FINAL TERM PAPER

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SUBJECT:- WASTE WATER ENGINEERING

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WASTE WATER ENGINEERING

Q1) Waste Water Treatment:.

Waste water Treatment is a process used to remove contaminants from waste water 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. The Treatment of waste water is part of the overarching field of sanitation.

• Importance of Waste water Treatment:.

The major aim of waste water treatment is to remove as much of the suspended solids as possible before the remaining water, called effluent, is discharged back to the environment. As solid materials decays, it uses up oxygen, which is needed by the plants and animals living in the water.

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* Rectangular Tanks over Circular Tanks:-

Circular Tanks have generally proven unsatisfactory because of sludge build up in the corners, and fouling of the more complex collection mechanism.

→ Stacked Rectangular tanks has been used where space is highly restricted. They have a much higher construction cost and require more complex structural design. Plate Settlers have become an important design alternation in primary sedimentation.

The shape of the Rectangular clarifiers 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 clarifiers.

QNo:-2. **Difference Between Aerobic and Anaerobic Waste water Treatment:.**

Ans:- Key Difference is Aerobic Treatment require oxygen and Anaerobic system do not.

Parameter	Aerobic Treatment.	Anaerobic Treatment
Application	low to medium strength waste water (<1000ppm) eg. municipal sewage, refinery, wastewater etc.	Medium to high strength wastewater (>4000ppm) eg. food and beverage industry wastewater.
Capital Investment	Relatively high	Relatively low with pay back.
Energy Consumption.	Relatively high.	Relatively low.
Foot-Print.	Relatively large	Relatively small and compact.
Net Sludge Yield.	Relatively high.	Relatively low.
Post-Treatment	Typically direct discharge	Required to fullfill 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.

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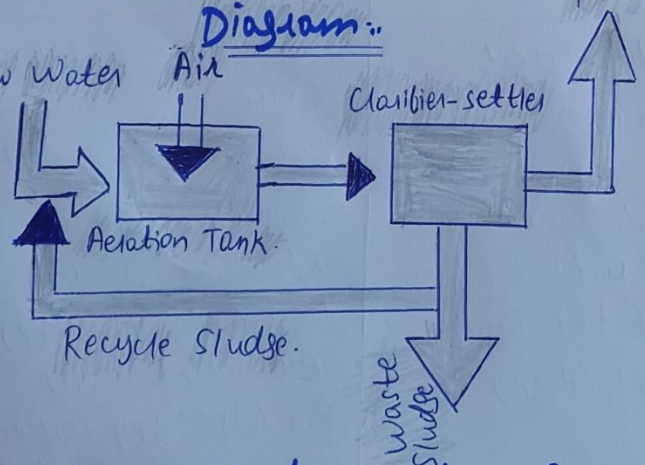
* Ans. Activated Sludge Process:-

The Activated Sludge process is a type of waste water treatment process for treating sewage or industrial waste waters using aeration and a biological floc composed of bacteria and protoza.

The General arrangement of an activated sludge process for removing carbonaccous pollution includes the following terms. An Aeration tank where air (or oxygen) is injected in the mixed liquor. This is followed by setting tank (usually refered to as "final clarifier" or "secondary setting tank") to allow biological flocs (the sludge blanket) to settle, thus separating the biological sludge from the clear treated water.

Diagram:-



Activated Sludge Process

Q3):- Assimilative Capacity :-

Assimilative Capacity can thus be defined as the amount of wastewater that can be disposed of in water body and can be safely stabilized while maintaining the desired quality.

→ Since a certain amount of waste water can be discharged into a receiving water body, it may be highly un-economical to outlaw that wastewater discharge. However, excessive discharge will impair the stream water quality.

→ How it helps?

Disposal of wastewater in a stream could be thus regulated with respect to both quality and concentration in order to safeguard the aquatic life and desirable water use. Thus there is a limit on the amount of liquid wastewater that can be disposed of in a water body, which is called the assimilative capacity of that water body.

Q4):- Sludge Management:-

Sludge Management describes the processes used to manage and dispose of sewage sludge produced during sewage treatment. Sludge is mostly water with lesser amounts of solid material removed from liquid sewage.

Primary sludge includes settleable solids removed during primary treatment in primary clarifiers.

Secondary sludge separated in secondary clarifiers includes treated sewage sludge from secondary treatment bioreactors.

• Advantages:-

1). Diverse; can be used for one household up a huge plant.
2). Remove Organics.
3). Oxidation and Nitrification Achieved.
4). Biological Nitrification without adding chemicals.
5). Biological Phosphorus Removal.
6). Solid / Liquid Separation.
7). Stabilization of Sludge.
8). Capable of Removing 97% of suspended solids.
9). The most widely used waste water treatment process.

QNo: 5):. Environmental Impact Assessment (EIA):-

→ An Environmental study comprising collection of data, prediction of qualitative and quantitative impacts, comparison of alternatives, evaluation of mitigatory and compensatory measures, formulation of environmental management and training plans and monitoring arrangements and framing of recommendations and such other components as may be prescribed.

In simple words EIA may be defined as,

→ A formal process to predict the environmental consequences of human development activities and to plan appropriate measures to eliminate or reduce adverse effects and to enchance positive effects

EIA thus has three main functions.

→ To Predict Problems.

→ To find way to avoid / mitigate them.

→ To Enchance Positive Effects.

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• Parameters of Importance:-

Waste water contains a loose number of contaminants and they are categorized as physical, chemical and biological contaminants. Different parameters have been established from experience and theory to define such characteristics. The quality of the influent waste water to a treatment plant will depend on the source and their activities. Typically industrial effluents are the most significant in terms of the level of Contaminants which are usually more elevated than from domestic or municipal waterflow effluents.

→ The most important parameters to be considered for Newly Waste Water Treatment are

1). Biochemical Oxygen Demand (BOD):.

2). Chemical Oxygen Demand (COD).

3). Total Suspended Solids (TSS):.

4). Total Kjehdahl Nitrogen (TKN).

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2):. Biochemical Oxygen Demand (BOD).

The BOD is the amount of oxygen consumed by aerobic organisms to break down the organic matter in wastewater. It is the BOD_5 which is the actual measured parameter and is an indication of the amount of organic matter within 5 days. as from testing.

2):. Chemical Oxygen Demand (COD):.

The COD is a alternative measure of the amount of organic matter. The amount of oxygen used up by a strong oxidising agent is measured. This value is of greater importance when evaluating wastewater from industries since these effluents tend to the toxic to microorganisms thereby affecting the validity of BOD results.

3):. Total Suspended Solids:. (TSS)::

The TSS is measured to indicate the amount by mass of fine suspended particles. Effluent discharged 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.

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4):. Total Kjehdahl Nitrogen (TKN):.

Waste water usually contains high levels of nitrogen containing compounds. The nitrogens 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.