

Name: Salman Abdullah Khan

ID: 7772

Sec: "C"

Paper: Wastewater Engineering

exam: Final term exam

Semester: 8th

Dept: Civil Engineering (BS)

Date: 27/June/2020

Teacher Name: Engr Sir Nadeem

①

Question 1:-

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

Ans:- Wastewater is a term that is used to describe waste material that includes industrial liquids waste and sewage waste that is collected in towns and urban areas and treated at urban wastewater treatment plant.

Waste water treatment

A process to convert wastewater 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 environment issues or reused.

Importance:-

- ⇒ It is very important to provide some degree of treatment to wastewater before it can be used for agricultural or landscape irrigation or for aquaculture.
- ⇒ The principal objectives of sewage treatment is generally to allow human effluents to be disposed of without danger to human health or unacceptable damage to the natural environment.

(2)

⇒ Water scarcity is the major problem that is faced all across the world. Although $\frac{2}{3}$ rd of earth crust is made up of water but all this water is not available for drinking and for other human activities. It has been found out that 97% of the total water is salty that is of no use to human and animals and remaining three 3% percent is available as fresh water.

⇒ Over homes is ever increasing day by day as more home are being established.

Rectangular tank

⇒ Removal of Scum and floating solids is almost always easier with Rectangular clarifiers which are known to provide more effective scum/foam trapping via rotating scum troughs. It is generally that scraper speed greater than 6ft (1800 mm)/min can cause re-suspension of settled solids.

Aerobic Treatment

- ⇒ Organic material decomposing with oxygen is an aerobic process.
- ⇒ When organism that use oxygen feeds upon organic matter, they develop cell protoplasm from the nitrogen, phosphorus some of the carbon and other required nutrients.
- ⇒ Generally organisms respire about two thirds of the carbon they consume as CO_2 . While the other third is combined with nitrogen in the living cells.
- ⇒ In the nature the aerobic process is most common in areas such as the forest floor, where droppings from trees and animals are converted into relatively stable organic matter.
- ⇒ We can try to imitate this natural ~~treatment~~ system when we plan and maintain our landscape.

Anaerobic Treatment

- ⇒ Anaerobic process is a collection of processes by which microorganisms break down biodegradable material in the absence of oxygen.
- ⇒ The process is used for industrial or domestic purposes to manage waste and/or to produce fuels.
- ⇒ The digestion process begin with bacterial hydrolysis of the input materials.
- ⇒ Insoluble organic polymers such as carbohydrate are broken down to soluble derivatives that become available for other bacteria.
- ⇒ Type of treatment for wastewater Anaerobic.
- Anaerobic treatment takes place in absence of air.

⇒ Types of treatment for wastewater
Aerobic.

- Aerobic treatment takes place in presence of air.
- The organic pollutants are converted into carbon dioxide and water.

• The organic pollutants are converted by anaerobic microorganisms to a gas containing methane and carbon dioxide.

Activated Sludge process

• Microbes, mainly aerobic heterotrophic bacteria are involved designed to remove (soluble) biodegradable organic matter.

• Removal of nutrient, TSS, pathogens and heavy metals is coincidental.

⇒ Usually clarified sewage (primary effluents) is treated

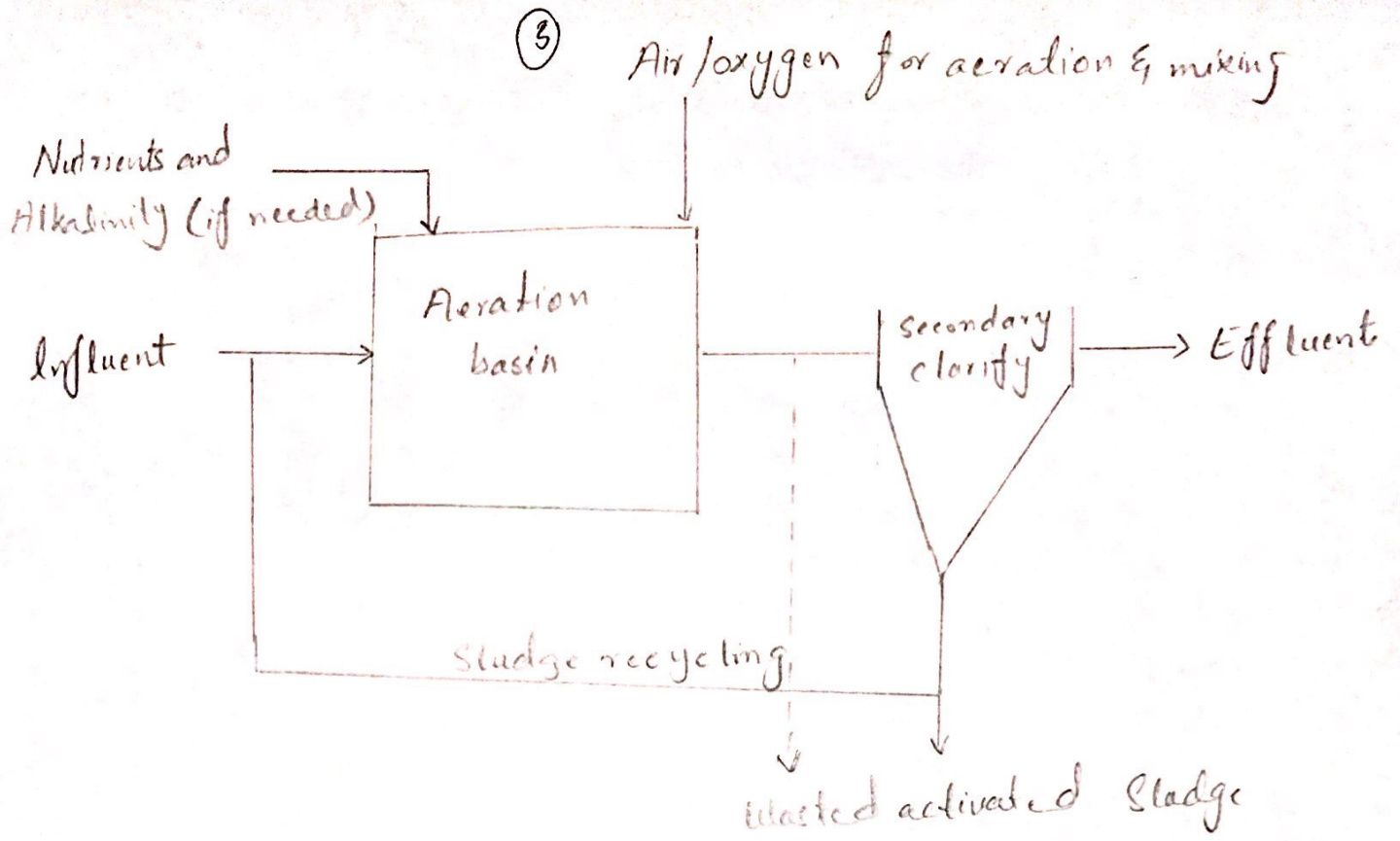
• Primary treatment is omitted in case of small flow and low TSS sewage and in hot climates (to avoid/control odour problems)

• SBR, oxidation ditches, aerated lagoons, contact-stabilization process etc may not require primary treatment.

⇒ Treatment involves conversion of soluble organic matter into biological flocs and their removal as secondary sludge

⇒ Includes an aeration tank and a secondary sedimentation tank.

• Aeration and mixing and sludge recycling are additional features.



Activated Sludge process



Question no 3

(6)

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

Ans: \Rightarrow Assimilative Capacity refers to the ability of a body of water to cleanse itself; its Capacity to receive waste water or toxic substance without deleterious effects and without damage to aquatic life or human who consume the water. It is level to which water body or nature control the toxicity without affecting the aquatic life.

\Rightarrow Although wastewater is properly treated before it is disposed of to the natural water streams still it has impurities pollutants that need to be removed or make them less effective so that the receiving water bodies may not become unsuitable for use or cause damage to the aquatic life.

Help in wastewater treatment

\Rightarrow The ability of stream to accept modest amount of biodegradable waste. Bacteria in a stream utilize oxygen to degrade the organic matter present in a such a waste causing the level of dissolved oxygen on the stream to ~~fall~~ but ~~the decrease~~ decrease in dissolved oxygen causes additional oxygen to enter from atmosphere

\Rightarrow 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.

_____X_____X_____

Question 4

(9)

Briefly describe sludge management and its advantages in wastewater engineering?

Sludge disposal

- Sewage Sludge Contains both Compounds of agricultural value and pollutants.
- Agricultural value - organic matter, nitrogen phosphorus and potassium.
- Pollutants - heavy metals, organic pollutants and pathogens.

Methods of Sludge disposal

- 1) Land fill
- 2) Agricultural use
- 3) Other methods

Sludge Thickening

- ⇒ The process of reducing the moisture content in the sludge.
- ⇒ Using Sludge thickener or Concentrator unit.
- ⇒ Three types of thickening units.
 - Gravity thickeners
 - Flotation thickeners
 - Centrifugal thickeners.

Sludge Treatment ⁽⁸⁾

- Thickening
- Digestion
- Conditioning
- Dewatering
- Drying
- Disposal (incineration)

Sludge Handling Processes

- 1) Primary operations
- 2) Thickening
- 3) Stabilization
- 4) Dewatering
- 5) Heat drying

1) Primary operation

The process includes:

- 1) Grinding: It includes particles size reduction.
- 2) Screening: It includes removal of fibrous materials.
- 3) Degritting: It includes removal of sand or other inorganic material.
- 4) Blanding: It includes making the sludge homogeneous.
- 5) Storage: It ensures flow equilization in the system.

② Thickening:-

⇒ Sludge thickening is undertaken to increase percentage of solid content in sludge by removing a portion of liquid fraction.

⇒ Volume reduction of approximately 30-80% can be reached with sludge thickening.

③ Stabilization

Undertaken to reduce pathogens, eliminate offensive odors, minimize production of usable gas.

Methods:-

- i) Alkaline stabilization
- ii) Anaerobic stabilization

iv) De-watering:

⇒ is undertaken to reduce the moisture content of sludge.

⇒ Centrifugation is the method used for separating liquids of different densities, thickening slurries.

⑤ Heat Drying

Applies heat to evaporate water and to reduce the moisture content of biosolids.

Advantages

(10)

- We can use sludge in a landfill or for Agricultural use.
- The sludge is very useful for agricultural use because contain organic matter, nitrogen, phosphorus and potassium, soil improvement also occur.
- Some of Advantageable uses are following.
 - 1) Landscape irrigation
 - 2) Agricultural use
 - 3) Ground water recharge.



Define Environment Impact Assessment (EIA)? In your opinion what parameter should be considered while conducting EIA for newly proposed wastewater treatment plant?

Ans.: A statutory process for assessing the impact on the environment of certain projects and proposals.

Background:-

The fourth ordinary meeting of the Contracting parties to the Barcelona Convention (Genoa, September 1985) when considering the workplan of the priority Action programme Regional Activity Center (PAP/RAC) of the Mediterranean Action plan stressed the interest to develop suitable methodologies for environmental impact assessment. The same meeting adopted ten target to be achieved as a matter of priority during the second decade (1986-1995) of the Mediterranean Action plan (MAP) among these target were.

EIA for propose wastewater treatment plant

- (1) To predict environmental impact of project.
- (2) find ways to an means to reduce adverse impacts.
- (3) Shape project to suit local environment.
- (4) Present the predictions and options to the decision-makers

⑤ The EIA statement ^⑫ should cover brief description of project, brief description of existing environment likely impact of project.

⑥ It should provide employment.

