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Question Paper Code : 91306

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2019

Fifth Semester

Civil Engineering

CE 6503 – ENVIRONMENTAL ENGINEERING – I

(Regulations 2013)

(Common to PTCE 6503 – Environmental Engineering I for B.E. (Part-Time) –
Third Semester – Civil Engineering – Regulations 2014)

Time : Three Hours

Maximum : 100 Marks

Answer ALL questions.

PART – A

(10×2=20 Marks)

1. What is design period ? List any two factors influence it.
2. State the assumptions made in an incremental increase method to forecast population.
3. What are the advantages of DI pipe over CI pipe ?
4. What is meant by intake ?
5. Differentiate between unit operations and processes.
6. Distinguish between coagulation and flocculation.
7. Define Zeolite Process.
8. List out the various types of aerators.
9. What are the components of a water distribution system ?
10. What is meant by service reservoir ?

PART – B

(5×13=65 Marks)

11. a) The population of a town as per census record is furnished below. Forecast the population in the year 2031 and 2041 using the following methods :

- i) Arithmetical increase method.
- ii) Geometrical increase method.
- iii) Incremental increase method.

Census year	1931	1941	1951	1961	1971	1981	1991	2001	2011
Population	22300	35642	49487	55816	65859	79458	95543	110131	129500

Estimate the water demand at 90 Lpcd for the year 2031 and 2041 by incremental increase method.

(OR)

- b) Enumerate and explain the characteristics of surface and ground water and state their environmental significance.



12. a) i) In a water supply scheme to be designed for serving a population of 4 lakhs the storage reservoir is situated at 8 km away from the city and the loss of head from source to city is 16 metres. Calculate the size of supply main by using Weisbach formula as well as Hazen's formula assuming a maximum daily demand of 180 litres per day per person and half of the daily supply to be pumped in 8 hours. Assume the coefficient of friction for the pipe material as 0.012 in Weisbach formula and $C_H = 130$ in Hazen's formula. (9)
- ii) Explain the factors to be considered for selection of pumps. (4)
- (OR)
- b) i) Explain the working of a reservoir intake with a neat sketch. (8)
- ii) Explain briefly the steps involved in water supply pipeline installation. (5)
13. a) Discuss the design aspects of sedimentation tanks in detail. (9)
- (OR)
- b) i) Explain the process, requirements and methods of disinfection of water. (7)
- ii) Discuss Chlorination. State its advantages and precautions. Also discuss residual chlorine and chlorine demand. (6)
14. a) Explain the methods of removing temporary and permanent hardness from water. (9)
- (OR)
- b) Discuss in detail about any two methods of de-flouridation technique. (7)
15. a) Explain the different layouts of water distribution system and also list the requirements of good water distribution system. (9)
- (OR)
- b) i) Explain the different types of plumbing systems available in buildings. (6)
- ii) Explain domestic water supply systems fitted with gravity and pressurized tanks along with required line diagrams. (7)

PART – C

(1×15=15 Marks)

16. a) Design a flash mixer for a proposed WTP of 25 MLD capacity. Draw a neat sketch of the unit. (15)
- (OR)
- b) Design a sodium based resin softener to produce 1000 kL/d of soft water with a hardness of 50 mg/L as CaCO_3 . The data pertaining to softener are furnished below.
- Exchange capacity = 50 kg CaCO_3/m^3 of resin
- Salt requirement = 110 kg NaCl/m^3 of resin
- Raw water hardness = 600 mg/L as CaCO_3 .