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Sec C

Subject: WasteWate Engineering

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Q:no 1

Waste Water Treatment :-

Waste water treatment consists of applying known technology to improve or upgarde the quality of a wastewater.

Wastewater treatment involves collecting the wastewater in a centralized or decentralized loction (waskwater treatment Plant) and subjecting the wastewater to various treatment processes.

Importance :

There are several importance of wastewate treatment which are given below

i) The Principal objective of wastewater treatment is generally to allow human and industrial effluents to be disposed

off without causing danger to human health or unacceptable damage to the natural environment.

ii) Wastewater if properly treated, is an importante resource and can be used for various purpose including irrigation, lawn watering, car washing, flushing toilets and landscaping etc.

iii) Wastewater treatment can also generate biogas as final product which is a potential source of Energy.

Why Rectangular Tank are Preferred:-

Advantage Because the shape of the rectangular clarifies provides a longer path for the wastewater flow and the suspended solids to travel, and subsequently longer detention time which warrants less short circuiting and more sludge settling compared to the center feed/peripheral overflow Circular Clarifies. In addition, flow distribution among several clarifiers is usually more even and often require less head loss for rectangular clavifiers.

Construction: Rectangular clavifiers typically require less land than

Circular clarifiers for a similar surface area (21% less in theory). The reduction becomes even more significant in a multiple-unit design, where common concrete walls are used between rectangular basins. The resulting land availability is a major advantage for treatment plant layout. Construction cost is also reduced as a result of the common concrete walls.

Q: 2 Difference between (5) Aerobic & Anaerobic wastewater treatment.

Parameter	Aerobic Treatment	Anaerobic Treatment
Application	Low to medium strength wastewater (< 1000 ppm) eg. Municipal sewage, refinery wastewater, etc.	Medium to high strength wastewater (> 4000 ppm) eg food & beverage industry wastewater.
Capital Investment	Relatively high	Relatively low with pay back
Energy Consumption	Relatively high	Relatively low
Food-Print	Relatively large	Relatively small & compact
Net-sludge Yield	Relatively high	Relatively low
Post-Treatment	Typically direct discharge	Required to fulfill wastewater standard discharge requirement
Example Technologies	Activated Sludge process (ASP) Trickling Filter, and Rotating Biological Contactor (RBC)	Anaerobic Digestors (AD), continuous stirred Tank Reactors (CSTR), Sequencing batch Reactors (SBR), upflow Anaerobic sludge Blanket (UASB) Reactors.
* CH_4	generated can be used to generate energy.	

(6)

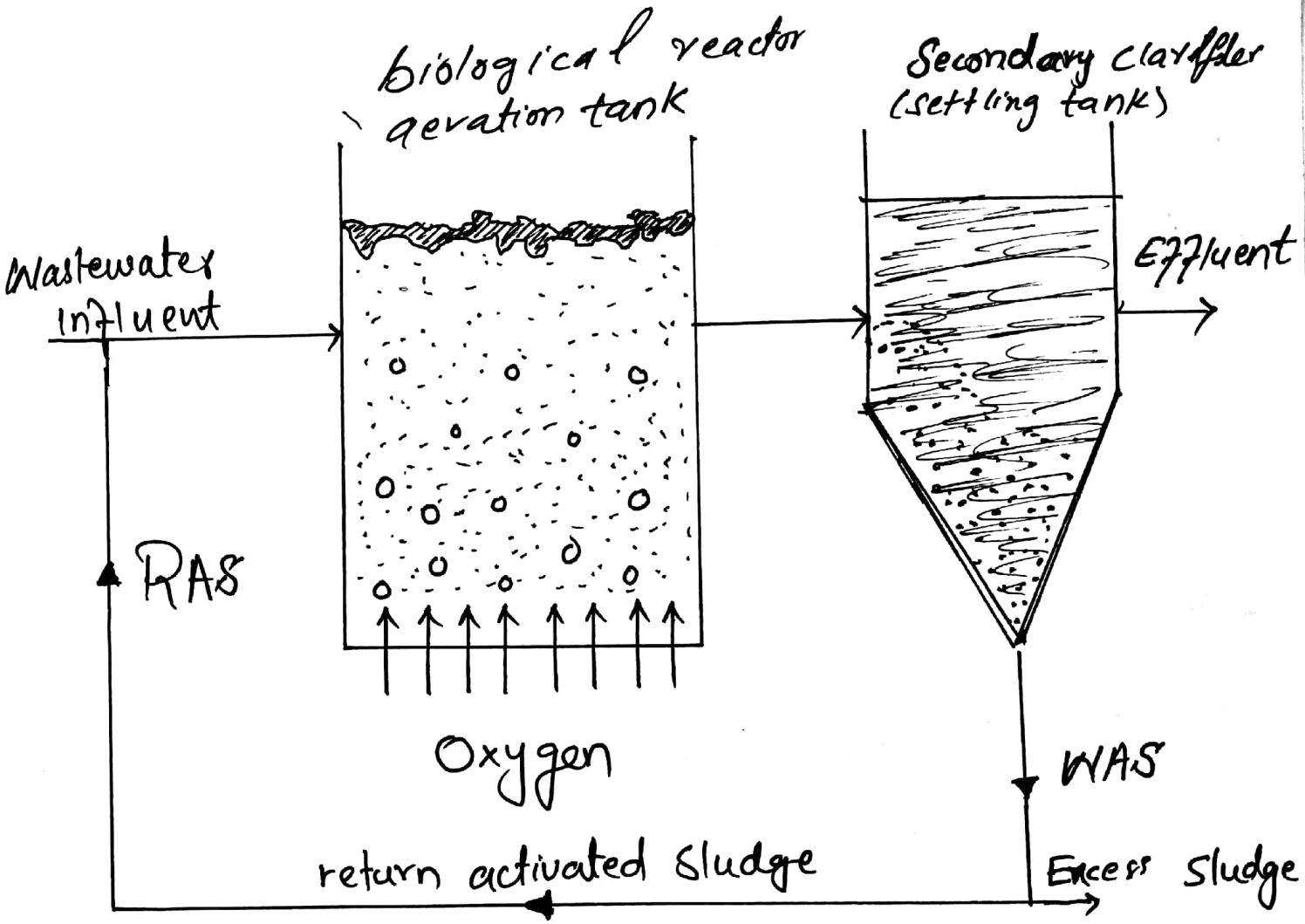
Activated Sludge Process (ASP):-

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

* In aeration tank, contact time is provided for mixing and aerating influent wastewater with microbial suspension, generally referred to mixed liquor suspended solids (MLSS)

* Typically 99% of suspended solids and up to 90% of dissolved organics are ~~compared~~ removed by activated sludge process.

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



Activated Sludge Process (ASP)

Diagram

Q: 3 Assimilative Capacity of Receiving Water bodies :-

It is refers to the ability of a body of water to cleanse itself; its capacity to receive wastewaters without deleterious effects and without causing 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.

Although wastewater is properly treated before it is disposed of to the natural water streams still it has impurities / pollutants

that needs to removed or make them less effective so that the receiving water bodies may not become unsuitable for use or cause damage to the aquatic life.

Physical Forces Helping Assimilative Capacity of Receiving Bodies :-

1) Dilution:

Dilution is the process of reducing the concentration of pollutants in receiving water, usually simply by mixing with more quantity of water.

2) Dispersion:

Dispersion is the distribution of pollutants in relatively large area of water. Dilution and

dispersion are interrelated.

3) Sunlight:

Sunlight facilitates biological decomposition of pollutants and kills pathogens by ultraviolet radiation (UV)

4) Temperature:

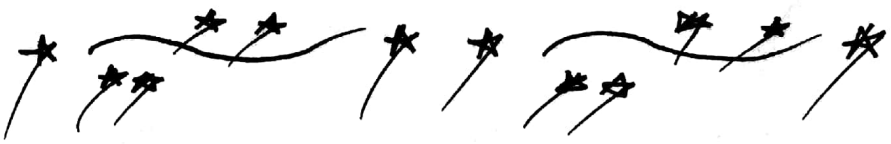
Temperature plays an important role in assimilative capacity of recieving water. Increase in temperature will increase the biological decomposition of organics and thus assimilative capacity will improve. Increase in temperature also cause to increare the dilution process and thus increase the assimilative capacity.

5) * Flow Velocity:

Flow velocity is also critical to assimilative capacity of receiving water bodies. Higher the flow velocity will encourage quick and dispersion of pollutants.

6) Depth of Flowing Water :-

Assimilative Capacity is directly related to the depth of receving water bodies. ~~Increase~~ Increase in depth relates UV radiation kills pathogens.



Q: 3 Sludge Managment:-

Sludge refers to residual semisolid material left from municpal wastewater or industrial wastewater treatment processes.

Sustainable sludge handling managing may be defined as a 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.

Treatment Processes:

Thickening:
Gravity and Floatation

Digestion:
Aerobic, Anaerobic

Mechanical Dewatering:
Vacuum filtration,
centrifugation

Disposal:
Land application, Burial

Advantages of Sludge management in waste Water Engineering :-

1) As Wastewater engineering is directly related to environmental Sludge management is approach towards a better environment.

2) Residual Wastes from hospitals reaseach facilities and other Industries can be hazardous to our health and environment These harmful elements may require thermal treatment to control the Spread of diseases or toxins. Sewage Sludge incineration reduces volume upto 90% and weight upto 75% and breaks down dangerous Substances Such as Pathogens

and toxic ~~material~~ chemicals.

fuel gases from exaust pipes must be handle properly by utilizing a complete treatment system to prevent hazardous emission and ashes from contaimnating the environment.

3) The other importance is that as a result of sludge which manged is a agriculture manure.

4) Due to excess of new problems in sludge management every year new techniques and proffessional experts are emerges in waste water engineering industry to face the challenges and finding the solutions.

Advantages of Sludge Treatment:

* It reduces pathogens and volume to be disposed.
* Protects wild life, aquatic life and also prevent diseases.
* Sustainable management of organic waste.
* Reduction of odors and disease causing agents.
* Producing Bio gas.

Q: 5 Environmental Impact Assessment (EIA):-

Various Definitions:

* "a technique and a process by which information about environmental effects of a project is collected, both by the developer and from other sources, and taken into account by the planning authority in forming the judgement on whether the development should proceed."

* "an enviromental study comprising collection of data, prediction of qualitative ~~eva~~ and quantitative impacts, comparison of alternatives, evaluation of preventive, mitigatory and compensatory measures formulation of environmental management

and training plans and monitoring arrangements, and framing of recommen-
- dations and such other components as may be prescribed"

Parameters:

Wastewater contains a large number of contaminants and they are catagorised as chemical and biological contaminants. Different parameters have been established from experiance and theory to define such characteristics.

In my opinion, the most important parameters to be considered for a local wastewater treatment plant are;

i) Biochemical Oxygen demand (BOD):-

The BOD is the amount of oxygen demand by aerobic microorganisms to break down

the organic matter present in the wastewater. It is the BOD, which is the actual measured parameter and is an indication of the amount of organic matter consumed with 5 days as from testing. This value is used to measure the efficiency of a treatment plant in terms of organic matter removal. High BOD values are undesirable and would affect the ecological cycle by reducing the normal DO to critical levels for ~~Sust~~ sustaining aquatic life.

2) Chemical Oxygen Demond (COD):-

It is an alternate measure of the amount of organic matter. The amount of oxygen used up by a strong oxidizing agent is measured. This value is of greater Importance when evaluating Wastewate from Industries Since these effluents tend to be toxic to microorganisms thereby affecting the Validity of BOD results (Metcalf & Eddy, 2003)

3) Total Suspended Solids (TSS):

The TSS is measured to indicate the amount by mass of fine Suspended particles.

Effluent discharge in the water courses must contain low levels of TSS since TSS causes turbidity, affecting the amount of light to aquatic plants and also causes visual pollution.

4) Total Kjehdahl Nitrogen (TKN):-

Wastewater usually contains high levels of nitrogen containing compounds. The nitrogen exists mostly in free forms; organic nitrogen, ammonia and reduced nitrogen. The TKN value hence indicates the amount of nitrogen of all these 3 forms. TKN is useful in monitoring the plant.