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Q# 2

Part (a)

Parameter	Aerobic Treatment	Anaerobic Treatment
Application	Low to medium strength wastewater (< 1000 ppm) eg: municipal sewage, refinery, waste water etc.	medium to high strength waste water (< 4000 ppm) food and beverage industry waste water.
Capital investment	Relatively high	Relatively low high 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 full fill waste water stand discharge requirement.
Example Technologies	Activated sludge process (ASP) Trickling Filter and Rotating contactor (RRC).	Anaerobic Digestor (AD) continuous Stirred Tank Reactors (CSTR) sequencing Batch Reactor (SBR) up Flow anaerobic sludge Blanket (UASB) Reactors.

CH₄ generated can be used to generate energy.

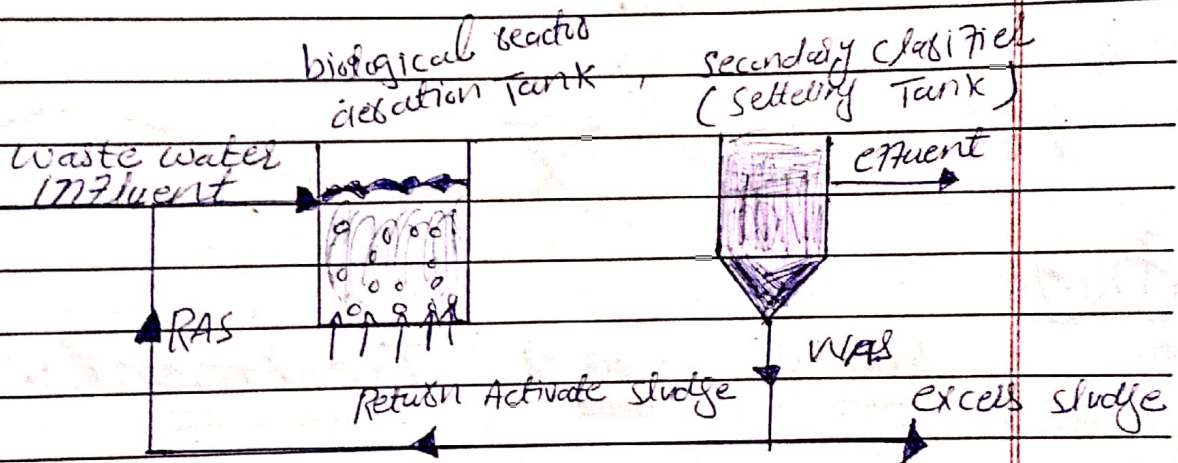
Q#2 part (b)

"Activated Sludge process (ASP)

- ⇒ microorganism are responsible for treatment contain liquid suspension by proper mixing method.
- ⇒ Main constituents of ASP are
A. Aeration Tank in which oxygen is provide in tank for micro-organism to grow.
- ⇒ Aeration tank is followed by clarifier / settle in which the micro-organism form flocs and settle down on the bottom.
- ⇒ After the formation of floc particles ranging in size from 50 to 200 μm is removed by gravity, After leave so clear liquid as treated effluent.
- ⇒ A part of solid bio flocs are recycled back into aeration Tank to maintain certain amount of micro-organism in the system for further operation. This is known

as Recycled Activated Sludge (RAS).

- ⇒ After this processes the Remaining settled bio flocs particles are removed from the system and its term is known as Wasted Activated Sludge (WAS).
- Activated Sludge process (ASP)



- ⇒ ASP involves production of Activated mass of micro organism capable of stabilized waste under aerobic condition.

~~In the aeration~~

- ⇒ In the aeration Tank, some time provide for mixing and aerating waste with micro-organism suspension generally referred to mixed

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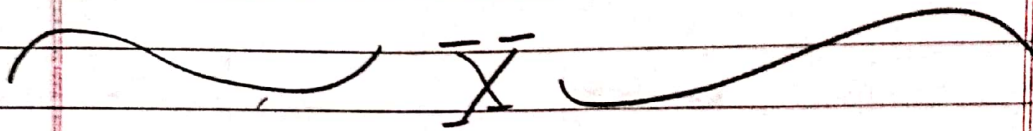
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liquor suspended solids (MLSS)

⇒ Typically 99% of suspended solids and up to 90% of dissolved organic are removed by Activated sludge processes.

⇒ The main drawback is Asp is its high electricity consumption particularly for aeration.



Q#1

Waste water Treatment:

Ans:

Waste water treatment consists of applying known technology to improve or upgrade the quality of waste water.

OR

Waste water treatment is a technique which convert harmful quality of water into healthy water is called waste water treatment.

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Waste water treatment involves collecting the waste water in centralized or decentralized location (waste water treatment plants) and subjects the waste water to various treatment processes.

↳ Importance of waste water treatment:

The importance of waste water treatment plant are given below:

⇒ The main importance of waste water treatment plant is that to allow human industrial effluents to be disposed off without causing danger to human health or an acceptable damage to the natural environment.

⇒ Another importance waste water is that if the waste water is properly treated then it is a very important resource. It can be used for various purposes like irrigation, lawn watering.

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car washing flushing toilets
and land scaping etc.

⇒ waste water treatment can
also generate biogas
as final product which
is potential source of
energy.

∨ Rectangular tank preferred
over circular tank for
removal of settleable
solids during preliminary.

⇒ Rectangular tank preferred
over circular tank for
removal of settleable
solids because rectangular
tank have greater possible
ratio of axial circumference
to Area than circular tank.

⇒ The rectangular tank have
small capacity than circular
tank there for rectangular
tank is preferred than
circular tank.

⇒ The cost of rectangular
tank is less than circular
tank.

⇒ To design rectangular tank easy
than circular tank.

Q#3

Ans. ² Assimilative capacity of receiving water bodies :: 4

⇒ Assimilative capacity of receiving water bodies refers to the ability of a body of water to cleanse itself. It is capacity to receive waste water without deleterious effect and without causing 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.

⇒ Although waste water is properly treated before it is disposed of the natural water stem still it has impurities / pollutants that need to be removed or made them less effective so that the receiving water bodies may not become unsuitable for use or cause damage to aquatic life.

"Physical Forces helping Assimilative capacity of Receiving Bodies"

(1) 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 distribution of pollutants in relatively large area of water. Dilution and dispersion are inter-related.

(3) Sunlight: Sun light facilitates biological decomposition of pollutants and kills pathogenic by ultraviolet radiation (UV).

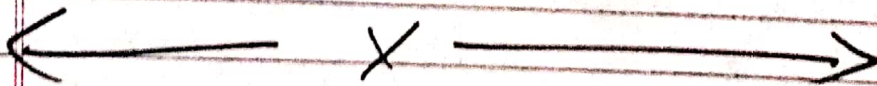
Conclusion:

Assimilative capacity above way help in treatment of waste water.

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(4) Temperature: The Temperature Delay important role in the assimilative capacity of receiving water bodies, increase the biological decomposition of organic matter and thus assimilative capacity of waste water increases.

(6): Flow velocity is also critical to assimilative capacity of receiving water bodies. Higher the flow velocity will encourage quick dilution and dispersion of pollutants.



Q#5

Ans:

EIA Definition:

"A technique and a process by which information about environment effect of a project is collected both by the developer and from other sources and taken into account by the planning authority in planning the

Judgment on whether the development should proceed."

OR: another definition:

"The processes of identifying, predicting, evaluating and mitigation of biophysical and other relevant effects of development proposals prior to major decisions being taken and commitments made."

"An environment study comprising collection of data, prediction of qualitative and quantitative impacts, comparison of compensatory measures formulation of environmental management and training plans and monitoring arrangements."

"In simple word EIA may be define as "

"A formal processes to predict the environmental consequences of human development activities and to plan appropriate to eliminate or reduce adverse effects and to

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enhance positive effects //

" ETA thus has three main functions //

- ⇒ To predict problems:
- ⇒ To find way to avoid mitigate them!
- ⇒ To enhance positive effects:

Q#5 part (b)

Ans: parameters of importance:

waste water contain a large number of contaminants and they are categorised a physical, chemical, and biological contaminants. Different parameter have been established from experience and they to define such characteristics.

The quality of influent waste water to a treatment plant will depend on the the source and activities.

Typically industrial effluents have most significance in term of level of contaminants which are usually more elevated than from domestic

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of municipal wastewater effluents.

The most important parameters to be considered for a local wastewater treatment plant are

(1) Biochemical Oxygen Demand (BOD)

The BOD is the amount of oxygen consumed by aerobic micro-organisms to break down the organic matter present in wastewater. It is BOD which is the actual measured parameter and 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 of organic matter removal. High "BOD" and other which affects the ecological cycle by reducing the normally dissolved oxygen to critical levels for sustaining aquatic life.

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(2) Chemical Oxygen Demand (COD)

The COD is alternate measure of amount of organic matter. The amount of oxygen used by a strong oxidising 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 amount by mass of fine suspended particles. Effluent discharge in water courses must contain low levels of "TSS" since TSS cause turbidity affecting the amount of light plants and cause visual pollution.

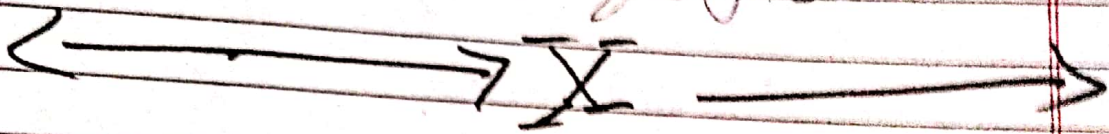
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(4) Total Kjeldahl Nitrogen (TKN)

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waste water usually high levels of nitrogen containing compounds. The nitrogen exists mostly in free form, organic matter, nitrogen ammonia and reduced nitrogen. The "TKN" value hence indicates the amount of nitrogen of all these 3 forms:-



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Q4(4)

Ans:

Sludge management:-

Sludge management consists of following steps:-

- * primary operation
- * Thickening
- * Stabilization
- * Dewatering
- * Heat Drying

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primary operation:-
This process includes

- * Screening:- it includes removal of fibrous materials.

- * Grinding: it include particle size reduction.
- * Degritting: it include removal of sand or other organic particles
- * Blending: it include making sludge homogeneous.
- * Storage: it ensures flow equalization in the system.

(2) Sludge Thickening:
⇒ Sludge Thickening is under taken to increase percentage of solids content in sludge by removing a portion of liquid fraction.

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

⇒ Various method of sludge thickening are:

- ⇒ Gravity Thickening
- ⇒ Flotation Thickening
- ⇒ Rotator Drum Thickening

(3) Sludge Stabilization:

Sludge stabilization is undertaken to reduce pathogenic eliminate offensive odour minimize production of stable gas.

Method of stabilization:-

- * Alkaline stabilization
- * Anaerobic Digestion

(4) Dewatering:

Dewatering is undertaken to reduce the moisture content of sludge.

Compared to thermal (evaporative process) for water reduction mechanical energy dewatering is often selected due to its low energy requirements.

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

P.T.O

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(5) Heat Drying: it involves the application of heat to evaporate water and to reduce the moisture content of biosolids.

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

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

⇒ Advantages:

⇒ High treatment efficiencies possible for BOD, COD, TSS, N, P.

⇒ High Flexibility in operating conditions.

⇒ Possibility of producing

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electric energy from biogas.

⇒ Low land requirement of CAS some what higher land requirement for EIA.

⇒ High effluent quality.

