INTERNAL ASSESMENT TEST 1 WSTE – JULY 2022

1. **Explain the need and importance of protected water supply to a community**

To supply safe and wholesome water to consumers
To supply water in sufficient quantities
To supply water at convenient points and timings
To supply water at reasonable cost to the users
To encourage personal and house hold cleanliness of users
Protected water supply means the supply of water that is treated to remove the impurities and made safe to public health. Water may be polluted by physical and bacterial agents.
The protected water supply system is only available in urban areas and only to some extent in rural areas. But the country like India is essentially a village based country and majority of population which lives in rural villages need safe and portable water for usage.
Most of the rural population if not provided with protected water supply systems. They are mostly depending upon the conventional sources like wells, ponds and streams etc are generally in polluted condition.
People consuming this water without any treatment they are bound to suffer from water borne diseases like typhoid, dysentery, cholera, poliomyelitis, Jaundice etc.
The rural water supply system aim to provide reasonable quantity of safe wholesome water to satisfy demands of people and thus helping in maintaining better sanitation and beautification of surroundings, thereby reducing environmental pollution.

2. **What is meant by per capita demand? List and discuss the factors that affect the per capita demand**

Maximum hourly consumption of the maximum day is called Peak demand. This is nothing but a factor of safety. Evidently, the peak factor tends to reduce with increasing population, since the different habits and customs of several groups in larger population, tend to minimize the variation in demand pattern.

DESIGN PERIOD

The future period or number of years in future for which a provision is made in designing the capacities of the various components of the water supply scheme is known as ***design period.***
The design period should neither be *too long* nor should it be *too short*. The design period cannot exceed the useful life of the component structure, and is guided by the fallowing considerations. A water supply scheme includes huge and costly structures (such as dams, reservoirs, treatment works, penstock pipes, etc.) which cannot be replaced or increased in

their capacities, easily and conveniently. For example, the water mains including the distributing pipes are laid underground, and cannot be replaced or added easily, Without digging the roads or disrupting the traffic In order to avoid these future complications of expansions, the various components of water supply scheme are purposely made larger, so as to satisfy the community needs for the reasonable number of years to come. This future period or the number of years for which a provision is made in designing the capacities of the various components of the water supply scheme is known as Design period.

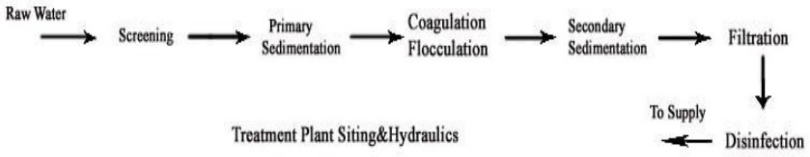
Selection of an appropriate design period for a particular facility/component of a water supply system is very important and depends upon fallowing factors

Factors governing the design period

1. Length or Life of Structures. 2. Ease of Extension.
3. First Cost 4. Economy of Scale
5. Lead Time

1. Useful life of the pipes, structures and equipment used in the water works and the chances of their becoming old and absolute. The design period should not exceed those respective values. If the useful life is more, design period is also more.
2. The anticipated rate of growth of population. If the rate is more, design period is less.
3. The rate of interest of loans taken for the construction of the project. If this rate is more the design period will be less.
4. The rate of inflation during the period of repayment of loans. When the inflation rate is high, a longer design period is adopted.
5. Efficiency of component units of the project during the early years of working, when they are not loaded to their capacity. The more the efficiency, the longer the design period

3. Explain Complete sequence of water treatment plant with significance of each unit



Significance of each unit:

1. Screening

Screening is done to carry out the remove all floating matter i.e heavy suspended solid from the water. like:- plants, stones, animals, trees, etc.

Screening is generally adopted for the treatment of surface water.

Screening is done with the help of

1. Coarse Screen 2. Fine Screen

Coarse Screen:- Coarse Screen in the form of bar of size 10mm to 25mm having spacing of 2200mm center to center.

1. 5Fine Screen:- Fine screen in the form of wire of size 10mm

2. Aeration

It is the process in which water of brought intimate contact of air.
It removes undesirable gases. Co2, H2S.
It removes undesirable organic matter.

3. Floculation:- It is the process in which nutralize particle are in contact with each other , so as to promote their resulting in increased size.

4. Plain Sedimentation:- Sedimentation is the process removes suspended particle form the water which could not be removes in the screening process. ex: silt, clay etc are to be removed

5. Sedimentation aided with coagulation: Fine suspended and colloidal impurities and some bacteria are removed

6. Filtration:-This process employed to remove very fine particles and colloidal matter which might have escaped from sedimentation process, micro-organisms are largely removed hence

7. Disinfection:-It is the process of removing disease causing bacteria present in it.

8. **Miscellaneous treatment:** In order to make water fit for a particular use any special treatment to be used

5 List the objectives of water quality analysis. What is sampling? Differentiate between grab sampling and composite sampling

Objectives of water sampling:

Objective of sampling is to collect a portion of material small enough in volume to be transported comfortably and yet large enough for analytical purposes while still representing the material being sampled.

To obtain reliable and useful data

To assess the impact of human activities on Water quality and its suitability

To determine the quality of water in its natural state

To keep under observation the sources and pathways of pollutants/contamination

Methods of Sampling:

There are three methods of sampling

1. Grab or Catch Samples

2. Composite Samples

3. Integrated Samples

Generally for drinking water quality monitoring, Grab Samples are taken

1. Grab sampling-

- Grab samples are also called as spot or catch samples. Grab samples are single samples collected at a specific spot at a site in specified time. Grab samples are to be collected only when the source is known to be constant in composition for an extended period of time. Examples are, ground water samples, well mixed surface waters, large lakes, rivers, estuaries, shorelines, wastewater streams that are expected to be constant in composition over an extended period of time, like spent wash line in a distillery.
- When the source composition varies from location to location, like upstream and downstream of a river, then grab samples can be collected from appropriate locations. This helps in finding out the extent of variation and duration of variation.

2. Composite Sampling

Composite sampling is carried out when the liquid matrix is expected to be heterogeneous and varies from time to time or depth or at many sampling locations. This type of sampling provides a representative sampling for this type of matrix and is carried out by combining portions of multiple grab samples collected at regular intervals. If the flow is expected to be constant, then volume based sampling can be carried out. If the flow varies, like sewerage line, then sampling can be done by flow based composite, i.e., collecting sample that is proportional to the discharge. Time composite sampling represents a 24- hour period, with interval being 1-3 hours

Use composite samples only for parameters that will remain unchanged under the sampling conditions, preservation and storage. For parameters like pH, temperature, residual chlorine, carbon dioxide, alkalinity, sulfide, dissolved oxygen, Oil&Grease etc. avoid composite sampling and analyse individual samples as soon as possible, preferably in the field itself, except for sulfide and Oil &Grease