

B.E. Civil Engineering (Model Curriculum) Sem-IV  
**PCCCE405 : Environmental Engineering-I**

P. Pages : 2

Time : Three Hours



**GUG/W/22/13719**

Max. Marks : 80

- 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 population of a town in 1960, 1970, 1990 and 2000 was 25,000, 28,000, 34,000, 42,000, 47,000 calculate the population for the year 2010 and 2030 by Geometric increase method. **6**
- b) What are the intake structure? Explain with the help of neat sketch "Canal intake". **5**
- c) Enlist the various types of water demand. Explain the various factors affecting the water Demand. **5**

**OR**

2. a) Explain in brief the physical, chemical and bacteriological characteristics of water. **5**
- b) The data given below shows details of population of city from year 1930-1970. Calculate the population for the year 1980, 1990 and 2000 by Arithmetic Increase Method. Year 1930 1940 1950 1960 1970 Population 24000 27000 33000 41000 49000. **6**
- c) What are the different source of water? Explain any two source with the help of neat sketch. **5**
3. a) Design a cascade aerator for capacity of 18 m<sup>3</sup>/d. Assume suitable data with a neat sketch. **8**
- b) Design the dimensions of a sedimentation tank to treat a demand of 12 Million litres per day. Assume a detention time of 6 hours and velocity of flow as 20cm/minute. **8**

**OR**

4. a) Explain with a neat sketch the working of 'Clariflocculator' **5**
- b) Derive an equation for settling velocity of discrete particles freely falling in a sedimentation tank. **6**
- c) Draw layout of conventional water treatment plant & explain in brief function of each unit. **5**
5. a) Chlorine usage in Treatment of 20,000 m<sup>3</sup>/day is 7 kg/day the Residual chlorine after 10 min contact is 0.3 mg/lit. Calculate the dosages in milligram per liter and chlorine demand of water. **6**

- b) What is disinfection? Explain in detail break point chlorination. 5
- c) Clarify the various filters and differentiate “Slow Sand Filter” and “Rapid Sand Filter” 5

**OR**

- 6. a) Calculate the quantity of bleaching powder required per day for disinfecting 4 million liters/day. The dose of chlorine has to be 0.5 p.p.m and the bleaching powder contains 30% of available chlorine. 6
- b) Determine the dimensions of Rapid sand filter for 20MLD. Assume filtration rate is 5000 lit/hr/m<sup>2</sup>. 10
- 7. a) Design a main sewer line for a colony of population 20,000. The per capita demand of water supply is 135 LPCD. The sewer line is to be laid at a slope of 1/600. Use Manning’s coeff ‘n’ = 0.012. The design discharge is 1.5 times. The average discharge and the sewer is to be designed as a half full section. 8
- b) Discuss the various stages followed in the construction of sewer. 4
- c) Describe conservancy system & water carriage system. 4

**OR**

- 8. a) Design a Grit chamber for a flow of 8MLD. 8
- b) Design a circular sewage sedimentation tank for a town having population of 100000. The average water demand is 135 lpcd. Assume that 80% water reaches at the treatment unit and the maximum demand is 2.5 times the average demand. 8
- 9. a) What is activated sludge? Explain with neat sketch ‘Activated sludge process?’ 4
- b) Design a septic tank for a small colony of 200 person. Rate of water supply 135 LPCD. Assume suitable data. 8
- c) Explain the working of trickling filter with neat sketch. 4

**OR**

- 10. a) Explain the anaerobic sludge digestion process in details. 5
- b) Draw a neat sketch of “Oxygen sag curve” and explain the characteristics of each zone. 5
- c) Draw a sketch of sludge of a sludge digester & explain it’s working in brief. 6

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