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Assignment ; Waste water - Engineering

Date ; 27/6/2020

Question No: 01

Q.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 treatment;

Wastewater treatment consist of applying known technology 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 subjecting the wastewater to various treatment processes.

\* Importance of wastewater treatment;

\* The principal objective of wastewater treatment is generally to allow human and industrial effluents to be disposed off without causing damages to human health or unacceptable

Question No: 01

Damage to the natural environment.

\* Wastewater if properly treated is an important resources 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.

\* Rectangular tank are preferred over circular tank for Removal of settleable solids.

\* Rectangular tank are preferred over circular tank for removal of / settleable solids because due to greater <sup>surface</sup> area of cylindrical tank the cylindrical tank has the least possible ratio of circumference to area as compared to rectangular tank. Rectangular tank has smaller capacities as compared to circular

tanks therefore rectangular tank is economical as compared to circular tank. So the rectangular tank are preferable as compared to circular tank for removal of settleable solids.

**Q2; What is the difference between aerobic and anaerobic wastewater treatment? Briefly describe Activated Sludge process with Diagram?**

**Ans: Difference between aerobic and anaerobic wastewater treatment;**

\* While both rely on a process of microbial decomposition to treat wastewater the key difference between aerobic and anaerobic is that aerobic treatment system required oxygen while anaerobic system do not required oxygen. In an anaerobic digester gaseous oxygen is prevented from entering the system through physical through physical containment in sealed tank

In an aerobic system the majority of energy in the starting material is released as heat by their oxidation in carbon dioxide and water.

### \* Activate sludge process;

\* Microorganism is responsible for treatment are maintained in liquid suspension by appropriate mixing method.

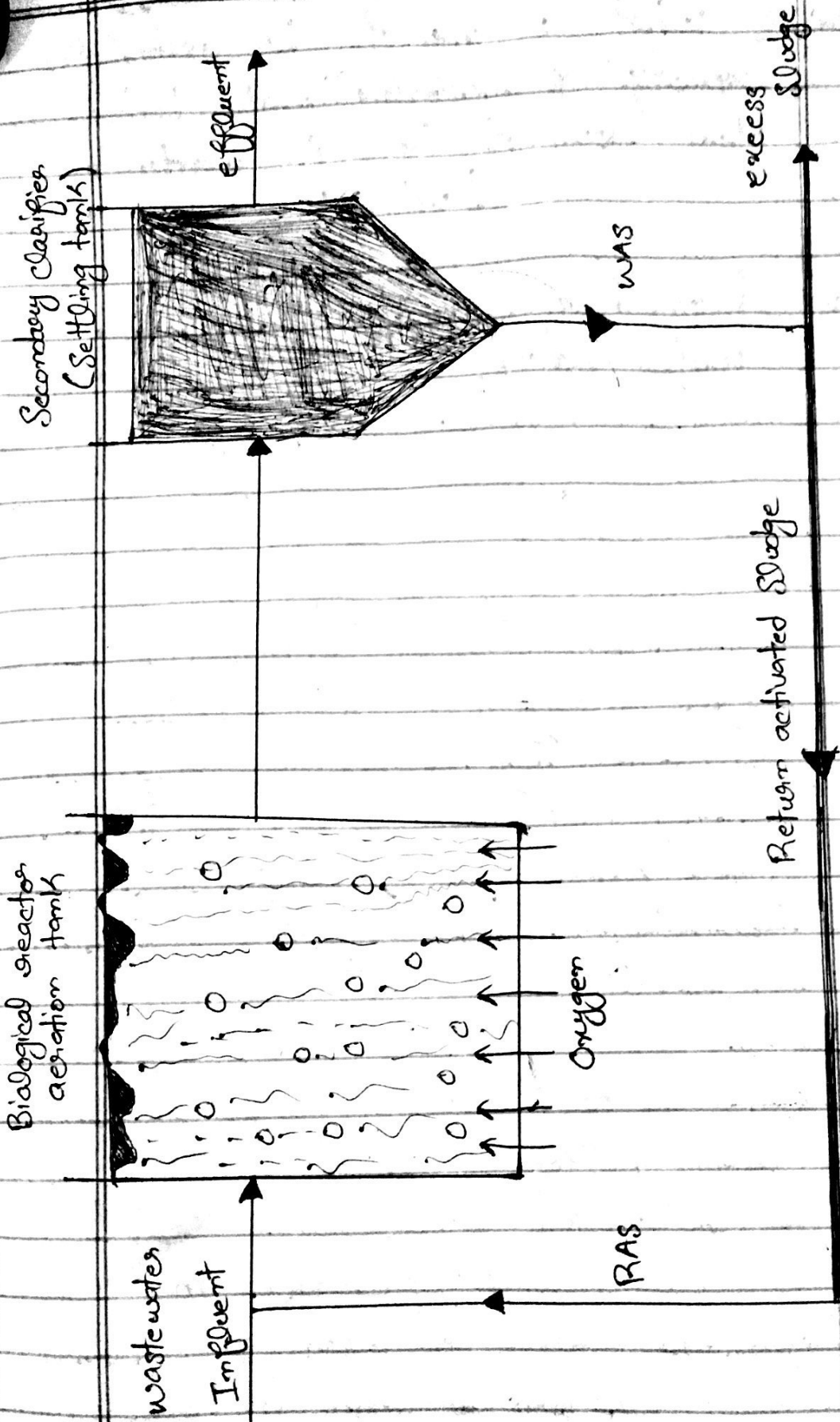
\* Main constituent of ASP are aeration tank in which oxygen is provided for the micro-organism to grow. This aeration is also helps to keep micro-organisms in suspension.

\* Aeration tank is followed by clarifier / tank settler in which micro-organism form flocs 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-organism in the system for efficient operation of the system. (Recycled Activated Sludge)

# Diagram of Activated Sludge Process



## Question NO: 03

Q.No:03: What is meant by assimilative capacity of receiving water bodies? How does it help in wastewater treatment?

Ans Assimilative capacity of receiving water bodies;

Assimilative capacity of receiving water bodies refers to the ability of a body of water to clean itself its eq capacity to receive 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 off to the natural water stream still it has impurities/pollutants that need to 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.

### \* Assimilative capacity help in wastewater treatment

\* Assimilative capacity in a land treatment system can be define as the potential for the removal of contaminants from wastewaters through different means including plant uptake, soil retention, leaching and ground water attenuation so the results surplus of contaminants does not create an adverse effect on environment. It is the level to which water body or natural control the toxicity without affecting the aquatic life. So this is how the assimilative capacity helps in wastewater treatment.

Q No: 04; Briefly describe sludge management and its advantages in wastewater engineering?

\* **Sludge Management includes;**

\* Primary operation.

\* Thickening.

\* Stabilization.

\* Dewatering.

\* Heat drying.

\* **Primary Operation;**

(i) Grinding; It includes particle size reduction

(ii) Screening; It includes removal of fibrous material.

(iii) Degritting; It includes removal of sand or other inorganic materials

(iv) Blending; It includes making the sludge homogenous.

(v) Storage; It ensures flow equalization in the system

## \* Sludge 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.

\* Methods of Sludge thickening

- (i) Gravity thickening.
- (ii) Flotation thickening.
- (iii) Rotatory drum thickening.

## \* Sludge Stabilization

\* Sludge stabilization is undertaken to reduce pathogens, eliminate offensive odors, minimize production of usable gas (methane)

\* Methods of Sludge stabilization

- (i) Alkaline stabilization
- (ii) Anaerobic digestion

## \* Dewatering.

- \* Dewatering is undertaken to reduce the moisture content of sludge.
- \* Compared to thermal (evaporate processes) for water reduction, mechanical dewatering is often selected due to its low energy requirement.
- \* Centrifugation is the method used for separating liquids of different densities, thickening slurries.

## \* Heat drying.

- \* It involves the application of heat to evaporate and to reduce the moisture content of biosolids.
- \* Advantages of this method is to reduce product transportation cost improve storage capability and marketability.

## \* Sludge Management Advantages;

- \* Remove Organics.
- \* Oxidation and Nutrification achieved.
- \* Biological Nutrification without adding chemicals
- \* Biological phasposous removal.
- \* Solid / Liquid separation
- \* Stabalization of Sludge.
- \* Capable of removing 97% of suspended solids.
- \* The most widely used waste water treatment processes.
  
- \* Diverse can be used for one house hold up a huge plant.

Question No: 05

Q5: Define environmental impact assessment (EIA)? In your opinion what parameters should be considered while conducting EIA for newly proposed waste water treatment plant?

\* Environmental Impact Assessment;

A formal process to predict the environmental consequences of human development activities and to plan appropriate measures to eliminate and reduce adverse effects and to enhance positive effect. Three main functions of EIA. To predict problem, To find way to avoid/mitigate them and to enhance positive effects.

\* According to my opinion the most suitable parameter which should be considered while conducting environmental impact assessment for newly proposed waste water treatment plan is the Accountability because the decision makers are responsible to all parties for their action and decisions under the assessment process.