

FINAL TERM ASSIGNMENT

WATER DEMAND SUPPLY AND DISTRIBUTION (CE- 562)

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ANSWER 1

Desalination is the process of removing salts and other minerals from the saline water to render it suitable for drinking, irrigation or industrial uses.

Various methods for desalination

- **DISTILLATION (EVAPORATION)**

Salt water is heated in one container to make the water evaporate leaving the salt behind. The desalinated vapor is then condensed to form water in separate container.

- **ELECTRODIALYSIS**

Electro dialysis utilizes a membrane and send an electric charge through the solution.it draws metal ions to the positive plate on one side and other ions (salt) to negative plate on other side.

- **FREEZING METHODE**

Based on the principle that water excludes salts when it crystallizes to ice. Involves three steps. ICE FORMATION, ICE WASHING and ICE MELTING to obtain fresh water with subsequent removal of contaminants.

- **REVERSE OSMOSIS**

Reverse osmosis is a water purification technology that use a semi permeable membrane to remove ions from saline water .Reverse osmosis can remove many types of dissolved and suspended species from water used in industrial processes and production of potable water.

Although 71% of the worlds surface is covered by sea water.

There are many ways to desalinate water but one of the most effective is membrane desalination. In membrane desalination method water is pushed through a thin membrane with tiny holes. The water flows through the pores, but the salt ions can't leaving only fresh water on the other side.

ANSWER 2

The main objective of water distribution layout is to distribute adequate quantity of water at adequate pressure to individual consumer.

The distribution pipes are generally laid below the road pavements and as such their layout generally follow the layouts of roads.

MERITS of four types of water distribution layout is

- Dead end system is suitable for old towns and cities having no definite pattern of roads

Relatively cheap

Determination of discharges and pressure easier due to less number of valves

- Radial system gives quick service
Stagnation does not occur
- Grid iron system is suitable for cities with rectangular layout where the water mains and branches are laid in rectangles. water is kept in good circulation due to the absence of dead ends
- In Ring system water can be supplied to any point from at least two direction
Determination of the size of pipe is easy

DEMERITS of Four types of water distribution layout is

- In dead end system due to many dead end stagnation of water occur in pipes
- In radial system end of distributor near to the substation gets heavily loaded when load on the distributor changes the clients at the distant end of the distributor face serious voltage fluctuations.

- In grid iron system proper designing is relatively difficult.
- In ring system exact calculation of sizes of pipes is not possible due to provision of valves on all branches

For newly proposed townships in hilly areas gravity flow water supply system is most appropriate for rural sloppy terrain, where the source is usually situated at the uphill and the community is as far down. In this system water is supplied to the community with or without using reservoirs.

Water distribution in hilly areas is always divided in several zones due to undulation .The present approach of dividing water distribution systems lacks an assessment index and is characterized by low degree of automation. With the building of a mathematical model here introduces two indicators-pressure limitation and pressure variation to enable the automatic division of water supply pipe network

ANSWER 3

Reservoirs also called service reservoirs are the storage reservoirs which store water for distributing during emergencies. It should be located as close as possible to the center of demand. Water level in the reservoir must be at a sufficient elevation to permit gravity flow at an adequate pressure.

TYPES OF RESERVOIRS

- **SURFACE RESERVOIRS.** To obtain water tightness bitumen compounds are used at all construction joints. For aeration of water and inspection, manholes, ventilation pipes and stairs are provided. Surface reservoirs are built structures for water storage that help improve water security for local communities. Surface reservoirs are circular or rectangular tanks

constructed at ground level or below ground level therefore they are also called as ground reservoirs

- **ELEVATED STORAGE RESERVOIRS.** Also referred to as overhead tanks are required at distribution areas which are not governed and controlled by the gravity system of distribution. These are rectangular or circular in shape. If the topography of town is not suitable for gravity system the elevated tank or reservoir are used to provide sufficient pressure head. Constructed where combine gravity and pumping system of water distribution is adopted. These reservoir may be made of RCC, steel or prestressed concrete.

The storage capacity of reservoirs is the summation of

- **BALANCING STORAGE.** Quantity of water required to be stored in the reservoir for balancing fluctuating demand against constant supply.
- **BREAKDOWN STORAGE.** Also called emergency storage is the storage preserved in order to tide over emergencies posed by the failure of pumps, electricity or any other mechanism driving the pumps.
A 1.5 to 2 times of the average hourly supply may be considered as enough provision for accounting this storage
- **FIRE STORAGE.** Third component of the total reservoir storage is the fire storage. This provision takes care of the requirements of water for extinguishing fires.
Total reservoir storage can finally be worked out by adding all the three storage.

ANSWER 4

Pumps are used in water supply schemes because it delivers a constant pressure for any given set of conditions. The centrifugal pump is ideal for delivering water to customers. Most well pumps are centrifugal pumps. They are ideal for use in the distribution system since they do not produce pulsating surges of flow and pressure.

Pumps are used to develop the necessary head (pressure) to distribute water to the consumer and storage reservoirs.

Pumping system are usually designed for

- Head
- Flow/discharge
- Pressure

A pump performance curve indicate how a pump will perform in regards to pressure head and flow. A curve is defined for a specific operating speed (rpm).

And specified inlet/outlet diameter the curve also shows the shut off head or the head that the pump would generate if operating against a closed valve.

Pump curves are essentially data about a given pumps ability to produce flow against certain head, when you are reading a curve the pump flow rate will be on the top and bottom and its height to push it on the sides.

Pump performance curve shows the correlation between flow (Q) and pressure or head (H) that pump creates. Flow is normally given in m³/h or l/s