B.E. / B.Tech. Civil Engineering (Model Curriculum) Semester-IV

# PCC-CE405 - Environmental Engineering-I

P. Pages : 2 **GUG/S/25/13719**

Time : Three Hours * 2 1 9 4 * Max. Marks : 80

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Notes : 1. All questions carry equal marks.
2. Due credit will be given to neatness and adequate dimensions.
3. Assume suitable data wherever necessary.
4. Illustrate your answers wherever necessary with the help of neat sketches.

**1.** a) The following data shows the variation in population of a town from 1950 to 2000. Estimate the population of town in the year 2020 by Geometrical increase method and Incremental increase method. **8**

| Year | 1950 | 1960 | 1970 | 1980 | 1990 | 2000 |
|---|---|---|---|---|---|---|
| Population | 85000 | 115000 | 145500 | 185800 | 225500 | 290500 |

b) Explain the common impurities in water. **8**

**OR**

**2.** a) Describe the different types of intake with a neat sketch. **8**

b) What are the various types of water demand? State the factors that affect the rate of water demand. **8**

**3.** a) Design a sedimentation tank for a water supply scheme which has to supply $1.5\times10^6$ litres/day to a town. Assume detention period as 5 hours, velocity of flow as 20m/min, depth of tank as 3m, allowance for sludge deposition 50 cm. **8**

b) Design a cascade aerator for capacity of 18 MLD. Assume suitable data with a neat sketch. **8**

**OR**

**4.** a) Draw layout of conventional water treatment plant & explain in brief function of each unit. **8**

b) Derive an equation for settling velocity of discrete particles freely failing in a sedimentation tank. **8**

**5.** a) Design the approximate dimensions of a set of rapid sand filters for treating water required for a population of 50,000. The rate of supply being 180 litres per day per person. The filters are rated to work 5000 litres per hour per sq. m Assume required data. **8**

b) Clarify the various filters and differentiate “Slow Sand Filter” and “Rapid Sand Filter” **8**

**OR**

**6.** a) What is disinfection? Explain in detail break point chlorination. **8**

b) Determine the dimensions of Rapid sand filter for 20MLD. Assume filtration rate is 5000 lit/hr/$m^2$. **8**

**7.** a) Design the diameter of combined sewer having following data. **8**
i) Area = 500 hectares
ii) Population = 1,00,000
iii) Water supply = 150 lits/capita/day
iv) Intensity of rainfall = 15mm/hr
v) Impermeability factor = 0.50
vi) Maximum permissible velocity = 2 m/sec.

b) What are the various systems of sewerage? Describe the merits and demerits of each. **8**

**OR**

**8.** a) Describe the physical properties of sewage. **8**

b) Draw a flow chart of conventional primary treatment plant of sewage and discuss the function each unit. **8**

**9.** a) What is activated sludge? Describe activated sludge process with help of neat sketch. **8**

b) Design of septic tank having following data **8**
i) Number of users = 200
ii) Rate of demand = 150 lit/head/day
iii) Detention period = 18 hours
iv) Percolating capacity of filter media = 3 1250 lits/$m^3$.

**OR**

**10.** a) Describe trickling filter with help of neat sketch. **8**

b) Draw a neat sketch of "Oxygen sag curve" and explain the characteristics of each zone. **8**

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