53 (CE 404) ENEN

2019

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)* Draw schematic layout of a typical Water treatment plant of a town. 5

   (b) Why the population forecast is necessary in the design of public water supply scheme? Discuss in brief various methods employed for the purpose and their comparative merits and demerits. 15

2. Explain briefly, the physical and chemical examination of raw water supplies. 20

3. *(a)* Mention *any three* methods of softening water. Describe zeolite process of softening water in detail. 10

(b) Explain briefly the following processes : 10

(i) Breakpoint Chlorination

(ii) Super Chlorination.

4. *(a)* Derive an expression for determination of permeability in a well with an unconfined aquifer. A 30*cm* diameter well penetrates 25*m* below the static water table. After 24 hours of pumping @ 5400 litres/minute the water level in a test well at 90*m* is lowered by 0.53*m* and in a well 30*m* away the drawdown is 1.11*m*.

(i) What is the transmissibility of an aquifer? *(ii)* Also determine the drawdown in the main well. 10

(b) Explain how to determine the Safe. Yield from a reservoir of a given capacity. 5

(c) How will you estimate the per capita demand? Explain the factors affecting the per capita demand. 5

5. *(a)* Elaborate how you would arrive at the total quantity of water to be supplied to a Metropolitan area. 8

(b) With the help of the following data, estimate by the incremental increase method, the population of a city for the year 2000 AD.

Year	**Population**
1880	25,000
1890	27,500
1900	34,100
1910	41,500
1920	47,050
1930	54,500
1940	61,000

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(c) Define Intake, explain the various factors which govern the location of an intake structure. Enumerate various types of intakes. Briefly explain simple submerged intake. 6

6. *(a)* Write notes on ***any three*** of the following : 15

(i) Deep and Shallow tube well

(ii) Tube well screen

(iii) Aquifer and aquiclude

(iv) Permeability and transmissibility.

(b) From a clear water reservoir $3m$ deep and maximum water level at 30.00, water is to be pumped to an elevated reservoir at 75.00 at the constant rate of $0.25m^3/sec$. The distance is $1500m$. Give the economical diameter of the rising main and water horsepower of the pump. Neglect minor losses and take $f = 0.01$. 5