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Section : B

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Q1 Wastewater treatment:-

A process to convert wastewater or which is water no longer needed or suitable for its most recent use. into an effluent that can be either returned to the water cycle with minimal environmental issues or reused.

Importance of wastewater treatment:

Essential for life. clean water is one of the most important natural resources on the planet.
wastewater. which is basically used water, is also a valuable resource. especially with recurring droughts and water shortages in many areas of the world. However, wastewater contains many harmful substances and cannot

be released back into the environment until it is treated.

Restoring the water supply:-

Look at a global drought map and you will see that many areas of the world simply do not have enough water. All communities, especially areas with water scarcity, need to ensure they have good water treatment processes in place so that treated water can either be reused or returned to the water cycle, but never wasted.

Protecting the planet:-

Wastewater can include contaminants from both residential and commercial use. Untreated, the chemical compounds and pathogens in wastewater can harm the health of animals,

plants and birds that live in or near the water.
Wastewater treatment is fundamental to protect the health of many different ecosystems.

→ Wastewater if properly treated, is an important resource and 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.

We prefer Rectangular tanks because it clarifiers typically require less land than circular clarifiers for a similar surface area. The reduction become 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.

The even flow distribution configuration for rectangular clarifiers requires simpler and less expensive pipe work layout and pumping requirement as compared to circular clarifiers where the pipes require a more complicated layout pattern and perhaps a seperate pumping station as well.

Q NO 2.

Aerobic wastewater treatment :-

→ Aerobic processes use bacteria that require oxygen, so air is circulated throughout the treatment tank.
→ These aerobic bacteria then break down the waste within the wastewater.
→ Some systems utilize a pretreatment stage prior to the main treatment to reduce the chance of clogging the system.
→ Electrity is required for system operation.

Anaerobic Wastewater treatment :-

→ Anaerobic bacteria transform organic matter in the wastewater into biogas that contains large amounts of methane gas and carbon dioxide.
→ Energy efficient process

→ Often used to treat industrial wastewater that contains high levels of organic matter in warm temperatures.
→ It can be used as a pretreatment prior to aerobic municipal wastewater treatment.

Activated sluge Process:-

Process for treating sewage or industrial wastewater using aeration and a a biological floc composed of baiteria and protozoa.
→ It is a biological process that can be used for oxidizing carbonaceous biological matter, oxidizing nitrogenous matter (NH_3 and N_2) removing nutrients N and P).
→ Aeration methods - diffused aeration, surface aerators (cones) and pure oxygen aeration.

Process :-

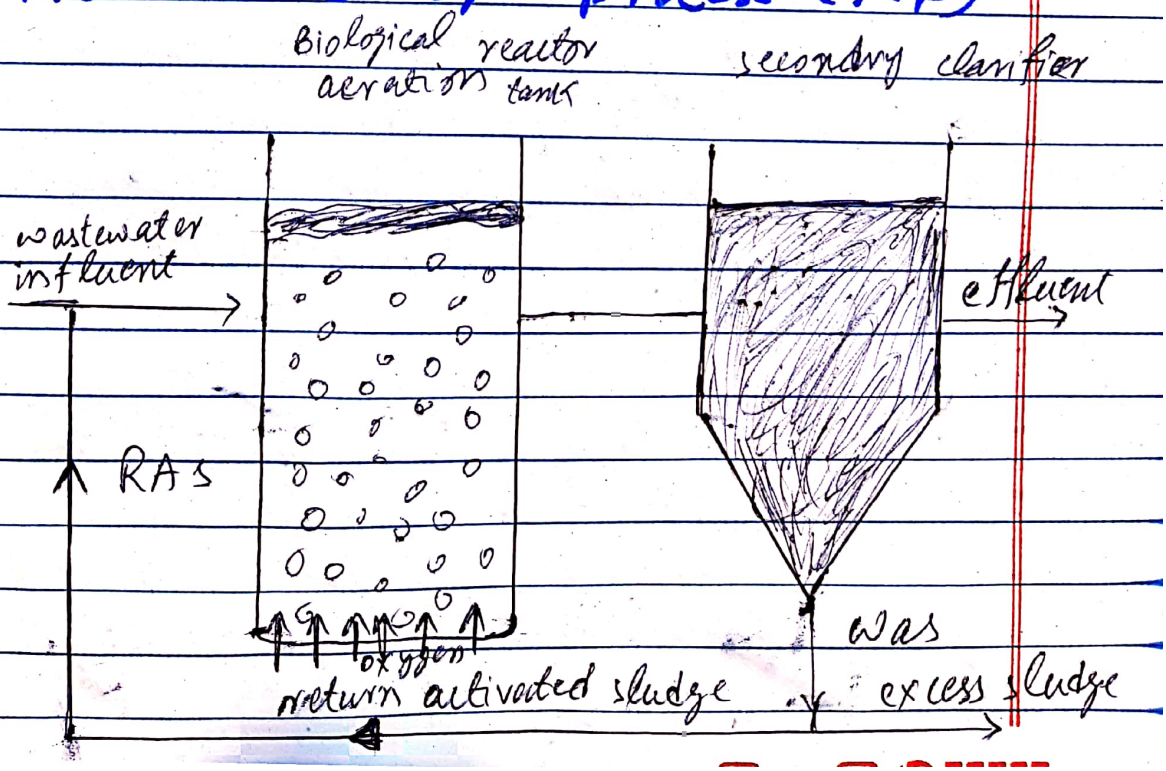
→ Pre-treatment stage to remove large solids and other undesirable substances.

→ Aeration stage, where aerobic bacteria digest biological wastes.

→ Settling stage allows undigested solids to settle, forms a sludge that must be periodically removed from the system.

→ Disinfecting stage, where chlorine or similar disinfectant is mixed with water, to produce an antiseptic output.

Activated sludge process (ASP)



Q NO 3.

Assimilative Capacity of Recieving Bodies.

→ It is refers to the abilidy of a body of water to cleanse itself; its capacity to recieve waste-waters 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 recieving water bodies may not become unsuitable for use or cause damage to the aquatic life

Assimilative capacity of recieving water bodies help in wastewater treatment:-

i) Dilution:-

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

ii) Dispersion:-

It is the distribution of pollutants in relatively large area of water. Dilution and dispersion are inter-related.

iii). Sunlight:-

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

1) Temperature:-

Temperature plays an important role in assimilative capacity

of recieving water. Increase in temperature will increase the biological decomposition of organics and this assimilative capacity will improve.

2) Flow Velocity:-

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

3) Dissolved Oxygen:-

Rate of biological decomposition is directly related to the amount of dissolved oxygen. DO is replenished by re-aeration. Re-aeration may be provided by maintaining ~~quick~~ sufficient flowing velocity.

4) Depth of flowing water:-

Assimilative capacity is indirectly related to the depth of recieving water bodies. Increase in depth causes to decrease dissolved oxygen in the water and thus it reduces the purification process.

Q NO 4.

Sludge Management:-

Sludge Management is the most different and challenging task of wastewater treatment plant due to its high water content and poor dewatering and strick regulation for sludge reuse or disposal.

→ One of the recent goal of wastewater treatment plant is to

develop more environmentally friendly process to reduce the volume of sludge for disposed and content sludge into bio energy.

→ Energy recovery of the sludge into biogas, sygas and bio-oil which can be further converted in to electricity mechanical energy and heat

Primary sludge:-

→ Contains both organic and inorganic solids.
→ upto 5% solids (95% water).

Secondary sludge:-

→ Dead bacteria
→ Activated sludge : 1% solids
→ Trickling Filter & RBC 5% solids.

Goals of sludge management:-

→ Stabilize primary and secondary sludges.

→ Kill pathogens.
→ Decrease water content.
— Untreated: 0.5 to 8% solids
— Treated: 6 to 12% solids

Sludge processing.

→ Thickening
→ Stabilization
→ Disinfection
→ Dewatering
→ Final Disposal.

Advantages of Sludge Management:-

→ As Environmental enginneering directly released to environment sludge management is approach towards a better environment.

→ Residial waste from industries hospitals, research faulities can be hazerdous to our health and enviroment. It is should be manage properly, because it spread diseases.

→ Sewage sludge reduce volume and weight

Due to excess of their problem in sludge management every year new techniques and expert are emerges in wastewater engineering. Industries to face the challenges and finding the solution.

Q No 5. EIA:-

Environmental impact Assessment is defined as an activity designed to identify the impact on the biogeophysical environment, on man and well-being of legislative proposals, projects, policies, operational procedures and to interpret and communicate information. EIA is a systematic process of identifying future consequences of a current or proposed action.

Enviromental impact statement information:

1) Description of proposed action.
2) Nature and magnitude of likely environmental effects.
3) Possibility of earthquake and cyclones.
4) effects on vegetation, wild life, and endangered species.
5) Economic and demographic factors.
6) Identification of relevant human concerns
7) Noise pollution. Efficient use of inputs.

The following consideration should keep in mind while conducting EIA for the newly proposed waste water treatment plant.

Enviromental Damages should be minimum such as do not effect water body greenary and energy consumption which effect the environment should be controlled.

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Enviromental Benefits should be maximum and water life should be protected.

Ensure that Development is according to National Quality standard (NEQS).

The project should not conflict with Govt. policies

International obligations should be strickly followed

Most treatment plant have primary treatment and secondary treatment.

Some other treatment plant have tertiary

treatment option.

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