

NAME: S. ALI RAZA.

ID # 7744.

SECTION: C.

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of WASTEWATER ENGINEERING.

Question 1 Answer 1 -

ANS: WASTE WATER TREATMENT -

It is a process used to remove contaminants from wastewater or sewage & convert it into an effluent that can be returned to the water cycle with minimum impact on the environment or directly reused.

* IMPORTANCE -

Water scarcity is the major problem that is facing all across the world.

=> Although 2/3rd of earth crust is made up of water but all this water is not available for drinking & for other human

activities. It has been found out that 97% of the total water is salty that is of no use to human & animals & remaining three (3%) is available as fresh water.

⇒ The demand for fresh clean water delivered to our homes is ever increasing day by day as more homes are being established.

* RECTANGULAR TANKS:-

These are the most widely used tanks.

⇒ Low cost of maintenance is required in case of rectangular tanks.

⇒ Suitable for large capacity.

* CIRCULAR TANKS:-

These type of sedimentation tanks are preferred for continuous verticle flow type of sedimentation tanks.

⇒ It has high clarification efficiency but they are uneconomical.



Question & Answer:-

Parameters	Aerobic treatment	Anaerobic treatment
⇒ Application	⇒ Low to medium strength wastewaters (< 1000 ppm) eg Municipal sewage, refinery wastewaters etc.	⇒ Medium to high strength. wastewaters [> 4000 ppm] eg, food & beverage industry.
⇒ Capital investment	⇒ Relatively high	⇒ Relatively low with pay back
⇒ Energy consumption	Relatively high	Relatively low
⇒ Foot Print	Relatively large	Relatively small & compact.

⇒ Net sludge yield	Relatively high	Relatively low
⇒ Post-treatment	Typically direct discharge	Required to fullfill waste-water standard discharge requirement.
⇒ Example technologies	Activated sludge process (ASP), Trickling filter, & Rotating Biological contactor (RBC)	Anerobic Digestors (AD), continuous stirred tank Reactors (CSTR) sequencing batch Reactors (SBR), Upflow to Anerobic sludge blanket (UASB) reactors.

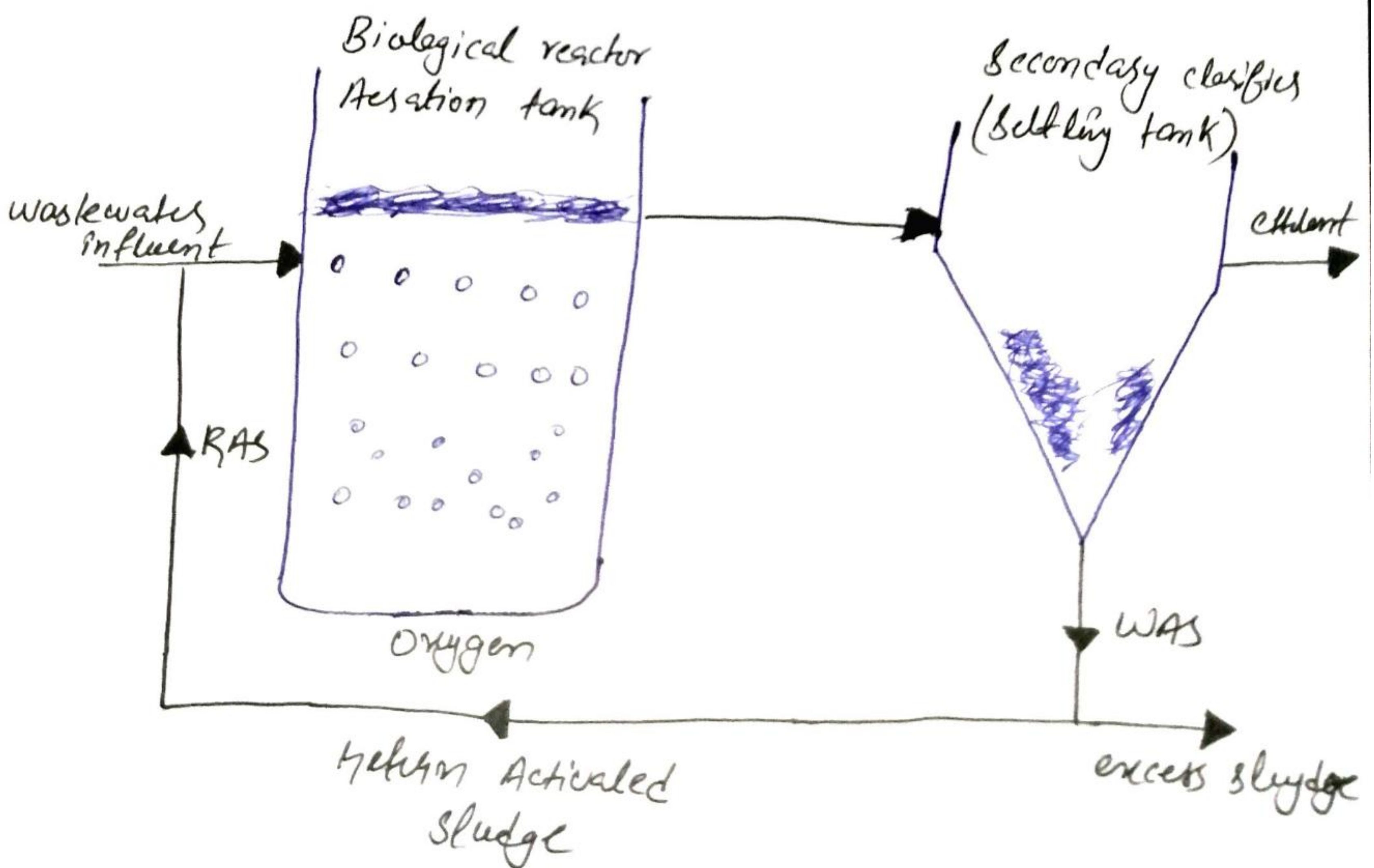
* ACTIVATED SLUDGE PROCESS-

⇒ Micro organisms 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 microorganisms to grow. This aeration also helps to keep micro-organisms in suspension.

⇒ Aeration tank is followed by clarifiers settles in which the micro-organisms form flocs & settle down at the bottom.

"DIAGRAM"



Question 3 ANSWER:-

ANS ASSIMILATIVE CAPACITY OF RECEIVING BODIES:-

It refers to the ability of a body of water to cleanse itself; its capacity to receive waste waters without deleterious effects & 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.

* HELP IN WASTE WATER TREATMENT:-

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

Q4 ANSWER:-

SLUDGE HANDLING:-

socially acceptable
cost effective method that meets
the requirement of efficient recycling
of resources while ensuring that
harmful substances are not transferred
to humans or the environment.

⇒ Process of sludge handling.

- (i) Primary operations.
- (ii) Thickening.
- (iii) Stabilization.
- (iv) Dewatering.
- (v) Heat drying.

① PRIMARY OPERATIONS:- It includes:-

⇒ Grinding:- It includes particles size of reduction.

② SCREENING:- It includes removal of fibrous materials.

* Degreasing:- It includes removal of sand or other inorganic materials.

* Blending:- It includes making the sludge homogenous.

* Storage:- It insures flow equilization in the system.

② SLUDGE THICKNING:-

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 **SLUDGE STABILIZATION**:- Is undertaken to reduce pathogens eliminate offensive odours, minimize production of usable gas.

* **METHODS**:-

- ① Alkaline stabilization.
- ② Anaerobic stabilization.

④ **DEWATERING**:- Is undertaken to reduce the moisture content of sludge.

Configuration is the method used for separating liquids of different densities thickening slurries.

⑤ HEAT DRYING:-

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

* ADVANTAGES:-

We can use sludge in a land fill or for Agricultural use. The sludge is very useful for Agricultural use because it contains organic matter, nitrogen phosphorus & potassium, soil improvement also occurs.

Some of its advantages are as follows.

- ① Land slope irrigation.
- ② Agriculture use
- ③ Ground water recharging.



Q 5 ANSWERS -

ANS: ENVIRONMENTAL IMPACT ASSESSMENT
In simple

words EIA may be defined as,

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

* It has three main functions:-

=> To predict problems

=> To find ways to avoid/mitigate them, and

=> To enhance positive effects.

* PARAMETERS of IMPORTANCE -

wastewater contains a large number of contaminants & they are categorized as physical, chemical & biological contaminants. Different parameters have been established from experience & theory to define such characteristics. The quality of the influent wastewater to a treatment plant will depend on the source & their activities. Typically industrial effluents are the most significant ~~the~~ in terms of the level of contamination which are usually more elevated than from domestic & municipal wastewater effluents.

⇒ The most important parameters to be considered are as follows:-

① BIOLOGICAL OXYGEN DEMAND:-

The BOD is the amount of oxygen consumed by aerobic microorganisms to break down the organic matter present in the waste water. It is the BOD which is the actual measured parameter & is an indication of the amount of organic matter consumed within 5 days as from testing. The value is used to measure the efficiency of a treatment plant in terms of organic matter removal.

(ii) CHEMICAL OXYGEN DEMAND - 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. This value is of greater importance when evaluating wastewaters from industries since these effluents tend to be toxic to micro organisms thereby affecting the validity of BOD results.

(3) TOTAL SUSPENDED SOLIDS - The TSS is measured to indicate the amount by mass of fine suspended particles. Effluent discharged in the water courses must contain low levels of TSS since TSS cause turbidity, affecting the amount

of light to aquatic plants & also causes visual pollution.

(iv) TOTAL KJELDAHL NITROGEN (TKN) :-
wastewater usually contains high levels of ~~the~~ nitrogen containing compounds. The nitrogen exists mostly in free forms, organic nitrogen, ammonia & reduced nitrogen. The TKN value hence indicates the amount of nitrogen of all these 3 forms. TKN is useful in monitoring the plants.