

# ***B. Tech Degree VII Semester (Supplementary) Examination July 2010***

## **CE 701 (A) ENVIRONMENTAL ENGINEERING II (2006 Scheme)**

Time : 3 Hours

Maximum Marks : 100

### **PART A**

Answer ALL questions

(8 x 5 =40)

- I.
- a. Explain the theory of filtration in the water treatment process.
  - b. Describe the purpose of aeration and its limitations.
  - c. List out the types of screens used in wastewater treatment process.
  - d. Compare between primary, secondary and tertiary waste water treatment units.
  - e. Explain with the help of a flow diagram the essentials of activated sludge process.
  - f. Differentiate between stabilization ponds and oxidation ditch.
  - g. Discuss the quantity and characteristics of sludge involved in sludge treatment process.
  - h. What do you understand by sludge thickening? List out various methods used in sludge thickening process.

### **PART B**

(4 x 15 =60)

- II.
- a. Differentiate between the theory of Plain Sedimentation and Sedimentation with Coagulation. (5)
  - b. The population of a town is 1,00,000 and the average per capita demand is 135 litre/day/capita. Design the coagulation – cum – Sedimentation tank for the water works, supplying water to the town. The maximum demand may be taken as 1.5 times the average demand. Assume the detention periods of 5 hours and 30 minutes for settling tank and flocculation chamber respectively. Also assume the flow rate as 900 litres/hour/m<sup>2</sup> of plan area. (10)
- OR**
- III.
- a. Briefly explain the importance of disinfection in treating public water supply. What are the various methods used in disinfection of water? (7)
  - b. Design five slow sand filter beds from the following data for the water works of a town of population 75,000. Per capita demand is 135 litres/day/capita. Rate of filtration is 210 litres/hour/m<sup>2</sup>. Assume maximum demand as 1.5 times the average demand. Out of five units, one is to be kept as stand by and used while repairing other units. (8)



(Turn over)

- IV. a. Write short notes on (i) Grit chamber (ii) Skimming Tank (iii) Detritus Tank (7 1/2)
- b. Design a rectangular grit chamber from the following data:
- |   |   |  |         |
|---|---|--|---------|
| Flow of sewage                          | = | 55 x 10 <sup>6</sup> litres/ day             |         |
| Specific gravity of the grit            | = | 2.70   |         |
| Size of the grit particle to be removed | = | 0.21mm                                       |         |
| Viscosity of the water                  | = | 1.0 x 10 <sup>-2</sup> cm <sup>2</sup> /sec. | (7 1/2) |
- OR**
- V. a. State the theory of sewage sedimentation and its design factors. (5)
- b. Design a circular sewage sedimentation tank for a town having population of 40,000. The average water demand is 140 litres/capita/day. Assume that 70% water reaches at the treatment unit and the maximum demand is 2.7 times the average demand. (10)
- VI. With a neat sketch, describe the construction features and working of a standard trickling filter for purification of sewage. (15)
- OR**
- VII. a. With the help of a schematic diagram explain the working principle of a rotating biological contactor. (5)
- b. Design the activated sludge unit treatment with the following data for a town of population of 65000. (10)
- |       |                                    |   |                       |
|-------|------------------------------------|---|-----------------------|
| (i)   | Average sewage flow                | = | 210 litres/capita/day |
| (ii)  | B.O.D of the raw sewage            | = | 210 mg/litre          |
| (iii) | Suspended solids in raw sewage     | = | 300 mg/litre          |
| (iv)  | B.O.D removal in primary treatment | = | 40%                   |
| (v)   | Overall B.O.D removal desired      | = | 90%                   |
- VIII. a. Sketch and describe the construction and working of a Septic tank. (7)
- b. Design a septic tank for 50 users, assuming the rate of water supply as 60 litres/head/day. (8)
- OR**
- IX. With neat sketches, briefly explain any three high rate anaerobic treatment methods used in sewage treatment. (15)