Roll No. ☐☐☐☐☐☐☐☐☐☐☐☐☐   Total No. of Pages : 02

Total No. of Questions : 09

B.Tech.(CE) (2011 Onwards) (Sem.–5)
# ENVIRONMENTAL ENGINEERING–I
Subject Code : BTCE-505
Paper ID : [A2082]

Time : 3 Hrs.   Max. Marks : 60

INSTRUCTION TO CANDIDATES :
1. **SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.**
2. **SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.**
3. **SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.**

SECTION-A

1. **Write briefly :**

   a) Define design period. How is it decided in a water supply scheme planning?

   b) What is meant by fluctuations in demand? How is this information used for balancing tank design?

   c) List any four important factors on which site selection of Intake Structures depend.

   d) What is meant by economical diameter of a rising main?

   e) Give any four factors on which the coagulant dose depends.

   f) What is the biological purification mechanism involved in a slow sand filter?

   g) The groundwater available for domestic water consumption was found to have problems of taste, odour and excessive iron present. Suggest any two household level methods of purification this water.

   h) What is the basic principle in the base-exchange process of water softening?

   i) Give any four methods of waste prevention in water Supply, distribution system.

   j) What is meant by 'rain water harvesting'?

SECTION-B

2. What are the sources of water used in water supply schemes? Compare their suitability with respect to quality and quantity.

3. Draw a typical treatment flow diagram for water drawn from 'Sutlej River'. Indicate the importance of each unit of treatment.

4. List the different types of pumps used in water supply. Give the suitability and criteria for choosing the pumps.

5. What are the factors which induce corrosion of water supply pipes? Discuss the various corrective treatments to prevent it.

6. Calculate the size of a rectangular tank to treat 1.5 million litres of raw water per day. The overflow rate less than 30 $m^3/m^2/d$ and detention time 3 h may be assumed. What will be terminal settling velocity of the slowest particle which will be 100 percent removed in this tank?

SECTION-C

7. a) What are the different types of pipes available for use in water supply systems? Compare the merits and demerits.

   b) The Water supply to a town was conveyed through a cast iron main of 60 cm diameter from an impounding reservoir through a distance of 1.5 km. Later, due to increase in population the scheme was augmented by adding another pipe line of same diameter parallel to the first in the second half of the length and cross connected. Estimate the increase in discharge.

   (use Darcy's equation, $hf = flQ^2/3D^5$; assume f = 0.04, total available head at the intake = 31 m and loss due to cross connection = 1 m).

8. a) What are the common impurities found in natural water and explain its effect on the quality?

   b) Distinguish clearly between water quality criteria and standards. Critically examine the use of MPN as bacteriological water quality standard.

9. Write short notes clearly differentiating the following term as applied to water treatment :

   a) Water quality standards and criteria

   b) Fluoridation and de- fluoridation

   c) Double Filtration and In-depth Filtration

   d) Water Softening and Stabilisation