

B.Tech. CIVIL ENGINEERING (BTCLEVI)**Term-End Examination****June, 2017****00964****BICE-014 : ENVIRONMENTAL ENGINEERING - I***Time : 3 hours**Maximum Marks : 70*

*Note : Answer any **five** questions. All questions carry equal marks. Assume suitable data, if missing. Use of scientific calculator is allowed.*

1. Population statistics of a town are given below :

Year	Population
1970	72,000
1980	85,000
1990	1,10,500
2000	1,44,000
2010	1,84,000
2020	2,21,000

Estimate the population for the year 2050

- (a) by Arithmetical Method,
- (b) by Geometrical Increase Method,
- (c) by Incremental Increase Method, and
- (d) considering the last 3 decades' data, calculate the population by Logistic Curve Method. 14

2. (a) Name and discuss the four mechanisms thought to occur during coagulation.
- (b) Describe the characteristics of good disinfection.
- (c) Name any two commonly used disinfectants and discuss their advantages and disadvantages in brief. 6+4+4=14

3. (a) Differentiate between single stage and two stage softening processes.
- (b) Find the terminal settling velocity of a spherical particle with diameter 0.5 mm and specific gravity of 2.65 settling through water at 20°C.
- (c) Define Stokes' law. 4+8+2=14



4. (a) A water treatment plant is being designed to process $50,000 \text{ m}^3/\text{d}$ of water. Jar testing and pilot plant analysis indicate that an alum dosage of 40 mg/L with flocculation at a Gt value of 4.0×10^4 produces optimal results at the expected water temperature of 15°C . Determine : $4+6+2=12$

(i) The monthly alum requirement

(ii) The flocculation basin dimensions [if three cross-flow horizontal paddles are to be used. The flocculator should be maximum 12 m wide and 5 m deep in order to connect appropriately with the settling basin.]

(iii) Power requirement

(b) Mention the significance of Rapid Mixing. 2

5. (a) Name the physical water quality parameters of concern to environmental engineers.

(b) List five waterborne diseases and their causes in detail.

(c) Differentiate between BOD and COD. $5+5+4=14$

6. (a) Determine the capacity of a storage reservoir required to maintain a constant water supply (draft) of $2 \times 10^6 \text{ m}^3/\text{m}$ given the following mean runoff values :

Month	Runoff $Q_R \times 10^6 \text{ m}^3$	Month	Runoff $Q_R \times 10^6 \text{ m}^3$
1	9	10	0.4
2	10.8	11	0.5
3	4.2	12	0.9
4	2.8	13	1.1
5	1.2	14	2.0
6	1.1	15	5.5
7	0.9	16	10.5
8	0.5	17	3.5
9	0.6	18	2.5

- (b) Discuss various methods of analysis for a water distribution system. 7+7=14
7. (a) Describe various intake structures with the help of neat sketches.
- (b) What are the various methods of leak detection in water supply systems? 10+4=14