53 (CE 404) EVEN

2014

ENVIRONMENTAL ENGG. I

Paper : CE 404

Full Marks : 100

Pass Marks : 30

Time : Three hours

The figures in the margin indicate full marks for the questions.

*Answer **any five** questions.*

1. *(a)* What is design period in the designing water supply scheme ? How the population of a town is forecast ? 6

   (b) What do you understand by an equivalent pipe ? How do you determine its length when the pipes are *(i)* in series *(ii)* in parallel. 6

   (c) Derive Stoke's law for the settlement of discrete particles in water. 6

(d) Find the diameter of the particles with specific gravity 1·2 removed in a tank having a surface area of $250 m^2$ and treating 8 million litres of water per day. Assume temp $= 26°C$. 2

2. (a) Describe in brief various test conducted for physical examination of water. 8

(b) What is meant by coagulation ? What are the common coagulants used ? Write the chemical reaction of *any three* coagulant. 8

(c) Chlorine usage in the treatment of $25000 m^3/day$ is $9 kg/day$. The residual chlorine after 10 minutes contact is $0 \cdot 2 mg/l$. Calculate the dosage in milligrams per litre and the Chlorine demand of the water. 4

3. *(a)* Estimate the population of the town in the year 2000 by incremental increase method from the data given below 6

Year	Population
1940	2,50,000
1950	4,80,000
1960	5,50,000
1970	6,38,000
1980	6,95,000

(b) Write a note on common impurities found in water. 4

(c) What are the various forms of chlorination ? Explain in brief. 10

4. *(a)* Describe with the help of a neat sketch the component parts of a rapid sand gravity filter. Explain its working. 8

(b) Compute the fill demand for a city having population of 1,40,000 using Kuichling's and Freeman's formula. 2

(c) What do you understand by desalination ? Explain the Reverse Osmosis method of desalination. 6

(d) Find the dimension of a circular sedimentation basin for the given data :

effective head $= 3m$

volume of water to be treated = 3 million litres per day

Detection period = 4 hrs. 4

5. (a) Write short note on : 2×5=10

(i) Hardness of water

(ii) *pH* value and its determination

(iii) Nitrogen and its compound

(iv) Total solid

(v) Water borne diseases.

(b) What is the objective of water treatment processes ? Give a schematic layout of water treatment plant. 6

(c) Explain in brief various filter troubles. 4

6. *(a)* A rectangular sedimentation basin is to handle 12 *million litres*/day of raw water. A sedimentation basin of width to length ratio 1/3 is proposed to trap all particles larger than $0 \cdot 05mm$ in size. Assume a relative density of 2·62 for the particle and $20°C$ as the average temperature, determine the Basin dimensions. If the effective depth of tank is $3m$, calculate the detention time. 6

(b) What is zeolite ? How is it regenerated ? Explain the zeolite method of water softening. 6

(c) Describe various methods of application of coagulants. 6

(d) What is the difference between disinfection and sterilization ? 2
