FACULTY OF ENGINEERING
B.E. 3/4 (Civil) II Semester (Main) Examination, May/June 2012
WATER AND WASTE WATER ENGINEERING

Time: 3 Hours]   [Max. Marks : 75

Note : Answer **all** questions from Part **A**. Answer **any five** questions from Part **B**.

PART – A   (25 Marks)

1. Discuss briefly the importance of treating water for public water supply.   **2**

2. Enumerate the various surface sources of water, and discuss and compare the quality and quantity of water that may be available from these sources.   **3**

3. Explain the importance of chemical and bacteriological analysis of water used for domestic purpose.   **2**

4. Compare rapid and slow sand filters under the following heads :   **3**

   Rate of filtration, quantity of waste water, method of cleaning, effective size of sand.

5. What are the steps involved in the design of a distribution system, what precautions should be taken to make the design economical.   **3**

6. State the hydraulic formulae which are commonly adopted in the design of sewers.   **2**

7. Describe the various methods used for aeration in the activated sludge process.   **2**

8. What do you understand by preliminary treatment of sewage ? Enumerate the various unit operations involved in preliminary treatment of sweage.   **3**

9. Describe the components of a septic tank with the aid of sketch.   **2**

10. Classify the solid wastes, giving suitable examples for each of them.   **3**

PART – B   (50 Marks)

11. a) The population of a locality as obtained from census report is as follows :   6

Census Year	1881	1891	1901	1911	1921	1931	1941	1951	1961
Population	8000	12000	17000	22500	29000	37500	47000	57000	66500

Estimate the population of the locality in the years 2001, 2021 and 2041, by incremental increase method.

b) Compare the quality and quantity aspects of ground and surface water sources.   4

12. a) Design a set of rapid gravity filters for treating water required for a population of 50,000 ; the rate of supply being 180 lts/head/day.

The filters are rated to work at 5200 lts/sqmt/day.   6

b) What is meant by coagulation ? What are the different coagulants used ?   4

13. a) A 600 mm diameter sewer is required to flow at half depth on a grade ensuring a degree of self cleansing equivalent to that obtained at full depth at a velocity of 0.9 m/s. Find the required grade, associated velocities and discharge at full depth and half depth. Take a uniform value of $n = 0.15$.   7

b) What do you understand by oxygen sag curve ? Explain with the aid of a neat sketch.   3

14. a) Design a secondary settling tank for an activated sludge process with the following design data :

Average sewage flow   =   9 Mld

MLSS concentration   =   3000 mg/lt

Peak flow factor   =   2.25

Recycle rate   =   30%   7

b) Describe briefly about the preliminary treatment using screens.   3

2

15. a) Discuss various types of solid wastes or dry refuse. Give the composition of solid waste for an average Indian city. 5

   b) Design a septic tank for a hostel with the following data :
      i) No. of users   = 125
      ii) Peak discharge   = 168 lpm
      iii) Desludging period   = 1 year

      Assuming the percolation rate of 20 minutes per cm design dispersion trench system for the disposal of septic tank effluent. 5

16. a) The 5 day BOD at 20° C is equal to 250 mg/lt for three different samples, but the 20° C, K values are equal to 0.12/day, 0.16/day and 0.20/day. Determine the ultimate BOD of each sample. 5

   b) Discuss about the low cost waste treatment : Oxidation ponds, RBC. 5

17. Discuss the following in detail : 10
    i) Disinfection – necessity and methods.
    ii) Sewer types and appurtenances.
    iii) Sludge digestion and disposal methods.