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Section = "B"

Subject = Wastewater Engineering

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Q1 Ans:- Waste water Engineering:-

Wastewater engineering is the branch of environmental engineering in which the basic principles of science and engineering are applied to solving the issues associated with treatment and reuse of wastewater. A process used to remove contaminants from wastewater or sewage.

Application and safeguarding the environment

- ① Water resources assessment and development to augment and enhance availability of water (ground water, surface water, non-conventional water resource)
- ② Water resources allocation to the competing group of water users in the society (municipal, commercial, industrial, agricultural)
- ③ Water utilization by various groups of water users which comprises the delivery, consumptive use and wastewater generation (the ways water could be conserved and wastewater generation reduced)

(6)

(4) Environmental protection and pollution control to stop the consumption of fresh water by pollution and to return wastewater to the water cycle as a beneficial source of water.

→ Supplying more water to match the demand focusing mainly on the assessment and development of new water resource.

⇒ Environmental protection, pollution control and recovery of wastewater is the main application of wastewater engineering and safeguarding of living thing in the environment.

→ By disposing of treated wastewater in order to reduce ground water contamination and protect aquatic life

→ Wastewater engineering ~~is~~ deal with the management of wastewater and its treatment to reuse for various purpose

→ The recovery of sewage is an effective means of saving water resource and promoting the reuse of water resources. It is the important measure to reduce the pollution of sewage & protect the environment.

Q2 Ans ⁽⁷⁾ Relationship between wastewater generation with water supply :-

Average daily water ~~supply~~ consumption varies from 130 to 200 liters local use depend on Per capita

(i) Characteristic of population:-

economic level of population determines the use of water which is usually range from 50 to 380-liter/capita/day. In the slum districts it is usually varies from 50 to 100 liter per capita per day. The quantity of waste water is directly proportion to the characteristic of population.

(ii) Pressure:-

High pressure of water supplies greater use of water and create high quantities of waste water, ~~press~~ and vice versa. pressure is direct proportion to waste water.

(iii) Size of city :->

Water supplies to small communities tend to have more limited use of water. Unsewered usually less than 40 ltrs/cap/day

in large cities ~~with~~ rapidly growth of population and accompanying urban and industrial development. The inadequate water supply and poor sanitation system lead to contamination of their water supply through the input of sewage water into groundwater

Metering:- metering of water supplies to individual users have been shown to reduce the consumption substantially. As the consumer has to pay in proportion to the quantity of water consumed. and generate less ~~amount~~ quantity of waste water.

Q3 Ans

Importance of Wastewater characteristic

Because of changing wastewater characteristics and the imposition of stricter limits is being placed on wastewater characterization. Because process modeling is widely used in the design and optimization of biological treatment processes (e.g. activated sludge), thorough characterization of wastewater, particularly wastewater containing industrial waste is increasing important. Process modeling for activated sludge as it is currently conceived requires experimental assessment of kinetic and stoichiometric constant fractionation of organic nitrogen, chemical oxygen demand (COD) and the total organic carbon into soluble and particulate constituent is now used to optimize the performance of both existing and proposed new biological treatment plant design to achieve nutrient removal.

Techniques from microbiological science such as RNA and DNA typing are being used to identify the active mass of biological treatment process, because of an understanding of the

nature of wastewater is the funda-
mental of the design and
operation of wastewater collection,
treatment and reuse facilities.

(4)

Q4 Enlist physical chemical and biological characteristics of waste water?

Ans: Characteristics of waste water

Physical characteristics	Chemical characteristics	Biological characteristics
→ Odour	→ PH value	→ Biochemical oxygen demand (BOD)
→ Temperature	→ (COD)	→ oxygen required for nutrition and microbial population
→ Density	→ Organic matter	
→ Specific gravity	→ Nitrogen contents	→ most of bacteria are helpful in oxidation and decomposition of sewage.
→ Turbidity	→ Chloride contents	
→ Colour	→ Fats, oils, & Greases	
	→ Sulphides, sulphates and Hydrogen gas	

Q5 Ans

Combine sewerage system

Advantages

- (1) Both domestic sewage and storm water are carried in a single sewer. So construction cost is less.
- (2) The strength of domestic sewage is reduced because of dilution of storm water.
- (3) The sewers are large size and therefore the chances of their chocking are rare. It is easy to clean them.
- (4) In town with narrow streets this system is preferred.

Disadvantages

- (1) Initial cost is high because of large dimension of sewers.
- (2) Because of large size of sewers, their handling and transporting is difficult.
- (3) Due to the inclusion of storm water the load on the treatment plant increases and ultimately increases treatment costs.
- (4) During heavy rain the sewer may be overflow and may thus create unhygienic conditions.
- (5) The whole sewage is to be disposed off by pumping it is uneconomical.

(2)

Separate sewerage system

Advantages

- ① size of sewers is generally less
- ② Since the sanitary sewage and storm water flows in a separate pipes, the quantity of sewage to be treated is less
- ③ As the sewer are smaller in section, they can be easily ventilated
- ④ Rain water can be discharge into the streams or can be reused/recycled with out any treatment

disadvantages

- ① Since the sewers are smaller size, it is difficult to clean them
- ② They are likely to be choked / blocked.
- ③ Initial cost is high, when two separate sets are used.
- ④ Maintenance cost of system is also high.

2. Sewerage system, depending on the area weather condition, if the area has ~~the~~ rainy and flood

so we recommended separate

sewerage system because to not increase treatment cost.

3. And if the area has not

more rainy so we recommended

combine sewerage system because it has ~~the~~ economical and easy to clean