53 (CE 404) EVEN-I

2018

ENVIRONMENTAL ENGINEERING-I

Paper : CE 404

Full Marks : 100

Time : Three hours

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

*Answer **any five** questions.*

1. *(a)* What do you understand by demand curve and explain the method of calculating reservoir capacity for a specific yield from the mass inflow curve? 8

   (b) What are Intakes? What are the important considerations which govern the selection of site of an intake. 8

   (c) Explain briefly the Surface and Subsurface sources of water. 4

2. *(a)* What is disinfection of water? Why is disinfection necessary? 4

(b) Explain briefly the various demands of water. 6

(c) Explain Slow sand filter with a neat sketch. 10

3. *(a)* Explain with a neat sketch the Operation of Centrifugal Pump. 6

(b) Design a Tube well for the following data: 5

(i)	Yield required	= 0.08 *cumecs*
(ii)	Thickness of confined aquifer	= 30 *m*
(iii)	Radius of zero drawdown	= 300 *m*
(iv)	Drawdown	= 5 *m*
(v)	Permeability coefficient	= 60 *m/day.*

(c) What are the factors affecting per capita demand? 5

(d) Compute the fire demand for a city having population of 140,000 using Kuichling's formula. 4

4. Write short notes on the following: 4×5=20

(i) Nitrogen and its Compounds.

(ii) Hardness of Water

(iii) Turbidity

(iv) pH value and its determination.

5. *(a)* Explain the purpose of aeration in water treatment. 4

(b) Derive the Stokes' law for finding the settling velocity of a discrete particle under the condition Reynolds number less than 0·5. 6

(c) Find the settling velocity of spherical silica particle of specific gravity 2.67, in water at 25°*C*, if the diameter of particle is 0·004 *cm*. 4

(d) A rectangular sedimentation basin is to handle 12 *million* litres/day of raw water. A sedimentaiton basin of width to length ratio of $\frac{1}{3}$ is proposed to trap all particles larger than 0·05 *mm* in size. Assume a relative density of 2·62 for the particle and 20°*C* as average temperature —

(i) determine the basin dimensions

(ii) if the effective depth of tank is 3 *m*, calculate the detention time.

6

6. (a) A city has a population of 200,000 with an average rate of demand of 180 litres per head per day. Find the area of filter.

3

(b) Differentiate between Slow sand filter and Rapid sand filter. 6

(c) Compare the Continuous and Intermittent system of water supply.

5

(d) Discuss with the help of diagram, various methods of laying out the distribution system. 6