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Ques 5) Objectives of grit removal-

- * Grit removal basins are the sedimentation basins placed in front of the fine screen to remove the inorganic particles having specific gravity of 2.65
- * such as sand, gravel, grit, egg shells, glass
- * pieces metal fragments etc. and other non-putrescible materials that may clog channels or damage pumps due to abrasion and to prevent their accumulation in sludge digester

Grit chamber is the second unit operation used in primary treatment of wastewater and it is intended to remove suspended inorganic particles such as sandy and gritty matter from the wastewater

- * limited to municipal wastewater

Grit chambers are provided to protect moving mechanical equipment from abrasion and normal wear, avoid deposition in pipelines, channel and conduits and to reduce frequency of digester cleaning.

- * The grit chamber is used to remove grit consisting of sand, gravel, cinder or other heavy solid materials (inorganic that have specific gravity much higher than those of the organic solids in wastewater) by the process of sedimentation due to gravitational forces and to pass forward the lighter organic material.

Ques 5 (b) (i) COD - Chemical oxygen demand

In environmental chemistry the chemical oxygen demand is an indicative measure of the amount of oxygen that can be consumed by reaction in a measured solution. It is commonly expressed in mass of oxygen consumed

over. Volume of Solution which in SI units is milligrams per litre (mg/l). A COD test can be used to easily quantify the amount of organics in water, the most common application of COD is in quantifying the amount of organics in water. The most common application of COD is in quantifying.

Displacement efficiency — is a measure of the amount of mobile fluid in the system. In addition to displacement efficiency, recovery efficiency for oil depends on the amount of oil contacted by injected fluids. Areal and vertical sweep efficiencies measure the degree of contact b/w in situ and injected fluids.

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Short circuiting — Shorten (a process or activity) by using a more direct (but often improper) method. Verb: short-circuit
A short circuit is an electrical circuit that allows a current to travel along an unintended path with no or very low electrical impedance. This results in an excessive current flowing through the circuit.
The opposite of a short circuit is an open circuit, which is an infinite resistance b/w two nodes.

Non Carbonate hardness - Called permanent hardness because it is not removed when the water is heated. It is much more expensive to remove non-carbonate hardness than carbonate hardness.

- > Ca^{2+} , Mg^{2+} associated with other ions, Cl^- , NO_3^- , SO_4^{2-}
- > $NCH = TH - CH$
- > If Alkalinity > Total hardness then $NCH = 0$

Physical characteristics - physical properties of waste water

- ① Temperature - Temperature affects biological activity of bacteria present in sewage. The average temp of sewage in India is $20^\circ C$.
- ② Colour - Colour can be detected by naked eye and it indicates the freshness of sewage.
- ③ Odour - fresh sewage is odourless but in 3-4 hours it becomes stinky with all oxygen present.
- ④ Solids - Sewage contains only about 0.1 percent solids. The sewage solids may be classified into dissolved solids.
- ⑤ Turbidity - Dirty dirty water or wastewater from both having floating matter like fecal matter.

Chemical characteristics - characteristics of waste water

① pH Value - pH value of sewage indicates the negative log of hydrogen ion concentration present in sewage.

$$[pH] = -\log_{10} (H^+)$$

$$[pH] = (10)^{-pH}$$