



(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 197404

Roll No.

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B. Tech.

(SEM. IV) THEORY EXAMINATION, 2014-15
WATER SUPPLY AND TREATMENT ENGINEERING

Time : 3 Hours]

[Total Marks : 100

NOTE : Attempt all questions, suitably assume the missing data.

1 Attempt any four parts of the following: 5×4=20

- (a) Discuss the sources and impacts of turbidity.
- (b) A sample of water from a surface steam is analyzed for the common ions with the following results:
 $Ca^{++} = 90 \text{ mg/L}$ $Cl^{-} = 80 \text{ mg/L}$
 $Mg^{++} = 20 \text{ mg/L}$ $HCO_3^{-} = 320 \text{ mg/L}$
 $Na^{+} = 70 \text{ mg/L}$ $SO_4^{--} = 120 \text{ mg/L}$
 - (i) What is % age error in the cations balance?
 - (ii) Draw a bar diagram for the water.
- (c) The 5-d 20 °C BOD of a wastewater is 212 mg/L. What will be the ultimate BOD? What will be the 10 days BOD? If the sample had been incubated at 30 °C what would the 5 day BOD have been? Use $K_{20} = 0.23 \text{ d}^{-1}$.

- (d) A city must treat about 12000 m³/d of water flocculating particles are produced by coagulation and a column analysis indicates that an overflow rate of 20 m/d will produce satisfactory removal at a depth of 3.20 m. Determine the size of the required settling tank with neat sketch.
- (e) Explain Break point chlorination and Super chlorination.
- (f) How are suspended solids measured? Also define Threshold Number (TON).
- 2 Attempt any four parts of the following: 5×4=20
- (a) Discuss the construction and working of a rapid sand filter.
- (b) Design the approximate dimensions of a set of rapid gravity filters for treating water required for a population of 40,000, the rate of supply being 135 ltr/capita per day. The filters are rated to work 4500 ltrs per hour per sq.m. Assume data not given.
- (c) Write advantages and disadvantages of multi media filters.
- (d) Chlorine usage in the treatment of 18,000 cubic meter per day is 9 kg per day. The residual after 10 min. contact is 0.20 mg/l. Calculate dosages in milligrams per litre and chlorine demand of water.
- (e) Differentiate between carbonaceous and non carbonaceous hardness of water.
- (f) Explain Aeration mechanism.

- 3 Attempt any two parts of the following: $10 \times 2 = 20$
- With a neat sketch explain ion exchange process of water softening.
 - Explain Reverse Osmosis process for desalination.
 - Explain physical adsorption with respect to Freundlich isotherm.
- 4 Attempt any two parts of the following: $10 \times 2 = 20$
- Using Geometrical increase method predict the population of a town for 2031 and 2041 with the following census records :
- | | | | |
|------------|----------|----------|----------|
| Year | 1991 | 2001 | 2011 |
| Population | 2,50,000 | 4,90,000 | 7,40,000 |
- Explain simons non recording raingauge with neat sketch.
 - Discuss the "Logistic Curve Method" for determining the future population of a locality.
- 5 Attempt any two parts of the following: $10 \times 2 = 20$
- Compare the merits and demerits of the continuous and intermittent system of water supply.
 - Design the diameter of cast iron pipe required for the distribution system of a part of a small city of population 10,000. Assume rate of supply and terminal pressure etc.
 - Write short notes on :
 - Water meter
 - Drain valve
 - Air valve
 - Manhole.