# TEMPLECITY INSTITUTE OF TECHNOLOGY & ENGINEERING (TITE)

## Writing Space

Sub - WWWE  6th Diploma

① (a) **Per Capita Demand**

for the purpose of estimation of total requirement of water, the demand is Calculated on an average basis, which is expressed as so many litres/capita/day.

* If R is the total quantity of water required by a town per year in litres, and the population of town is P, the Per Capita demand will be

$$\frac{R}{P \times 365} \text{ litres/day}$$

(b) **Domestic Demand** :— It includes the quantity of water required for drinking, cooking, bathing, washing etc. It mainly depends upon the habit, Social Status, climate condition of people. In India on an average, the domestic Consumption of water under normal condition is about 135 litres/capita/day.

(c) **Industrial Demand** :— Water requires in industry is called industrial demand. It depends upon the size of the industry. The water required by factories, papermill, Clothmill, Cottonmills, Sugar refinieries etc Comes under industrial Demand.

(d) **Aquifer** :— An aquifer is a Saturated formation of the earth. It is not only Stores water but also yield it in adequate quantity. Aquifers are highly permeable formation and hence they are considered main Source of ground water application. unconsolidated deposits of Sand and gravels are example of aquifer.

② (a) **Cavity of well** :— When the water being drawn from the well at Some Constant rate, the waterlevel inside the well starts going down and at a level it will become stable. The difference of head between the waterlevel inside the well and Outside the well will cause flow of water inside the well to meet the requirement of the Pumping. The difference in head Causing flow is known as depression head.

The surface of the water table around the well takes the shape of Curved Cone, and it is called Cone of depression. The distance from the Centre of the well to the base circumference of the Cone is known as radius of influence of the well, the velocity of the water entering the well all around directly depends on the rate of pumping or withdrawn of water. When the rate of withdrawal is very high, it will increase the depression head, there by Causing increase in the velocity of Percolating water. If this velocity is more than Critical velocity for the soil, Soil Particles makes hollows in the well bottom. Now when more and more Sand Particles will flow inside the well, the effective area will be increased due to formation of Percolating water below Critical velocity.

The formation of the hollows below the wells are dangerous and may Cause sinking of starving of the well and damage it..

(b) **aquifer :—** It is a saturated formation of the earth. It not only stores water but also yield it adequiet quantity. Aquifers are highly permeable in nature and hence it is the main source of ground water. unconsolidated deposit of sand and gravel are the example of aquifer.

**Types of aquifer :—**

**unconfined aquifer :—** The top most water bearing stratum having no confined impermeable Overburden laying over it.

**confined aquifer :—** when the aquifer is confined on its upper and lower surface by impervious formation. The water in the confined layer will be under great pressure and is greater than atmospheric pressure

(c) **strainer type tube well :—** This type of tubewell is in maximum in use and most of the state governments construct only this type of tube well.

* A strainer or fine screen is placed against all water bearing stratum through which water passes. It prevents the entry of sand particles inside the well.

* The diameter of outer shell = 15cm to 100cm. The dia of pipe drawing water 2.5cm to 90cm. The size of tubewell denoted by the diameter of the inner pipe.

* It is suitable for very fine sandy water bearing stratum.
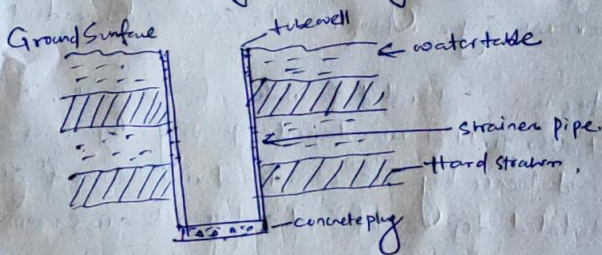


(3)(a) These are the following types of Demand in water supply.

(i) Domestic Demand.
(ii) commercial Demand.
(iii) fire Demand.
(iv) Demand in public use.
(v) compensate loss Demand.

**Domestic Demand :—** It includes the quantity of water required for drinking, cooking, bathing, washing etc. It mainly depends upon the habit, social status, climate condition and custom of people.

In India on an average the domestic consumption of water under Normal condition is about 135 litres/capita/day.

In developed country it may be taken as 350 litres/capita/day.

It is generally about 55-60% of total water consumption.

**Commercial & industrial Demand :—**

It includes office building, warehouse, stores, hotels, shopping centere, health centres, schools, temples, cinema house, railway & bus station etc.

The water requirement of Commercial and Public places may be upto 45 Lt/capt/day.

* Water required in industry depends on the size of the industry. The water required by factories, Papermill, Clothmills, Cottonmills, Sugar refinaries etc comes under Industrial Demand.

It is generally 20-25% of total demand of city.

**Fire Demand :-** The quantity of water required for extinguishing fire is not more than 5-10% of total Demand.

Fire hydrants are provided at every 100-150 m apart on water main.

Minimum Pressure = 1-1.5 kg/cm²

(a) National Board of fire under writer formula

$$Q = 4640 \sqrt{P} (1 - 0.01\sqrt{P})$$

Q = Quantity of water, P = Population

(b) **free Man's formula** : $Q = 1135.5 \left(\frac{P}{10} + 10\right)$

(c) Kuchling's formula :- $Q = 3182 \sqrt{P}$

(d) Buston's formula :- $Q = 5663 \sqrt{P}$.

**Demand for Public use**

washing & sprinkling of road, Clearing of sewer, watering Parks, gardens, are in the catagory of public use.

It is generally 5% of the total consumption of a city.

**Compensate loss demand :-** It is generally about 15% of the total quantity of water supply. It is generally made to compensate for losses due to theft and wastage of water.

(b) **various Source of Surface water**

Sources of ~~surface~~ water is generally divided into two catagory

(i) Surface Source    (ii) Ground source.

**Surface Source**

(i) **Streams :-** In mountaneous region streams are formed by the runoff. The discharge in stream is much in rainy season than other seasons. Those streams which dry up in summer and contain water only during rainfall are known as Raining Streams. The quantity of water in stream is normally good except the water of first runoff. But Sometimes runoff water while flowing over ground is mixed with clay, sand, and mineral impurities. The stream generally flow in valleys and are the main Source of water supply to villages of hills which are situated near them.

(ii) **Lake :-** In mountains at some places natural basins are formed with impervious bed. water from springs and streams generally flows towards these basins and lakes are formed.

The quantity of water in lake depends upon the basin Capacity, Catchment area, annual rainfall etc. The quality of large lake is good then Small lakes. Lake water is available only to those town which are situated near by them.

**Rivers :-** Rivers are born in the hills, when the discharge of large no of springs and small streams Combine together. In mountains the quantity of water in rivers remains small, therefore called small rivers. River grow bigger and bigger as they move forward due to increase in their catchment area.

Rivers are the only Surface water Sources which has maximum quantity of water and is the main water supply Source of town & cities. Mostly all the cities which are Situated near river discharge their used water of sewage in the river. River has Self Purification action and it automatically become clean.

**Ponds :-** These are depressions in plains like lakes of mountains, in which water is collected during rainy season. Sometimes ponds are formed when much excavation is done for constructing Kuccha houses in villages, embankment of road, & railway etc.

Generally it contains small amount of water and it contains large amount of impurities.

The water of ponds is used for washing clothes, animals bathing and drinky. It Cannot be used for water supply purpose due to its limited quantity & large amount of impurities

**Imponded Reservoir :-**

Mostly it is found that there is great variation in the quantity of river water during monsoon and Summer Season. The discharge In some rivers remains Sufficient to meet the hot weather demand, but in some river the flow becomes very small and Cannot meet the requirement of hot weather. In such Cases it becomes essential to store water for Summer Season. The water Can be stored in the river by Constructing a bund, a weir or a dam across the river at such places where minimum area of land is submerged in the water and the reservoir basin remain Cup-shaped having maximum possible depth of water.

* From the reservoir we can supply water to the town or cities.

(C)

| Year | Population | increase in population |
|------|-----------|------------------------|
| 1940 | 81,000 | 4,000 |
| 1950 | 121,000 | 5,000 |
| 1960 | 171,000 | 5,500 |
| 1970 | 22,500 | |
| Total | | 14,500 |
| Avg. Increse | | 4833 |

Possible population of year 1980 = 22,500 + 1×4883 = 27,333

Possible population of year 1990 = 27,333 + 1×4883 = 32,166

Possible population of year 2000 = 32,166 + 1×4883 = 36,999