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Paper Code: MTEV-102	**Roll No.**									

M. Tech.
FIRST SEMESTER EXAMINATION, 2016-17
WATER TREATMENT & SUPPLY SYSTEMS

[Time: 3 hrs.] [Max. Marks: 70]

Note: Attempt ***ALL*** questions. Assume suitable data, if required. All question carry equal marks.

1. Attempt any two parts of the following:- **[7x2=14]**

(a) Explain with the help of a diagram: (i) charge system in a colloidal suspension, (ii) forces acting on colloids of same charge.

(b) What are the remedial measures to overcome failure of wells?

(c) Illustrate and explain operation of centrifugal pumps. Also discuss the characteristic of centrifugal pumps.

2. Attempt any two parts of the following:- **[7x2=14]**

(a) Write short notes on: (i) Diatomaceous earth filters, (ii) Types of aquifers.

(b) Coliform bacilli are essentially lactose fermenters. Name and explain the method to detect these bacteria using this property.

(c)

(d) Discuss in detail different types of water meters.

3. Attempt any two parts of the following:- **[7x2=14]**

(a) Explain the processes used for demineralization.

(b) Give details of Elevated Reservoirs with help of figure.

(c) In two periods of each of 20 years, a city has grown from 40,000 to 1,60,000 and then to 3,00,000. Determine: (i) Saturation population, (ii) Equation of the logistic curve, (iii) Expected population after the next 20 years.

4. Attempt any two parts of the following:- **[7x2=14]**

(a) (i) Explain BOD and oxygen equivalent relationship with the help of a graph.
(ii) The BOD_5 of a sample is determined to be 150mg/l at 20°C. The k value is known to be 0.23 per day. What would the BOD_8 be if the test were run at 15°C?

(b) Elaborate diagrammatically methods used for distribution.

(c) Differentiate lime soda process and zeolite process on the basis of: (i) post treatment, (ii) result obtained, (iii) skilled supervision, (iv) effects on bacteria, (v) pH of treated water, (vi) size of plant, (vii) economy.

5. Attempt any two parts of the following:- **[7x2=14]**

(a) A rectangular sedimentation tank following coagulation-flocculation is to treat a flow 3000 m^3/day with a detention time of 6 hours. It is to be hand cleaned of sludge at 5 week intervals. The suspended solids concentration of the water is reduced from 245mg/lt to 5mg/lt by coagulation-flocculation. The settled sludge includes 40mg/lt (based on water flow) of metallic precipitate and has a moisture content of 85% and specific gravity of 1.24. Determine the volume of sludge produced between cleanings and the basic dimensions of the tank. If the water depth just before cleaning is 3m and its length is twice its width.

(b) The analysis of hard water shows the following compositions:

Free carbon dioxide= 3mg/lt	Non-carbonate hardness= 92mg/lt
Alkalinity= 68mg/lt	Total magnesium=15mg/lt

Assume that it is possible to remove all but 35mg/lt of carbonate hardness with lime, and that the treated water is to have a total hardness of 80mg/lt. Determine the amount of hydrated lime and soda required for treatment per million liters of raw water.

(c) Elaborate the operational troubles in rapid gravity filers and explain remedial measures used to avoid air binding.