T. E. (Civil)

Environmental Engineering I 3

(2008 Course)

April/May 2014

Time: 3 Hours **Max. Marks: 100**

Instructions to the candidates:

7) *Solve Q. 1 or Q. 2, Q. 3 or Q. 4, Q. 5 or Q. 6 from Section I and Q. 7 or Q. 8, Q. 9 or Q. 10, Q. 11 or Q. 12 from Section II.*
8) *Answers to the two sections should be written in separate books.*
9) *Neat diagrams must be drawn wherever necessary.*
10) *Figures to the right indicate full marks.*
11) *Use of logarithmic tables, slide rule, Mollier charts, non-programmable calculator and steam tables is allowed.*
12) *Assume suitable data, if necessary.*

Environmental Engineering- I

Section - I

Q1 a) What is population forecasting? Why it is necessary? Explain anyone method in detail. (06)

b) Enlist various types of intake structures. Draw neat labeled sketch of river Intake structure. (06)

c) What do you mean by treatment of water? State the objectives of water treatment. (04)

OR

Q2. a) Explain various factors affecting the rate of demand of water for a community. (06)

b) Furnish different types of valves used in water supply. Also state their functions and locations. (06)

c) Find the fire demand of a town with population of one million by various formulae. (04)

Q3) a) What are the objectives of the aeration of water? Also explain cascade aerator with a neat sketch. (06)

b) Draw a neat sketch of water treatment plant. Also mention the functions of each unit of water treatment. (06)

c) What is necessity of flash mixing and slow mixing? How it is achieved explain. (04)

OR

Q4. a) What is principle of sedimentation? Enlist various factors affecting the sedimentation. (06)

b) Design a circular sedimentation tank fitted with mechanical sludge remover for water work, which has to supply water at the rate of 135 lpcd for population of 50000 persons. Use detention period as 4.5 Hrs and water depth in the tanks as 3.3metres. (06)

c) Explain the terms: (04)
(i) Detention period (ii) Weir loading (iii) Flocculation (iv) Surface overflow rate

Q5. a) Explain various mechanisms by which filtration of water takes place. (06)

b) Alum dose of 20 mg/l is used to treat 50MLD of water. Workout (i) Quantity of alum required per month by the water treatment plant (ii) Amount of CO_2 released per day. (04)

c) Draw neat sketch of rapid sand filter and explain its cleaning process. (08)

OR

Q6. a) Explain various operational troubles associated with Rapid Sand Gravity Filter. (06)

b) Explain break point chlorination with a neat sketch. (04)

c) For a town with population of 1 lakh , water is supplied at the rate of 200 lpcd. (08)
Find out the dimensions of rapid sand filter by using the following data:

1. Rate of filtration = 6000 L/Hr/m2
2. Break through index = 1×10^5
3. Mean size of sand = 1 mm
4. Terminal head loss = 2.5 m

Also find depth of sand and water used for back washing.

Section - II

Q7. a) Furnish points of comparison between lime soda and Zeolite process. (08)

b) What do you understand by Desalination? Enlist methods used for desalination. (08)
Also explain Reverse osmosis method for water treatment.

OR

Q8. a) A raw water sample contains the following impurities: (10)

$CaCO_3$ = 200 ppm	$MgCl_2$ = 150 ppm
$Mg(HCO_3)_2$ = 120 ppm	$MgSO_4$ =100 ppm
$CaSO_4$ = 100 ppm	NaCl = 25 ppm
Fe_2O_3 = 40 ppm	SiO_2 = 30 ppm

Compute the annual requirements of slaked lime and soda, for treating 80,000 litres of water daily. The purity of slaked lime is 85% and that of soda is 90%.

b) Explain in short any three methods for Defluoridation of water. (06)

Q9. a) Enlist principal methods of laying out distribution system. Explain any two methods with neat sketches. (08)

b) A clear water tank is receiving water from the treatment plant at a rate of 200 m^3/Hrs for 24 hours. The high lift pumps are lifting the water from the same tank at the following rates: (08)

i) 4 to 14 hrs @ 120 m^3/hr

ii) 15 to 24 hrs @400m^3/hr

Determine the capacity required for clear water tank.

OR

Q10. a) What is rain water harvesting? Write down benefits of rain water harvesting. Also explain any two methods of recharging the ground water aquifers. (08)

b) What is service reservoir? State its functions. Explain surface reservoir with neat sketch. (08)

Q11. a) Explain various techniques used to control noise pollution. (06)

b) Convert the following sound pressure levels into micro bar unit. (06)

(i) 0 dB (ii) 10 dB (iii) 40 dB (iv) 100 dB (v) 120dB (vi) 160 dB

c) Explain how SPM is determined by using High Volume Sampler. (06)

OR

Q12. Write notes on the following (18)

a) Effects of noise pollution and remedial measures

b) Plume behavior

c) Inversion and its types