

Printed Pages : 4



EEV402/EV402

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

PAPER ID : 197402

Roll No.

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B. Tech. (Environmental Engineering)
 (SEM. IV) THEORY EXAMINATION, 2014-15
WATER SUPPLY & TREATMENT ENGINEERING

Time : 3 Hours]

[Total Marks : 100

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

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

- (a) Discuss the biological characteristics of water.
- (b) A 200 ml sample of water has an initial pH of 10. The 30 ml of 0.02N. H₂SO₄ is required to titrate the sample to pH 4.5. What is the total alkalinity of water in mg/l as CaCO₃?
- (c) Determine the Threshold Odor Number (TON) of an odorous water sample volume of 50 ml mixed with

odor free water by volume 150 ml. Is this water sample fit for drinking?

- (d) Determining the concentration of suspended solids, a filterable residue analysis is run on a sample of water as follows. Prior to filtering, the crucible and filter pad are kept overnight in the drying oven. Cooled and dry mass (tare mass) of the pair determined to be 54.352 gm. 250 ml of sample is drawn through a filter pad contained in the porous bottom crucible. The crucible and filter pad are then placed in a drying oven at 104°C and dried until a constant mass 54.389 gm is reached. Determine the SS concentration of the sample.
- (e) Explain Break point chlorination with neat sketch.
- (f) Derive an expression for settling velocity of a spherical particle in type-I settling.

Q. 2. Attempt any four parts of the following: 5x4=20

- (a) Discuss the construction and working of a slow sand filter.
- (b) A filter unit is $4.5 \times 9 \text{ m}^2$. After filtering $10,000 \text{ m}^3$ in 24 hours period, the filter is backwashed @ $10 \text{ L/m}^2.\text{sec}$ for 15 minutes. Compute filtration rate, quantity and percentage of treated water used in washing and the rate of wash water flow in each trough. Assume 4 troughs.

- (c) It is required to supply water to a population of 50,000 at per capita demand of 185 liters per day. The disinfectant used for chlorine is bleaching powder containing 35% of chlorine available. Determine how much of bleaching powder is required annually at water works, if 0.3 ppm chlorine dose is required for disinfection.
- (d) Chlorine usage in the treatment of 24,000 cubic meter per day is 10 kg per day. The residual after 10 min. contact is 0.20 mg/l. Calculate dosages in milligrams per liter and chlorine demand of water.
- (e) Explain a suitable method to remove dissolved metals and gases from ground water.
- (f) Explain various methods of defluoridation of water.

Q. 3. Attempt any two parts of the following: 10x2=20

- (a) With a neat sketch explain zeolite process of removing hardness of water.
- (b) Explain Membrane process for desalination.
- (c) Discuss various operation and maintenance works for a rapid sand filter.

Q. 4. Attempt any two parts of the following: 10x2=20

- (a) Using Logistic Curve Method predict the population of a town for 2021 and 2031 with the following census records

Year	1991	2001	2011
Population	1,00,000	1,30,000	1,48,000

- (b) Discuss various sources of water along with their characteristics.
- (c) Explain various types of aqueducts in ground water.

Q. 5. Attempt any two parts of the following: 10x2=20

- (a) Explain various types of distribution networks in water supply systems.
- (b) Explain the Hardy Cross method for the design of complex pipe network.
- (c) With neat sketch explain the working of a reciprocating type displacement pump.
