



Name Shah Fahad

ID no 7682

Section A

Exam Final Term

Subject Wastewater Engineering

Semester 8th

Submitted to Engr. Nadeem Ullah

Q1. Wastewater Treatments:-

Wastewater treatment

Consist of applying known technology to improve or upgrade the quality of a wastewater.

⇒ The principal objective of wastewater treatment is generally to allow human & industrial effluents to be disposed off without causing danger to human health or unacceptable damage to the natural environment.

⇒ Wastewater if properly treated, is an important resource & can be used for various purpose including irrigation, lawn watering, car washing, flushing toilets & landscaping etc.

★ The shape of the rectangular clarifiers provides a longer path for the wastewater flow & the suspended solids to travel, & subsequently longer detention time.

which warrants less short circuiting & more

Sludge Setting compared to the Centerfeed / peripheral overflow Circular clarifiers.

In addition, flow distribution among several clarifiers is usually more even \Rightarrow often requires less head loss for rectangular clarifiers.

Importance:-

Essential for life, clean water is one of the most important natural resources on the planet. Which is basically used water is also a valuable resource.

especially with recurring droughts \Rightarrow water shortages in many areas of the world. The importance of wastewater treatment is two fold:

To restore the water supply \Rightarrow to protect the planet from toxins.

Q2 Aerobic Wastewater Treatment:-

=> Aerobic processes use bacteria that require oxygen. So air is circulated through out the treatment tanks.

=> 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.

=> Electricity 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 & carbon dioxide.

=> Energy-efficient process.

=> Often used to treat industrial wastewater that contains high level of organic matter in warm temperatures.

=> It can be used as a pretreatment prior to aerobic municipal wastewater treatment.

Q2 Activated Sludge Process (ASP):-

→ Microorganism responsible for treatment are maintained in liquid suspension by appropriate mixing methods.

⇒ Main constituents of ASP are aeration tank in which oxygen is provided for the micro-organisms to grow.

→ Aeration tank is followed by clarifier/settle in which the micro-organisms from flocs are settled down at the bottom.

⇒ Formation of floc particles, ranging in size from 50 to 200 μm .
Removed by gravity settling, leaving relatively clear liquid as treated effluent.

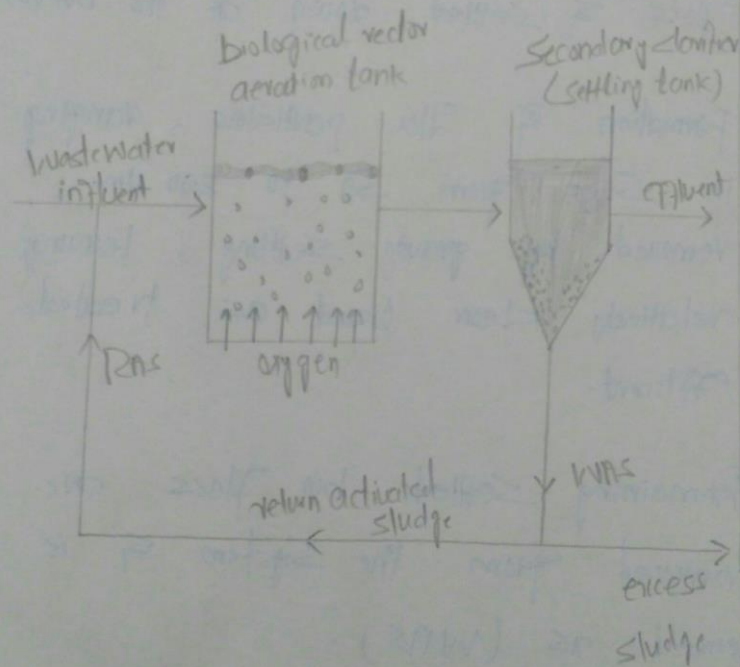
⇒ Remaining settled bio flocs are removed from the system and is termed as (WAS).

⇒ ASP involves production of activated mass of microorganisms capable of stabilizing waste under

aerobic Conditions

⇒ Typically 99% of Suspended Solids & up to 90% of dissolved organics are removed by ASP.

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



Q.3 Assimilative Capacity of Receiving Bodies:-

⇒ Assimilative capacity of receiving water bodies refers to the ability of a body of water to cleanse itself; its capacity to receive wastewater without deleterious effects or without causing damage to aquatic life or humans who consume the water.

⇒ Although wastewater is properly treated before it is disposed of 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.

Physical Forces Helping Assimilative Capacity of Receiving Bodies:-

i) Dilution:- Dilution is the process of reducing the concentration of pollutants in receiving water, usually simply by mixing with more

quantity of water.

2) Dispersion:-

Dispersion is the distribution of pollutants in relatively large area of water. Dilution \rightarrow dispersion are interrelated.

3) Sunlight:-

Sunlight facilitates biological decomposition of pollutants \rightarrow kills pathogens by ultraviolet radiation (UV).

Q4. Sludge Treatment:-

Sludge Treatment is the process used to manage & dispose of Sewage Sludge produced during wastewater & drinking water treatment.

Sludge is mostly water in with lesser amounts of solid material removed from liquid sewage.

We can identify physical & chemical characteristics in sludge.

Treatment Processes:-

=> Thickening-

Gravity & Flotation.

=> Digestion-

Aerobic, Anaerobic

=> Mechanical Dewatering-

Vacuum Filtration,

Centrifugation.

⇒ Disposal:- Land application, Burial.

Sludge Disposal:-

- ⇒ Various options are available for proper disposal.
- ⇒ Incineration of sludge is an option that is becoming less attractive because of the high cost of building & operating incinerators, plus the creation of air pollution & need to landfill the ash.

Advantages of Sludge treatment:-

- ⇒ It reduces pathogens & volume to be disposed.
- ⇒ Protects wild life & aquatic life & also prevents diseases.
- ⇒ Sustainable management of organic waste.
- ⇒ Reduction of odors & disease causing agents.
- ⇒ Producing Bio gas.

Q5

EIA:-

An environmental study comprising collection of data, predication of qualitative impacts, comparison of alternative evaluation of preventive, mitigatory & compensatory measures, formulation of environmental management & training plans & monitoring arrangements.

Parameters of importance:-

Wastewater contains a large number of contaminants & they are categorised as physical, chemical & biological contaminants. Different parameters have been established from experience & theory to define each characteristic.

1) Biochemical Oxygen Demand (BOD):-

The BOD is the amount of oxygen consumed by aerobic microorganism to break down matter present in the wastewater. It is the BOD₅, which is the actual measured parameter & is an indication of the amount of organic matter consumed within 5 days as from testing.

This value is used to measure the efficiency of a treatment plant in terms of organic matter removal.

2) Chemical Oxygen Demand (COD):-

The COD is an alternate measure of the amount of organic matter. The amount of oxygen used up by a strong oxidising agent is measured.

3) Total Suspended Solids (TSS):-

The TSS is measured to indicate the amount by mass of fine suspended particles. Effluent discharged in the water courses must contain levels of TSS since TSS causes turbidity, affecting the amount of light to aquatic plants & also causes visual pollution.

4) Total Kjeldahl Nitrogen (TKN):-

Wastewater usually contains high level of nitrogen containing compounds. The nitrogen exists mostly in free forms: organic nitrogen, ammonia & reduce nitrogen. The TKN value hence indicates the amount of nitrogen of all these 3 forms.