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Section A

Subject Waste Water Engineering

Department BE(C)

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Q No 1

Wastewater treatment:-

→ Waste-water treatment consists of appling known techology to improve or upgrade the quality of a wastewater.

→ Wastewater treatment involves collecting the wastewater in a centralized or decentralized location (Wastewater treatment plant) and subject the wastewater to various treatment processes.

Importance of wastewater treatment:-

The following importance of wastewater are;

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→ 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.

→ Wastewater if properly treated, is an important resource and can be used for various purposes including irrigation, lawn watering, car washing, flushing toilets and landscaping etc.

→ Wastewater treatment can also generate biogas as final product which is a potential source of energy.

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Why rectangular tank are preffered over circular tanks for removal of settleable soilds during priliminary treatment:-

Rectangular tanks are preffered over circular tanks because the rectangular tanks has a large horizental distance as compare to circular tanks and due to which the settlebale solids gets more detention time and it settle down before reaching the outlet. And in rectangular tanks due to higher vertical vocity, the settlable solids can can easily be settle as Compare to circular tanks which has less horizental distance, due to which the settlable Solids do not settle down well and

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reach to outlet. Also the rectangular tanks are easy to operate, have takes less construction as compare to circular tanks.

Q No 2

Aerobic wastewater treatment:-

→ Aerobic processes use bacteria that require oxygen, so air is circulated throughout the treatment tank.

→ Some systems utilize a pretreatment stage prior to the main treatment to reduce the chance of clogging the system.

→ These aerobic bacteria then break down the waste within the wastewater.

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→ Electricity is required for system operation.

Anaerobic Wastewater treatment:

→ Anaerobic bacteria transform organic matter in the wastewater into biogas that contains large amount of methane gas and carbon dioxide

→ Often used to treat industrial wastewater that contains high levels of organic matter in warm temperture.

→ Energy-efficient process.

→ It can be used as a pretreatment prior to aerobic municipal wastewater treatment.

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Activated Sludge process with diagram:-

→ Microorganisms 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 the micro-organisms to grow. This aeration also helps to keep micro-organisms in suspension.

→ Aeration tank is followed by clarifier/setter in which the micro-organism from flocs and settled down at the bottom.

→ Formation of flocs particles, ranging in size from 50 to 200 μm, removed by gravity settling, leaving relatively clear liquid as treated effluent.

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→ A part of settled bio flocs are recycled back to the aeration tank to maintain certain amount of micro-organisms in the system for efficient operation of the system. This is know as recycled activated sludge (RAS).

→ Remaining settled bio flocs are removed from the system and is termed as wasted activated sludge (WAS)

→ APS involves production of activated mass of micro-organisms capable of stabilizing waste under aerobic condition.

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

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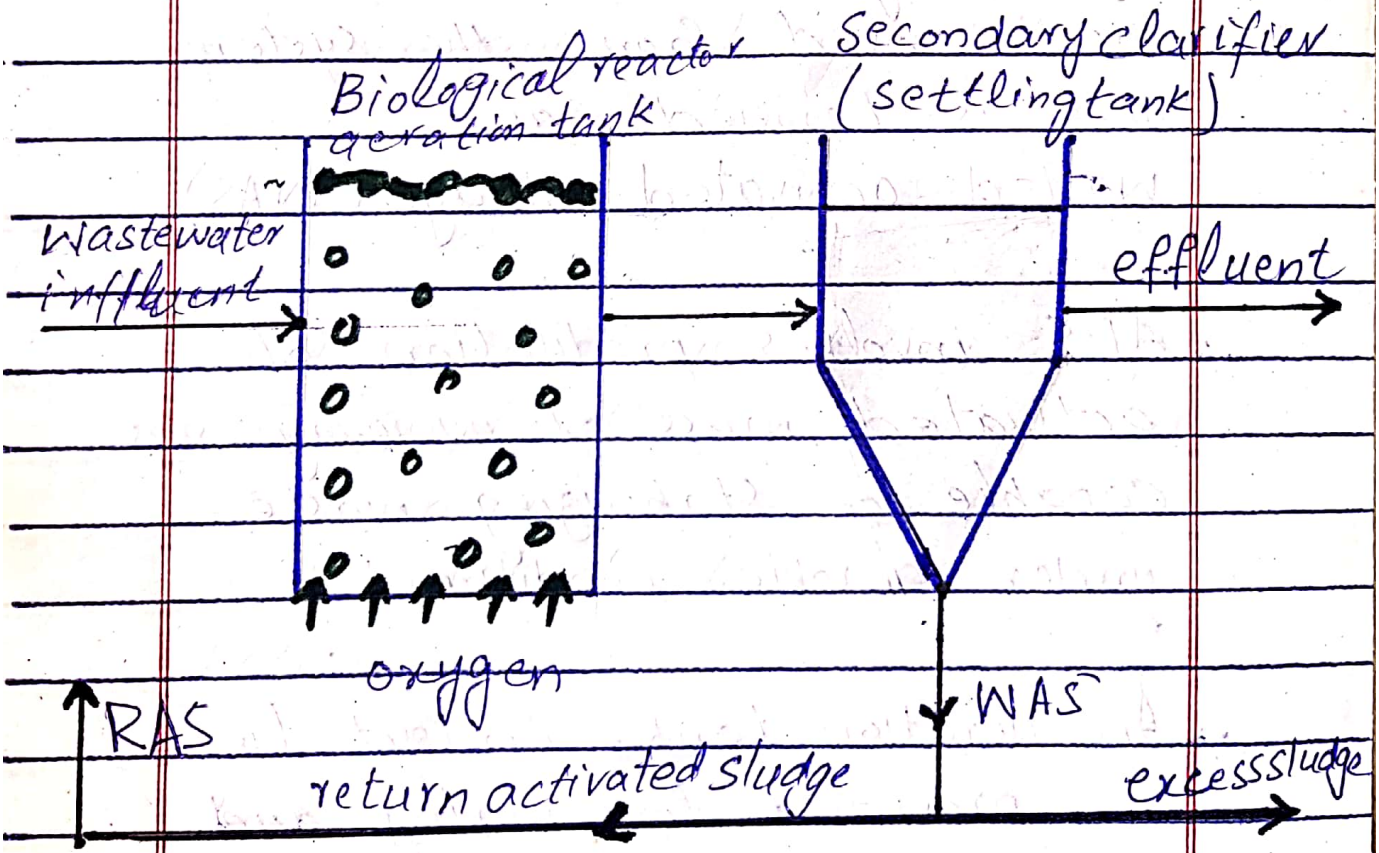
→ Typically 99% of suspended solids and upto 90% of dissolved organics are removed by activated sludge process.

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



Activated Sludge diagram

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QNo 3

Assimilative capacity of receiving water bodies:-

Assimilative Capacity of receving water bodies refers to the ability of a body of water to cleanse itself; its capacity to recive 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 need to

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

Help of Assimilative capacity in wastewater treatment:-

Assimilative capacity helps in wastewater treatment in the following aspacts.

(1) Dilution:

In this dilution occurs, which is a process in which the concentration of pollutants are reduce in recieving water, usually simple by mixing with more quantity of water.

(2) Dispersion:

Another help of assimilative capacity in wastewater

treatment is the dispersion, which is the distribution of pollutants in relatively large area of water. Dilution and dispersion are inter-relatid to help for treatment.

3- Sunlight:-

Another importance of Assimilative capacity for treatment is sunlight which facilitates biological decomposition of pollutants and kills pathogens by ultraviolets radiation (UV).

4- Temperture:

In Assimilatives capacity, the temperture plays an important role with increase in temperture of receving water the biological decomposition of organics and thus assimilative capacity will

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improve. Increase in temperture, also increase the dilution process.

(5) Flow velocity:

Assimilative capacity of receving water, also helps in terms of flow velocity, higher the flow velocity will encourage quick dillution and dispersion of pollutants.

(6) Depth of flowing water:

Assimilative capacity is directly related to the depth of receving water bodies. Increase in depth, relates or radiation, kills pathogens.

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QNo 4

Sludge Management:

Sludge refers to the residual, semi-solid material left from municipal wastewater or industrial waster water treatment processes.

Sustainable sludge manging may be defined as as a socially acceptable, Cost effective method that meets the requirment of efficient recycling of resources while ensuring that harmful substances are not transferred to humans or environment. i.e water, air and soil.

Advantages of Sludge handling/ Managing in waste water engineering:

(1) → As wastewater engineering is directly related to

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environment, sludge management is approach towards better enivornment;

(2) • Residual wastes from hospitals, research facilities and other industries can be hazardous to our health and enivornment. 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 ~~Susb~~ substances such as pathogens and toxic chemicals. Flue gases from exhaust pipes must be handled properly by utilizing a complex treatment system to prevent hazardous emissions and ashes.

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(3) → Due to excess of new problems in sludge managment every year new techniques and professional/experts ~~New~~ are emerges in wastewater engineering industry to face the challanges and finding the solutions.

(4) The other importance is that as a result of sludge managment, sludge which is managed is agriculture manure.

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Q No 5

Environmental Impact Assessment (EIA):

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 judgment on wether the development should proceed.

Parameters to be Consider;

1- Environmental damages should be minumum such as they do not affect water body, greenery and energy consumption which affect environment

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should be Controlled.

2- Environmental benefits should be maximum and water life (water pollution) should be protected.

3- It must be ensured that development is according to national environmental Quality standards (NEQs).

4- The project should not conflict with government policies.

5- International obligation should be strictly followed.

6- Most treatment plants having primary treatment (physical removal of floatable and settleable solids) and secondary treatment (the biological removal of dissolved

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Solids). Some other treatment plants have tertiary treatment option. The purpose tertiary treatment is to provide a final treatment stage to raise the effluent quality before it is discharged to the receiving environment (sea, river, lake, ground etc). More than one treatment process may be used at any treatment plant.

7- It should be ensured that the wastewater treatment plant do not pollute the air of the locality.

8- Also the noise pollution should not affect if the plant of treatment is in polluted area.