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Subject	***waste water Engineering***
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Submitted to	*Engr Nadeem*

Q1. What is wastewater treatment and its importance? Why rectangular tanks are preferred over circular tanks for removal of settleable solids during preliminary treatment?

ANSWER:

WASTEWATER TREATMENT:

Wastewater treatment is a process used to remove contaminants from wastewater 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

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. Thus, the importance of wastewater treatment is twofold: to restore the water supply and to protect the planet from toxins.

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 PLANTS:

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. It can also contaminate crops and drinking water, affecting human health. Wastewater treatment is fundamental to protect the health of many different ecosystems.

RECTANGULARS TANKS ARE PREFFERED BECAUSE:

It has low cost of maintenance

It is also suitable for large capacity of wastewater

Q2. What is the difference between aerobic and anaerobic wastewater treatment? Briefly describe Activated Sludge Process with diagram?

ANSWER:

DIFFERENCE BETWEEN ANAEROBIC AND AROBIC WATER TREATMENT

Anaerobic and aerobic systems are both forms of biological treatment that use microorganisms to break down and remove organic contaminants from wastewater. While both rely on a process of microbial decomposition to treat wastewater, **the key difference between anaerobic and aerobic treatment is that aerobic systems require oxygen, while anaerobic systems do not.**

Aerobic vs Anaerobic Wastewater Treatment	
Aerobic wastewater treatment is a biological wastewater treatment process which uses oxygen rich environment.	Anaerobic wastewater treatment is a process an where anaerobic organisms break down organic material in an oxygen absent environment.
Bacteria involved the aerobic wastewater treatment are aerobes.	Bacteria involved the anaerobic wastewater treatment are anaerobes.
Air Circulation Air is circulated in aerobic wastewater treatment tanks.	Air is not circulated in anaerobic wastewater treatment tanks.
Aerobic wastewater treatment does not produce methane and carbon dioxide	Anaerobic wastewater treatment produces methane and carbon dioxide.
Aerobic wastewater treatment requires energy Hence, they are less energy efficient.	Anaerobic wastewater treatment is an energy efficient process.

Activated Sludge

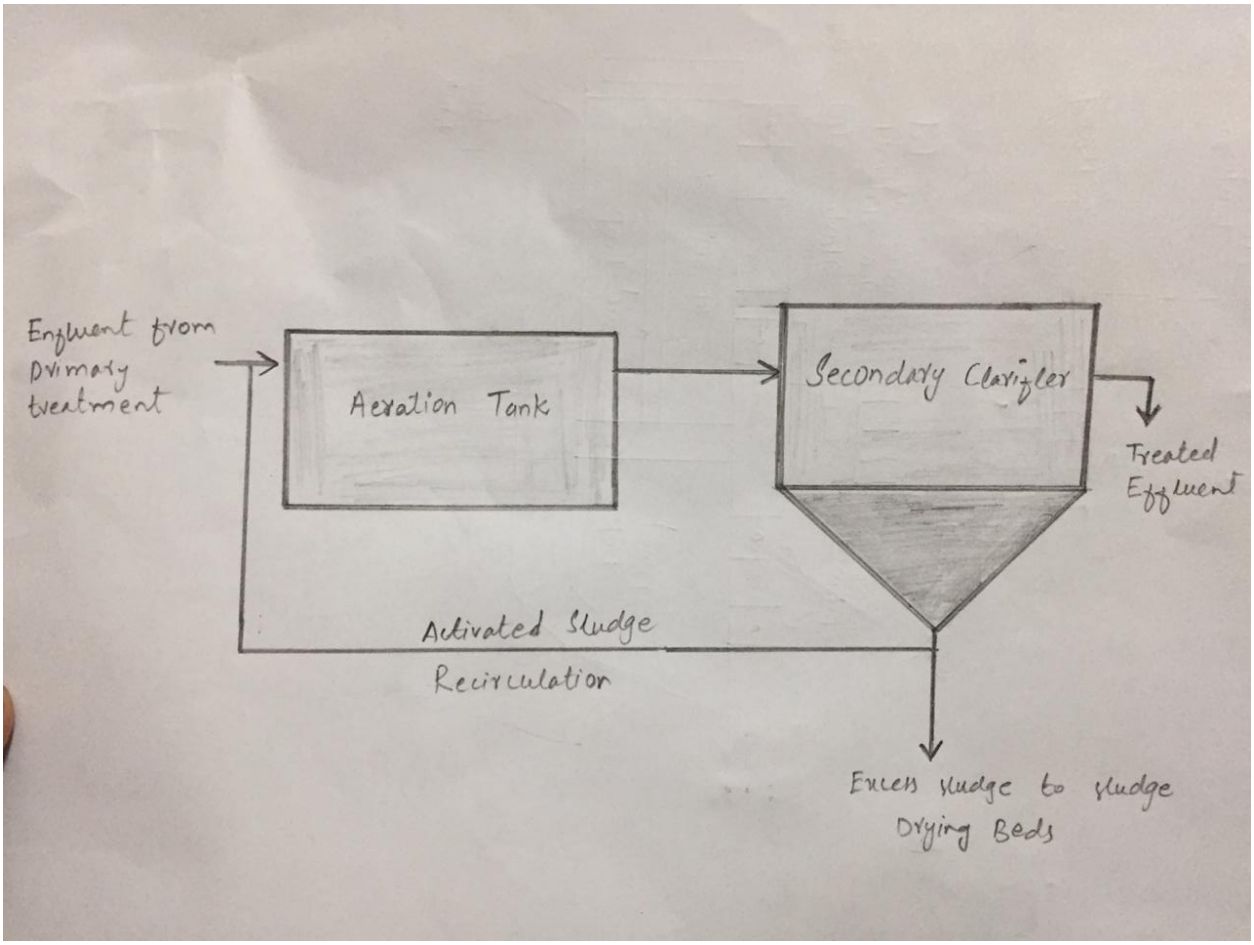
The process involves air or oxygen being introduced into a mixture of screened, and primary treated sewage or industrial wastewater (wastewater) combined with organisms to develop a biological floc which reduces the organic content of the sewage.

PROCESS:

The **activated sludge** process is a type of wastewater treatment process for treating sewage or industrial wastewaters using aeration and a biological floc composed of bacteria and protozoa.

The general arrangement of an activated sludge process for removing carbonaceous pollution includes the following items: An aeration tank where air (or oxygen) is injected in the mixed liquor. This is followed by a settling tank (usually referred to as "final clarifier" or "secondary settling tank") to allow the biological flocs (the sludge blanket) to settle, thus separating the biological sludge from the clear treated water.

DIAGRAM:


Effluent from primary treatment
Aeration Tank
Secondary Clarifier
Treated Effluent
Activated Sludge Recirculation
Excess sludge to sludge Drying Beds

Q3. What is meant by assimilative capacity of receiving water bodies? How does it help in wastewater treatment?

ANSWER:

Assimilative capacity

Assimilative capacity refers to the ability of a body of water to cleanse itself; its capacity to receive waste waters or toxic substances without deleterious effects and without 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

Help of Assimilative Capacity:

A classic example of assimilative capacity is the ability of stream to accept modest amount of biodegrable waste.

Bacteria in a stream utilize oxygen to degrade the organic matter present in such a waste causing the level of dissolve oxygen on the stream to fall; but the decrease in dissolve oxygen causes additional

Oxygen to enter the stream to fall enter from atmosphere.

A stream can assimilate a certain amount of waste and still maintain a dissolved oxygen level high enough to support a healthy population of fish and other aquatic organisms.

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Q4. Briefly describe sludge management and its advantages in wastewater engineering?

ANSWER:

SLUDGE MANAGMENT

The residue that accumulates in sewage treatment plants is called sludge (or bio solids). Sewage sludge is the solid, semisolid, or slurry residual material that is produced as a by-product of wastewater treatment processes. This residue is commonly classified as primary and secondary sludge. Primary sludge is generated from chemical precipitation, sedimentation, and other primary processes, whereas secondary sludge is the activated waste biomass resulting from biological treatments. Some sewage plants also receive septage or septic tank solids from household on-site wastewater treatment systems.

ADVANTAGES:

Energy Generation:

Incineration, also called “mass burn,” utilizes a high temperature furnace that burns any waste. In large treatment plants, high quantities of sludge are used as a source of energy used to produce steam when fed through a turbine

Control the Spread of Diseases:

Residual wastes from hospitals, research facilities and other industries can be hazardous to our health and the environment. These harmful elements may require thermal treatment to control the spread of diseases or toxins. Sewage sludge incineration reduces volume (up to 90%) and weight (up to 75%) and breaks down dangerous 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 from contaminating the environment.

Recovery of Precious Metals:

Significant quantities of precious metals may be recovered from urban waste after it goes through the sewage sludge incineration process. These metals can be recycled from sewage ash.

Q5. Define Environmental Impact Assessment (EIA)? In your opinion, what parameters should be considered while conducting EIA for newly proposed wastewater treatment plant?

ANSWER:

Definitions of 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.

PARAMETERS FOR NEW WASTEWATER TREATMENT PLANT:

- Water supply and quality
- Oxygen
- Nitrogenous compounds
- Ph.
- Environmental salinity
- Temp of water
- Density
- Noise, light and feeding etc.