Chapter 18

Waste water Story

Water, Our Lifeline

• The water which comes from the kitchen sink, bathroom, toilets, etc. goes out into the drain is dirty water.

• This used water that contains pollutants is called wastewater.

• This used water should not be wasted and can be reused after removing pollutants.

What is Sewage?

• Wastewater released by houses is called sewage. Sewage includes household wastewater from the kitchen sink, washing machine, washbasin, bathroom shower, bathtub, and faeces (human excreta) from the toilet.

• Sewage is wastewater released by homes as well as industries, hospitals, offices. Sewage also includes rainwater that has run down the street and roads during rain.

• Sewage is a liquid waste, which has dissolved and suspended impurities. These impurities are called contaminants.

♦ Composition of Sewage:

(a) Organic impurities – Human faeces, animal waste, oil, urea (urine), pesticides, herbicides, fruit and vegetable waste, etc.

(b) Inorganic impurities – Nitrates, Phosphates, metals.

(c) Nutrients – Phosphorus and Nitrogen.

(d) Bacteria – In include bacteria that cause water-borne diseases such as cholera and typhoid.

(e) Other-microbes – Other microbes present in sewage are protozoa which cause a water-borne disease called dysentery.

♦ Sewers and Sewerage:

An underground pipe that carried away dirty drainage water and waste matter is called a sewer. Sewers are linked to each other to form a network called a sewerage system.

Wastewater Treatment Plant

• Waste Water Treatment Plant is also called sewage treatment plant. A place where wastewater (or sewage) from houses and other buildings is brought for processing is called a wastewater treatment plant (WWTP).

• The treatment of wastewater involves physical, chemical, and biological processes which remove physical, chemical, and biological matter that contaminates the wastewater. This process involves:

♦ Screening:

The wastewater is passed through bar screens. The bar screen removes large objects like rags, cans sticks, plastic bags, napkins, sanitary towels, etc. from wastewater.

♦ Grit and Sand removal:

After passing the bar screen, the wastewater is passed slowly through a grit and sand removal tank. The speed is decreased to allow the sand, grit, and pebbles to settle down at the bottom and are removed.

♦ Sedimentation tank:

The water is then allowed to settle in a large tank. The solids like faeces settle at the bottom and are removed with a scraper. This solid part is called sludge. A skimmer removes floatable materials like oil and grease. Water so cleared is called clarified water. Sludge is transferred to a separate tank where it is decomposed by anaerobic bacteria to produce biogas. Biogas is used to fuel or can be used to produce electricity.

♦ Aeration tank:

Clarified water is then passed through an aerator tank where the air is pumped into the water. It helps aerobic bacteria to grow which decompose organic matter like a human and animal waste. After several hours, the suspended microbes settle at the bottom of the tank as activated sludge. The dried, activated sludge is used as manure. The activated sludge is about 97% water. The water is then removed from the top.

♦ Chlorination:

The treated water has a low level of organic material and suspended matter. It is discharged into a sea, a river, or into the ground. Sometimes it is disinfected through chemicals like chlorine and ozone before discharging into water bodies.

Some Good House Keeping Practices

♦ We should throw cooking oil and fats in the dustbin. Drains get blocked by cooking oil and fats. In an open drain, the fats clog the soil pores reducing its effectiveness in filtering water.

♦ We should not drain chemicals like paints, solvents, insecticides, motor oil, and medicines. They may kill microbes that help purify water.

Sanitation and Disease

• Creating a hygienic environment around us which is essential for preventing diseases and keeping good health is called sanitation.

• Poor sanitation and contaminated drinking water is the cause of a large number of diseases.

• Many people defecate in the open areas. Untreated human excreta is a health hazard. It causes soil pollution and is carried along by rainwater and pollutes surface water and groundwater.

• Water contaminated with untreated human excreta causes many water-borne diseases like Cholera, typhoid, dysentery, polio, meningitis, and hepatitis.

Alternative Arrangement for Sewage Disposal

• In order to prevent water-borne diseases and to improve sanitation onsite and low-cost sewage disposal are being encouraged.

• Some onsite sewage disposals for human waste are:

(a) Septic Tanks:

In this arrangement, the human waste is allowed to settle in a tank where anaerobic bacteria decompose the waste. This is suitable for those places where there is no sewerage system.

(b) Composting Pits:

It is a dry toilet where the toilet is not connected to the sewer line or septic tank. In this arrangement, the toilet seat is fixed on composting pit dug into the soil. The composting chamber breaks the human waste aerobically and converts it into compost. This is used where there is no or limited water supply.

(c) Chemical Toilets:

A chemical toilet uses a chemically treated reservoir located below the toilet seat. Chemical toilets have a limited storage capacity, so the reservoirs need to be emptied into a sewer line after a certain time. All the portable toilets are chemical toilets. Chemical toilets are used at construction sites, at large outdoor gatherings such as music festivals and marriages, etc.

Toilets in Aeroplane – Vacuum toilets are used in aeroplane. When we flush the toilet in an aeroplane, a valve opens in a pipeline which has vacuum inside it. The vacuum in the pipeline sucks the human excreta from the toilet seat with a great force and carries it into a tank in the aeroplane. When the aeroplane lands, then the tank is emptied into a sewer line in the ground through connecting pipes.