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Section # B

Subject # Waste Water Engineering

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Q No 1

Answer:

In simple words waste water treatment involves collecting the waste water in a centralized location and subjecting the waste water to various treatment process it consist of applying known technology to improve the quality of a waste water.

Importance

Basically wastewater treatment allow humans and other industrial effluents to be disposed off without causing damage to human health or unacceptable damage to

the natural environment.

\* When wastewater is properly treated, it can be used for various purposes like irrigation lawn watering, car washing flushing toilets and landscaping.

\* wastewater can also be used to generate biogas a final product which is a potential source of energy.

Why rectangular tanks are preferred over circular tanks for removal of settleable solids during Preliminary Treatment?

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Rectangular tanks are preferred over circular tanks because the rectangular tanks has a large horizontal distance as compare to circular tanks and due to which the settleable solids gets more detention time and it settle down before reaching the outlet. And in rectangular tanks due to higher vertical velocity the settleable solids can be circular tanks which has less horizontal distance due to which the settleable solids do not settle down well and reach to outlet. Also the rectangular tanks are easy to operate have low maintenance cost and takes less surface area for construction as compare to circular tanks.



Q No 02

Answer

## Aerobic wastewater Treatments

The waste water treatments process which use bacteria that require oxygen, so that the air is circulated throughout the treatment tanks is called aerobic wastewater treatments.

And with the help of these aerobic bacteria then breaks down the waste within the waste water.

Some of the wastewater treatment plants utilize a pretreatment to reduce the chance of clogging the system.

Electricity is required for system operation.

# Anaerobic waste water treatments

- ⇒ Anaerobic bacteria transform organic matter in the waste water into biogas that contains large amounts of methane gas and carbon dioxide.
- ⇒ Energy efficient process.
- ⇒ often used to treat industrial waste water that contains high level of organic matter in warm temperature.
- ⇒ it can be used as a pretreatment prior to aerobic municipal waste water treatment.

# Activated Sludge Process (ASP)

\* The Process for treating sewage or industrial ~~wast~~ wastewater using aeration and a biological floc composed of bacteria and protozoa, is called activated sludge process.

\* In this microorganisms responsible for treatment are maintained in liquid suspension by appropriate.

\* Main constituents of ASP are Aeration tank in which oxygen is provided micro-organisms to grow. This aeration also helps to keep micro-organism in suspensions.

\* Aeration tank is by clarifier/ Settler in which the micro-organisms from flows and settled down at the bottom.



\* Formation of floc particles, ranging in size from 50 to 200  $\mu\text{m}$  removed by gravity settling leaving relatively clear liquid as treated effluent.

\* 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 known as Recycled Activated Sludge.

\* Remaining settled bio flocs are removed from the system and it termed as wasted Activated Sludge (WAS).  
APS involves production of activated mass of microorganism.



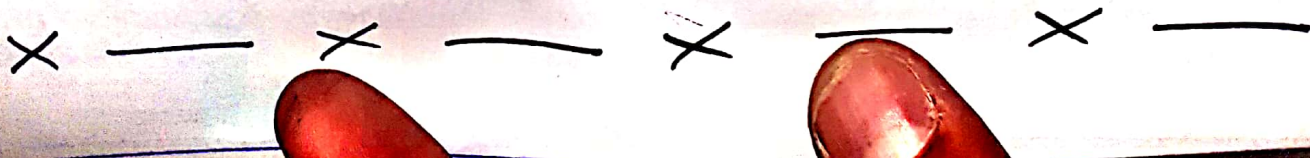
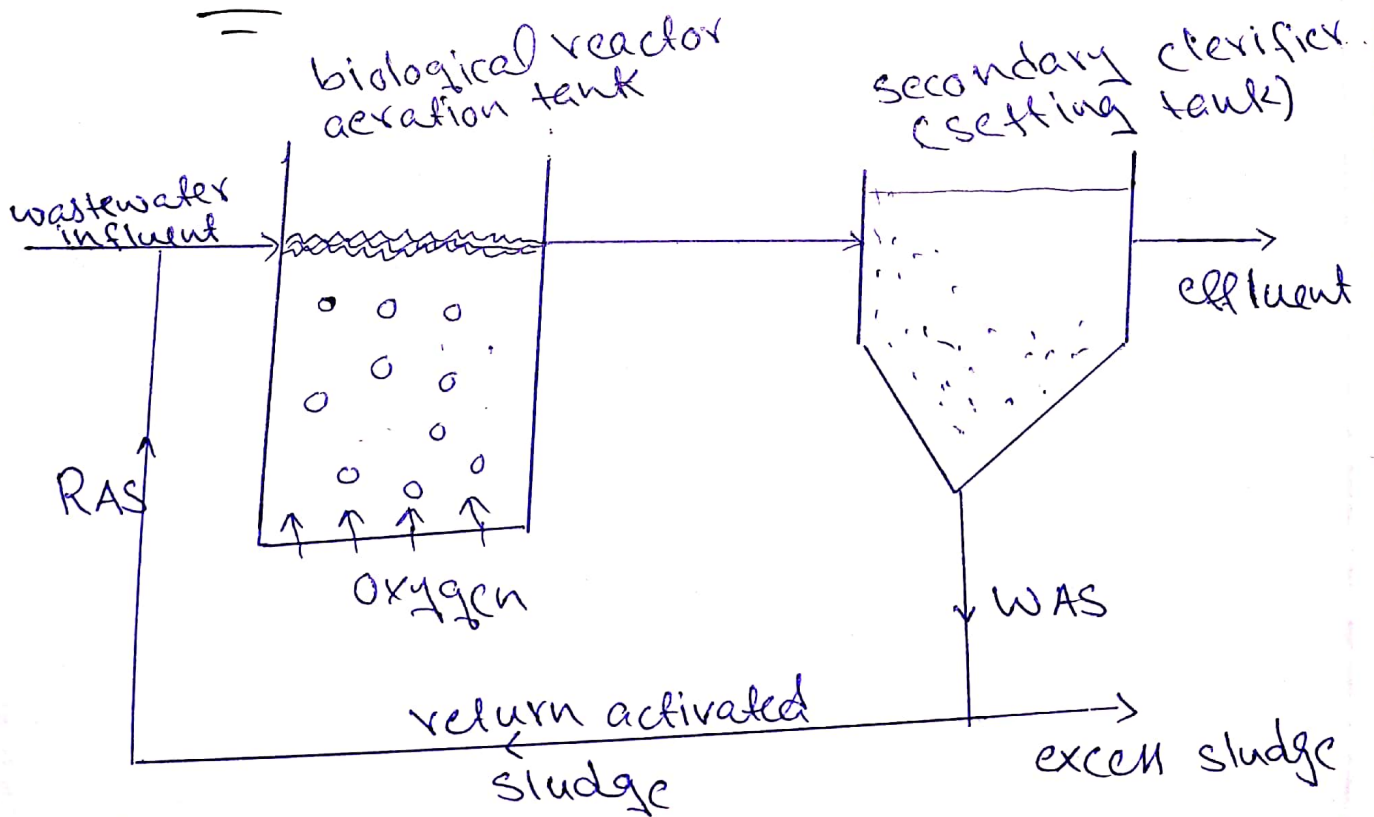
capable of stabilizing waste under aerobic conditions.

\* In aeration tank contact time is provided for mixing and aerating influent waste water with microbial suspensions, generally referred to mixed liquor suspended solids (MLSS).

Typically 99% of suspended solids and upto 90% of dissolved organics are removed by Activated Sludge Process.

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

# Diagram



Q No 3

Answer Assimilative capacity of  
Receiving water bodies::

Assimilative capacity of receiving water bodies 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 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 stream still it has impurities that need to



removed or make them less effective so that the receiving water bodies may not become unsuitable for use.

### Help of Assimilative capacity in wastewater treatment.

The assimilative capacity help in wastewater treatment in the following ways.

① **Dilution**:: In this dilution occurs which is a process in which the concentration of pollutants are reduce in receiving water, usually simply 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-related 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 ultraviolet radiation (UV)

4 Temperature: In Assimilative capacity the temperature plays an important role with increase in temperature of receiving water the biological decomposition of organics and thus assimilative capacity will improve. Increase in temperature also increase the dilution process.

⑤ Flow velocity: Assimilative capacity of receiving water, also help in terms of flow velocity. Higher the flow velocity will encourage quick dilution and dispersion of pollutants.

⑥ Depth of flowing water.

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



Q No 4

Answer

## Sludge management

Sludge management refers to the residual semi-solid material left from municipal wastewater or industrial wastewater treatment process.

Sustainable sludge handling management may be defined as a socially acceptable cost-effective method that meets the requirement of efficient recycling of resources which ensuring that harmful substances are not transfer to humans or the environment i.e water air or soil.

# Advantages of sludge management in waste water Engineering.

- ① As waste water engineering is related to environment sludge management is approach towards a better environment.
- ② Residual wastes from hospitals, research facilities and other industries can be ~~harmful~~ hazardous to our health and the environment. These harmful element may require thermal treatment to control the spread of disease or toxins sewage sludge incineration reduces volume (upto 90%) and weight (upto 75%) and breaks down dangerous substances such as pathogens and toxic chemicals. Fuel gases from exhaust pipes must be handled properly by utilizing a

a complex treatment system to prevent hazardous emissions and ashes from contaminating the environment.

③ The other importance is that as a result of sludge management, sludge which managed is a agriculture ~~is~~ manure.

④ Due to excess of new problem in sludge management every year new techniques and professional/experts are emerge in waste water engineering industry to face the challenges and finding the solutions.



Q/No 05

Answer

Environment Impact

Assessment (EIA)

A technique and a process by which information about environment 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.

Parameter to be considers

Environmental Damages should be minimum such as do not affect water body, greenery and energy

consumption which affect the environment should be controlled Environment Benefits should be protected.

Ensures that Development is according to National Quality Standards (NEQS).

The project should not conflict with Govt. Policies.

International obligations should be strictly followed.

Most treatment plants have Primary treatment (physical removal of floatable and settle able solids) and Secondary treatment (the biological removal of dissolved solids). Some other treatment plants have tertiary treatment option. The purpose of 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.