B.Tech. – 1st – All Branch

ENVIRONMENTAL SCIENCE & ENGINEERING

Time: 3.00 Hours   Full Marks: 70

Answer Q. No. 1 which is compulsory and any five from the rest
The figures in the parenthesis in the right hand margin indicate marks

1. Answer all the questions: (2×10)

    (i)   Mention important transformation processes (*minimum four*) in water bodies?

    (ii) Why proper storage of MSW is essential?

    (iii) What are the desirable limits of pH, Iron, Calcium and total hardness (as per IS 10500)?

    (iv) What are the differences between sedimentation and flocculation?

    (v)   What do you mean by break point chlorination?

    (vi) What are the methods used for water softening?

    (vii) Differentiate between super-adiabatic and sub-adiabatic lapse rate?

    (viii) What are the differences between primary pollutants and secondary pollutants?

    (ix) Explain the term hydrological cycle with mass balance assuming precipitations on land equals to 100 units?

    (x)   What are the functions of grit chamber and skimming tank in waste water treatment plant?

2. (i) Data from a domestic wastewater BOD test at 20°C are: 5 ml wastewater in 300 ml bottle with unseeded dilution water, initial D.O. is 8.8 mg/L and 5 day D.O. equal to 3.2 mg/L. Compute (a) 5 day BOD, (b) Ultimate BOD [deoxygenation rate constant (k) is 0.042 at 20°C] and (c) 3 day BOD at 27°C (6)

(ii) Explain energy budget with suitable sketch. (4)

3. (i) Draw a neat sketch of a rapid gravity filter and describe how it works. (4)

(ii) Describe the characteristics of a good disinfectant. What are the chemicals, which are used as disinfectants and discuss the advantages and disadvantages posed by each? (6)

4. (i) Explain the working principle of a standard activated sludge process with the help of a neat sketch. Mention the advantages and disadvantage of this process. (5)

(ii) Determine the diameter of a high rate trickling filter for the following data: Sewage Flow 4.0 MLD, BOD of raw sewage 300 mg/L, BOD removed in the primary settling tank provided before trickling filter is 30 %, BOD removal efficiency of trickling filter is 85 %, depth of filter is 1.6 m, and recirculation ratio is 1.5. (5)

5. Explain different options for MSW treatment? (10)

6. (i) Discuss the screening and scoping stages of the process for EIA. (5)

(ii) If sound pressure has a pressure of 1000 μPa at a distance of 20 m, compute: (5)
   (a) the sound pressure level
   (b) the sound intensity
   (c) the sound power

7. (i) Describe various air pollutants and their impacts? (5)

(ii) Explain the plume behavior form a stack with respect to the different prevailing lapse rate. Use neat sketches. (5)

8. Write short notes on (answer any two) (5x2)
   (i) Ground water contamination
   (ii) Equalization basin
   (iii) Noise criteria