Q#1 :-

*) :: WASTE WATER TREATMENT :-

waste water treatment is a process used to remove contaminants from waste water or sewage and convert it to effluent that can be returned to water cycle with minimum impact on the Environment. or directly reused. The treatment process taken place in waste water treatment plant.

*) IMPORTANCE OF WASTE WATER TREATMENT :-

=> It is important to produce to a safe environmental fluid waste streams and a solid waste suitable for disposal or reuse.

=> It is very important to provide some degree of treatment to waste water before it is used for Agriculture purpose or for irrigation.

=> The major aim of waste water treatment is to remove the suspended solids as possible before the remaining water called effluent is discharge back to environment.

=> waste water treatment is fundamental to protect the health of many different ecosystem.

=> Good waste water treatment allows the maximum amount of water to be used instead of going to waste it.

*) Why Rectangular tank are preferred over circular tank for removal of settleable solids :-

=> Rectangular tanks requires less land than circular tank.

=> It require less head loss for rectangular tank.

=> The shape of rectangular tank clarifiers provide suspended solids to travel and subsequently longer detention time which wants less short circulating and more sludge setting compared to the center-feed / peripherical overflow circular clarifiers / tank.

=> flow distribution configuration for rectangular tank require simpler and less expensive pipework layout while circular required complicated and expensive pipe work

Q no # 2 :-

Difference b/w Aerobic & Anaerobic treatment:

Parameter	Aerobic treatment	Anaerobic treatment
1) Application	low to medium strength waste water (< 1000 ppm) eg. Muncipal sewage, refinery waste water.	Medium to high strength waste water (> 4000 ppm) e.g :- food and beverage industry waste water
2) capital investment	Relatively high	Relatively low with pay back.
3) Energy consumption	Relatively high	Relatively low
4) Foot print	Relatively large	Relatively small and compact
5) Net sludge yeild	Relatively high	Relatively low
6) Post treatment	Typically direct discharge	Required to fulfill waste water standard discharge requirement.

1) Activated Sludge process :-

=> Process for treating sewage or industrial waste waters using aeration and a biological floc composed of bacteria 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 :- diffuse aeration, surface aerators (cones) and pure oxygen aeration.

=> The sludge blanket is measured from the bottom of the clarifier.

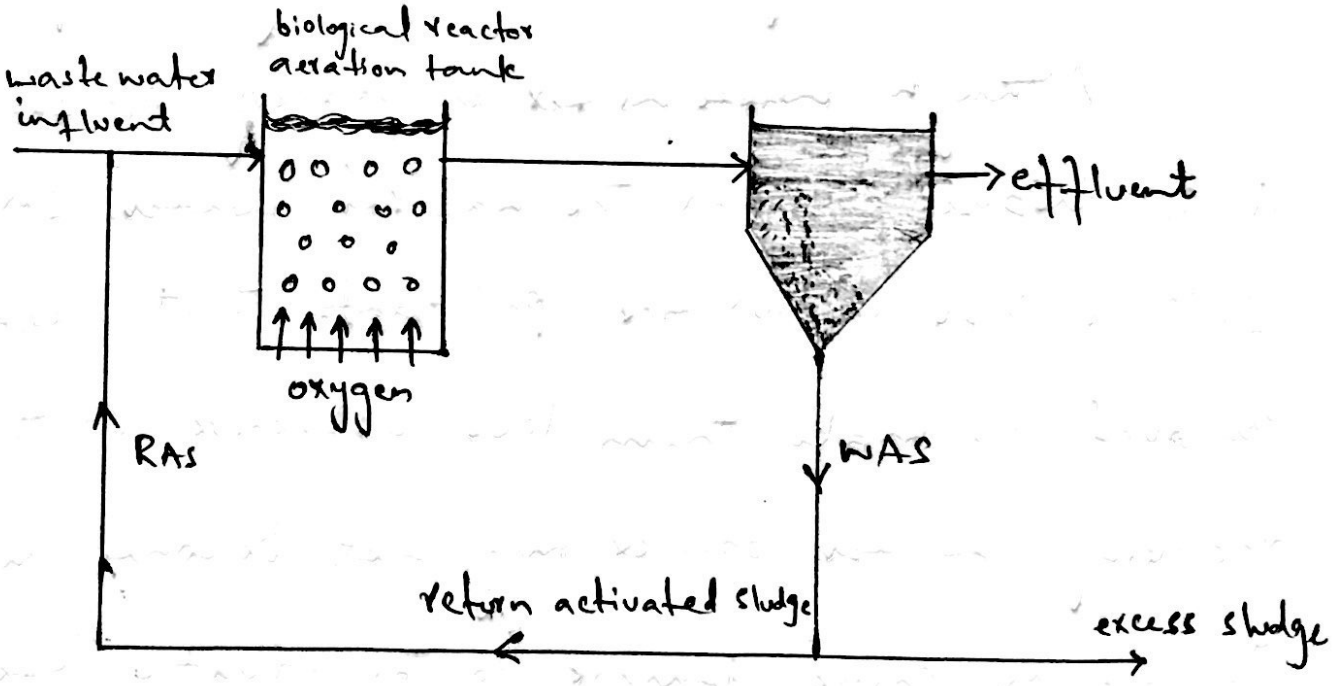
=> The sludge volume index is the volume of settled sludge in mm occupied by 1gm of dry sludge solids after 30mins of settling in a 1000ml graduated cylinder.

=> The mean cell residence time is the total mass (kg) of mixed liquor suspended solids in the aerator and clarifier divided by the mass flow rate (kg/day) of MLSS effluent

=> The F/M is amount of BOD fed to the aerator (kg/day) divided by the amount of MLVSS (kg) under aeration.

=> Some used mixed liquor suspended solids for expedience, but mixed liquor volatile suspended solids is considered more accurate for the measure of microorganisms.

*) Diagram:-



*) Q No # 3 :-

*- : ASSIMILATIVE CAPACITY of RECIEVING WATER BODIES

It refers to the ability of a body of water to clean itself; Its capacity to receive 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 natural control the toxicity without affecting the aquatic life

Although waste water 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.

=> P.T.O

4) Help of Assimilative Capacity :-

A classical example of Assimilative capacity is the ability of a stream to accept modest amount of biodegradable waste.

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

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

1) Q No #4 :-

*) : Sludge handling :-

following are the steps :-

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

1) Primary options :-

It includes :-

1) Grindering :-

Particle size reduction.

2) Screening :-

Removal of fibrous materials.

3) Degritting :-

Removal of sand or other inorganic materials.

4) Blending :-

It includes making the sludge homogenous

5) storage :-

Ensures the flow equalization in the system.

2) Thickning :-

⇒ To increase the percentage of solid content in sludge by removing a portion of liquid fraction.

⇒ volume reduction of approximately 30-80% can be reached with sludge thickning.

⇒ various methods of sludge thickning are :-

(1) Gravity Thickening
(2) Floatation "
(3) Rotatory drum "

3) Stabilization :-

To reduce pathogens, eliminates offensive odors, minimize production of usable ~~gates~~ gas (methane).

⇒ Methods of stabilization are :

(1) Alkaline stabilization
(2) Anaerobic Digestion.

(4) DEWATERING :-

→ To reduce the moisture content of sludge.

⇒ compare to thermal (evaporative 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.

(5) Heat DRYING :-

It involves the application of heat to evaporate water and to reduce the moisture content of biosolids.

⇒ Advantage of this method is to reduce product transportation costs, improve storage capability, and marketability.

⇒ Direct drying involves the waste water solids come into contact with hot gases, which cause evaporation of moisture. Dryers such as rotary dryers and fluidized bed dryers are used.

*)-: ADVANTAGES :-

1) Reduces pathogens and volume to be disposed.

2) Protect wild life and aquatic life.

3) It also prevent diseases.

4) Sustainable management of organic waste.

5) Reduction of odors and disease causing agents.

6) Producing Bio gas.

Q No # 5 :-

ENVIRONMENTAL IMPACT ASSESSMENT (EIA) :-

It is defined as

" A formal process to predict the environmental consequences of human development activities and to plan appropriate measures to eliminate or reduce adverse effects and to enhance positive effects ".

EIA has three main functions;

1) To predict problems
2) To find ways to avoid / mitigate them.
3) To enhance positive effects.

Waste water contains a large number of contaminants and they are characterized as physical, chemical and biological contaminants. Different parameters have been established from experience and theory to define such characteristics. The quality of influent waste water to a treatment plant will depend on the source and their activities. Typically industry effluents are the

are the most significant in terms of the level of contaminants which are usually more elevated than from domestic or municipal wastewater effluents.

The most important parameters to be considered for wastewater treatment are:-

1) BIOLOGICAL OXYGEN DEMAND (BOD):-

The BOD is the amount of oxygen consumed by aerobic microorganisms to break down the organic matter present in the waste water. It is BOD, which is the actual measured parameter and 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. High BOD values are undesireable and would affect the ecological cycle by reducing the normal dissolved oxygen to critical levels for sustaining aquatic life

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 oxidizing agent is measured. this value is of greater

importance when evaluating waste water from industries since these effluents tend to be toxic to micro organisms thereby affecting the validity of BOD results

(3) Total Suspended Solids :- (TSS) :-

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

(4) Total Kjehdal Nitrogen (TKN) :-

waste water usually contains high levels of nitrogen containing compounds. The nitrogen exists mostly in free forms, organic nitrogen, ammonia and reduced nitrogen. The TKN value hence indicates the amount of nitrogen of all these 3 forms. TKN is useful in monitoring the plant.