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Section # "C"

Semester # 8th

Subject # Wastewater treatment

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Q no 1:

Ans:

↳ Wastewater Treatment:

it is a process used to remove contaminants from wastewater or sewage and convert it into an effluent that can be returned to the water cycle with minimum impact on the environment or directly reused.

Importance:

Water scarcity is the major problem that is faced all across the world.

Although  $\frac{2}{3}$ rd of earth crust is made up of water but all

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but all this water is not available for drinking and for other human activities.

It has been found out that 97% of the total water is salty that is of no use to human and animals and remaining three 3% percent is available as freshwater.

The demand for fresh clean water delivered to our homes is ever increasing day by day as more homes are being established.

### Rectangular Tank :

These are the most widely used tanks. Cost of maintenance is very low in case of rectangular tanks." Also these are suitable for large capacity.

### Circular Tanks :

These type of sedimentation tanks are preferred for continuous verticle flow type of sedimentation tanks.

"It have high clarification efficiency but they are uneconomical."



Q 2:

Ans:

Aerobic Treatment

Anaerobic Treatment

(1) Low to medium strength wastewater. eg. Municipal sewage refinery wastewater.

(1) Medium to high strength (>4000ppm) eg. food and beverage industry wastewater.

(2) Relatively high capital investment.

(2) Relatively low capital investment.

(3) Energy consumption Relatively High.

(3) Energy consumption Relatively Low.

(4) Foot-print Relatively Large.

(4) Relatively small and compact.

(5) Net Sludge yield Relatively high.

(5) Relatively low.

(6) Post-treatment Typically direct discharge.

(6) Required to fulfill wastewater standard discharge requirement.

(6)

Qno 21

## Activated Sludge Process :

Microorganism responsible for treatment are maintained in liquid suspension by appropriate mixing methods.

Main constituents of ASP are Aeration tank in which oxygen is provided for micro-organisms to grow.

Aeration tank is followed by clarifier / settler in which the microorganisms form flocs and settled down at the bottom.

Formation of floc particles, size from 50 to 200  $\mu\text{m}$ , removed by gravity settling.

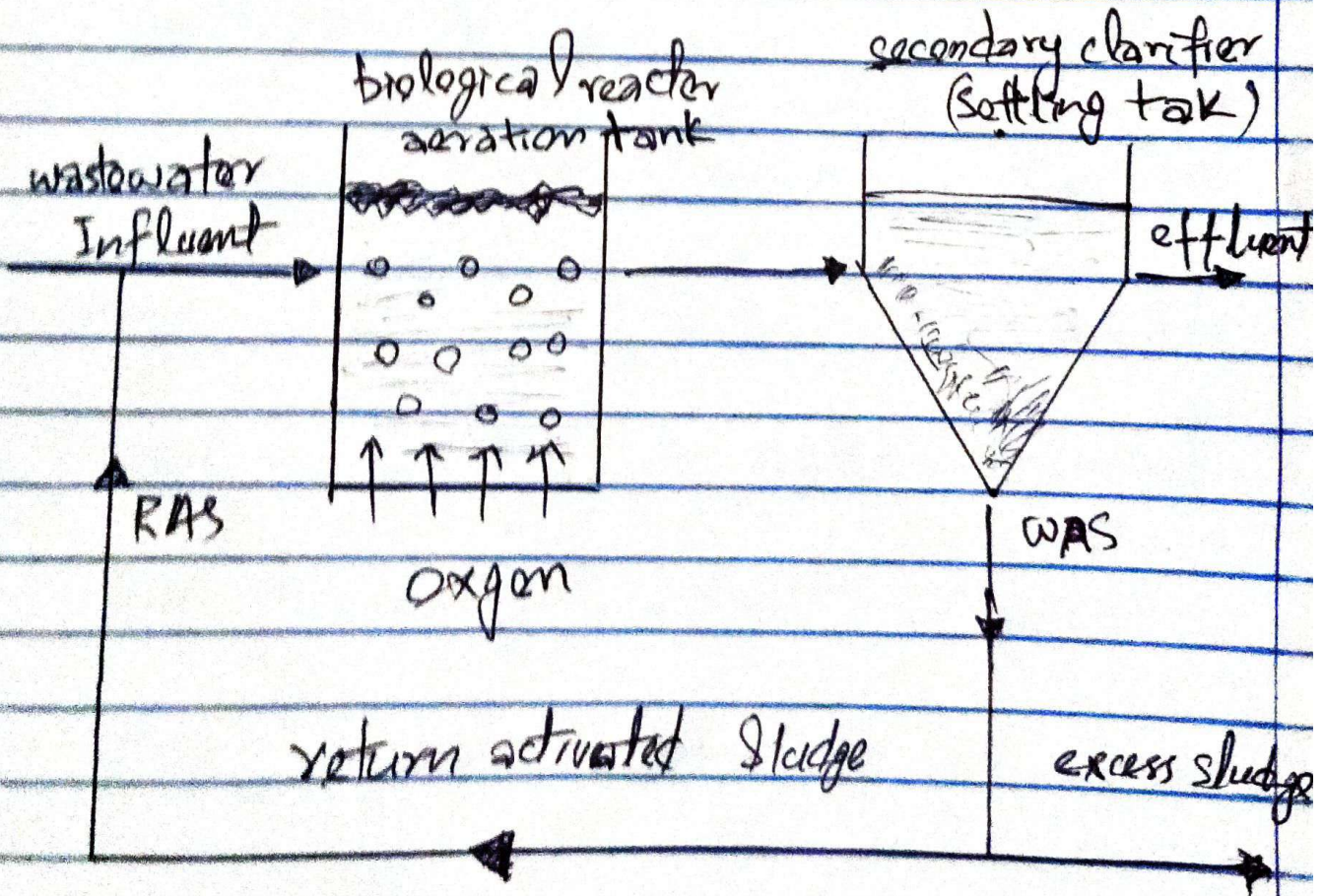
A part of settled bio flocs are recycled back to the aeration tank to maintain certain amount of micro-organisms.

Remaining settled bio flocs are removed from the system.

APS involves production of activated mass of microorganisms capable of stabilizing waste under aerobic conditions.

Typically 99% of suspended solids and up to 90% of dissolved organics are removed by Activated Sludge process.

The main drawback associated with APS is its high electricity consumption particularly for aeration.



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Qno 3:

Ans:

Assimilative Capacity:  
refers to the ability of a body of water to cleanse itself, its capacity to receive wastewater or toxic substances without deleterious effects and without damage to aquatic life or humans who consume the water. It is level to which water body or nature control the toxicity without affecting the aquatic life.



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## Help of Assimilative Capacity:

A classical example of assimilative capacity is the ability of a stream to accept a modest amount of biodegradable waste.

Bacteria in a stream utilize oxygen to degrade the organic matter present in such a waste causing the level of dissolved oxygen in the stream to fall; but the decrease in dissolved oxygen causes additional oxygen to enter the stream to fall enter from atmosphere.

A stream can assimilate a certain amount of waste and still maintain a dissolved oxygen level high enough to support a healthy population of fish and other aquatic organisms.



Q4:

(10)

Ans:

## Sludge Handling:

Socially acceptable, cost-effective method that meets the requirement of efficient recycling of resources while ensuring that harmful substances are not transferred to humans or the environment.  
i.e. water, air or soil.

### Process of Sludge Handling:-

- ① Primary operations.
- ② Thickening
- ③ Stabilization
- ④ Dewatering
- ⑤ Heat drying

#### ① Primary operations:

This process

includes:

- 1) Grinding :- It includes particles size reduction.

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- ② Screening:- It includes removal of fibrous materials.
- ③ Degritting:- It includes removal of sand or other inorganic materials.
- ④ Blending:- It includes making the sludge homogenous.
- ⑤ Storage: It ensures flow equilibration in the system.
- ② Sludge thickening:  
Sludge thickening is undertaken to increase percentage of solid content in sludge by removing a portion of liquid fraction.

Volume reduction of approximately 30-80% can be reached with sludge thickening.

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### (3) Sludge Stabilization:

is undertaken to reduce pathogens, eliminate offensive odors, minimize production of usable gas.

Methods:-

(i) Alkaline stabilization.

(ii) Anaerobic stabilization.

### (4) Dewatering:

is undertaken to reduce the moisture content of sludge.

Centrifugation is the method used for separating liquids of different densities, thickening slurries.

### (5) Heat Drying:

Applies heat to evaporate water and to reduce the moisture content of biosolids.

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## ADVANTAGES:

We can use sludge in a landfill or for Agricultural use.

The sludge is very useful for Agricultural use because

it contains organic matter, nitrogen, phosphorus and potassium, soil improvement also occur.

Some of Advantageable uses are following.

- ① Land scape irrigation
- ② Agriculture use
- ③ Ground water recharging.



Qno 5:

(14)

Ans 1

Environmental Impact Assessment is a process of evaluating the likely environmental impacts of a proposed project or development, taking into account inter related socio-economic, cultural and human-health impacts both beneficial and adverse.

EIA for propose wastewater treatment plants-

- ① To predict environmental impact of project.
- ② find ways to and means to reduce adverse impacts.

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(3) Shape project to suit local environment.

(4) Present the predictions and options to the decision-makers

(5) The EIA statement should cover brief description of project, brief description of existing environment, likely impact of project.

(6) It should provide employment

