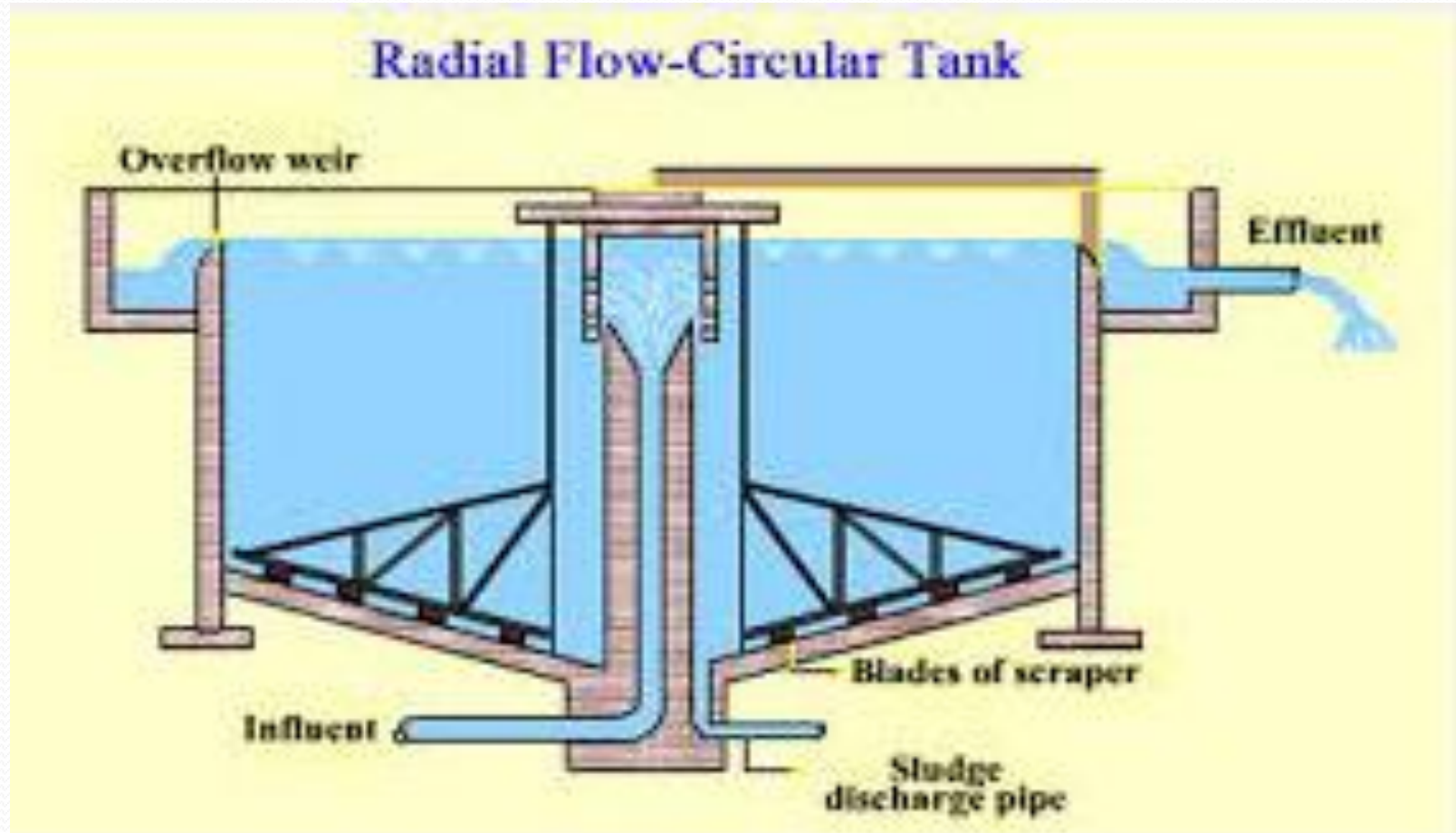
# Rectangular s.t





A rectangular settling tank

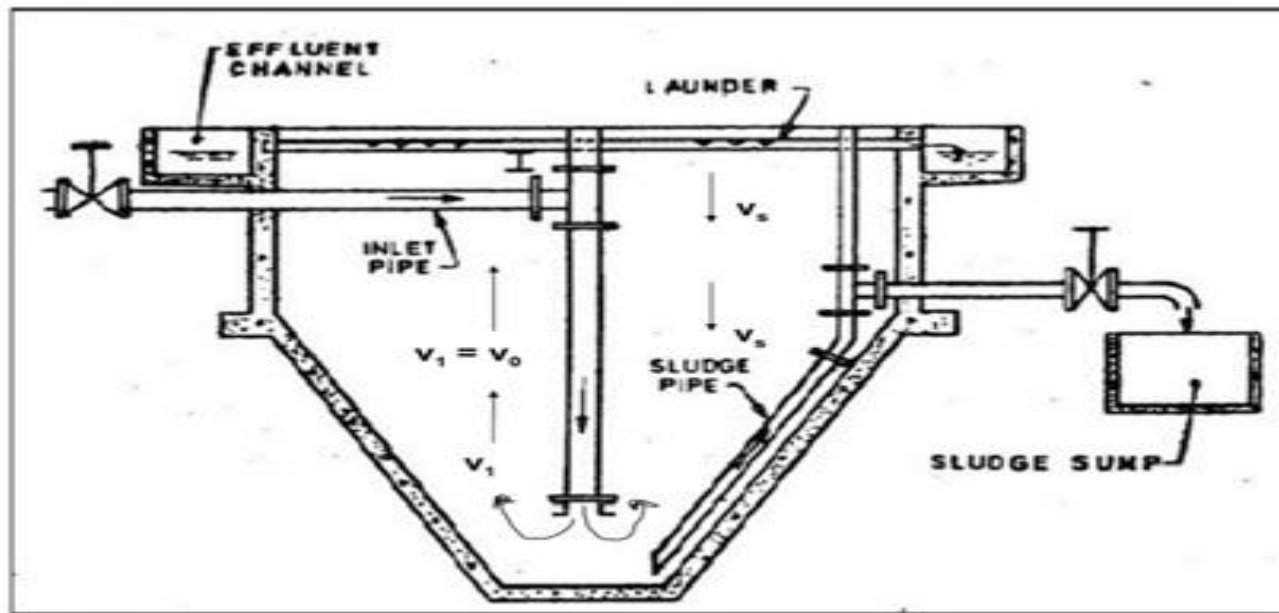
# Circular s.t








# hopper bottom tank

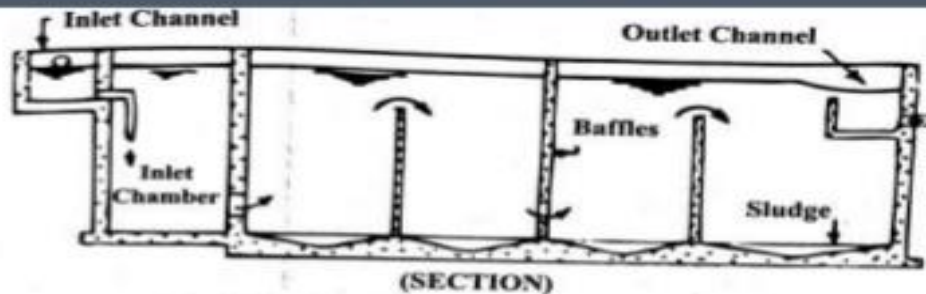


- 
- based on flow :
    - a) Fill and draw type
    - b) continuous type

# Fill And Draw Type Tanks

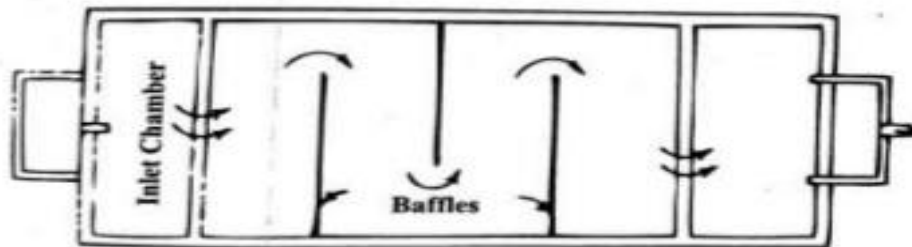


# Continuous Flow Type Tanks



(SECTION)

(a) UP AND DOWN BAFFLE TANK



PLAN

(b) AROUND THE END BAFFLE TANK



Thank you  
Thank you

3. odour - odour & taste are associated with the presence of living microscopie organisms; or decaying organic matter including weeds, or industrial water containing ammonia, phenols, halogens, hydrocarbons. This taste is imparted to fish, rendering ~~term~~ unpalatable

## II chemical tests

1. pH - It is a measure of hydrogen ion concentration. It is an indicator of relative acidity or alkalinity of water. Low pH values help in effective chlorination but cause problem with corrosion.
2. B.O.D - It denotes the amount of oxygen needed by micro-organisms for stabilization of decomposable organic matter under aerobic conditions. High BOD means that there is less of oxygen to support life & indicates organic pollution.

## III Bacteriological tests

whenever changes in conditions lead of deterioration in the quality of the water supplied or even if they should suggest any



Subject Title:

Subject Code:

Question Number	Solution	Marks Allocated
	<p>Surface area of Tank = <math>\frac{\text{Capacity}}{\text{depth}}</math></p> <p><math>= 138.88 \text{ m}^2</math></p> <p><math>B = 2L \quad 2L \times L = 138.88</math></p> <p><math>2L \times L = 138.88</math></p> <p><math>SOR = \frac{208.31}{138.8}</math></p> <p><math>= 1.49 \text{ m}^3/\text{m}^2/\text{hr.}</math></p> <p><math>L = 8.33 \text{ m}</math></p> <p><math>B = 4.16 \text{ m}</math></p>	

29/10/2021

29/10