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**Question # 01**

**Answer**

**Wastewater Engineering:**

**Wastewater engineering** is the study and methods to improve sanitation of human communities, primarily by providing the removal and disposal of human waste, treatment and reuse application for various purposes.

## **APPLICATIONS:**

Disposing off treated wastewater in order to reduce ground water contamination and protect aquatic life

Wastewater engineering deals with the management of wastewater and its treatment to reuse it for various purpose i.e. irrigation, washing etc.

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

Important objective of wastewater engineering is to provide good sanitary and environmental condition in a city

The important goal to achieve with the help of wastewater engineering is to minimize the upcoming water shortage in nearly future.

## **Question #02**

### **Answer**

The wastewater generation is directly proportional to water supply because the water that is supply to a town is use and come out as in the form of wastewater.

Wastewater is about 60 to 80 percent of the water that is supplied

In situation where wastewater flow rate data are limited or unavailable. Wastewater flow rate estimate have to be developed from water consumption. It will be taken as 60 to 80 percent of water supply.

## **Question #03**

### **Answer**

The characterization of wastewater is directly depends on the contamination present in wastewater.

With the help of characterization of wastewater we know about the nature of contaminants (physical chemical and biological) and then design wastewater treatment plant according to the nature of contamination

## Question #04

### Answer

Physical characteristics:

Turbidity

- Color
- Odor
- Total solids
- Temp

## Chemical characteristics:

- Chemical oxygen demand
- Total organic carbon
- Nitrogen
- Phosphorus, chloride
- PH
- Heavy metals
- Trace elements
- Priority pollutants

## Biological characteristics:

- Biological oxygen demand
- Oxygen required for nitrification
- Microbial population

## **Question #05**

### **Answer**

#### **1) Combined Sewerage System:**

##### **Advantages:**

- Both domestic sewage and storm water are carried in a single sewer, so construction cost is less.
- The strength of domestic sewage is reduced because of dilution of storm water.
- These sewers are of large size, and therefore the chances of their choking are rare. It is easy to clean them.
- In towns with narrow streets, this system is preferred



## **Disadvantages:**

- Initial cost is high because of large dimensions of sewers.
- Because of large size of sewer, their handling and transportation is difficult.
- Due to the inclusion of storm water, the load on the treatment plant increases and ultimately increases treatment costs.
- During heavy rain the sewer may be overflow and may thus create unhygienic conditions.
- .If the whole sewage is to be disposed off by pumping it is uneconomical.

## **2) Separate Sewerage System:** **Advantages:**

- Size of sewers is generally less.
- Since the sanitary sewage and storm water flows in a separate pipes, the quantity of sewage to be treated is less.
- As the sewers are smaller in section, they can be easily ventilated.
- Rain water can be discharged in to the streams or can be reused /recycled without any treatment.

## **Disadvantages:**

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

## **Suggestion**

I will suggest combined sewerage system because both domestics and storm water are carried in a single sewer so construction cost will be less and sewers are of large size so that will be easy to clean.