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 **PRESIDENCY UNIVERSITY**

  **Bengaluru**

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| **End - Term Examinations – JANUARY 2025** |
| **Date:** 13 – 01- 2025 **Time:** 09:30 am – 12:30 pm |

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| **School:** SOE | **Program:** B.Tech-CIV/CII |
| **Course Code :** CIV2047 | **Course Name :** Water Infrastructure Systems |
| **Semester**: V | **Max Marks**: 100 | **Weightage**: 50% |

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| **CO - Levels** | **CO1** | **CO2** | **CO3** | **CO4** | **CO5** |
| **Marks** | **25** | **36** | **39** | **-** | **-** |

**Instructions:**

1. *Read all questions carefully and answer accordingly.*
2. *Do not write anything on the question paper other than roll number.*

**Part A**

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| **Answer ALL the Questions. Each question carries 2marks. 10Q x 2M=20M** |
| **1** | The purpose of distribution system is to deliver water to consumer with appropriate quality, quantity & pressure. Write about the stages in conveyance of water. | **2 Marks** | **L1** | **CO3** |
| **2** | List the factors affecting design period of a water supply scheme. | **2 Marks** | **L1** | **CO1** |
| **3** | What is the annual *Chlorine*requirement in quintals to treat 20MLD of water with *chlorine* dose of 0.5mg/ltr.  | **2 Marks** | **L1** | **CO2** |
| **4** | Dental science discovered and ultimately proved to the world that fluoride, a mineral found in rocks and soil, prevents tooth decay. In relation to this define fluoridation of water. | **2 Marks** | **L1** | **CO3** |
| **5** | Duty of an engineer in designing a water supply scheme for a particular section of community is to evaluate the amount of water available and amount of water demanded by the public and to design a water supply. What are the two objectives of the community water supply scheme? | **2 Marks** | **L1** | **CO1** |
| **6** | Design period is the utility or useful life period of a component, during this period component should offer best service without failure. Write the design periods for four different components of water supply scheme. | **2 Marks** | **L1** | **CO1** |
| **7** | Sedimentation tank are designed to reduce flow velocity which makes particles to settle at bottom of the tank. List the types of settling. | **2 Marks** | **L1** | **CO2** |
| **8** | What is the fire demand for a town of population 1 lakh. Assuming that one fire accident breakout per month and which last for 5 hrs. Use national board of fire underwriter’s formula and express fire demand in lpcd. | **2 Marks** | **L1** | **CO1** |
| **9** | List any four requirements of ideal disinfectant. | **2 Marks** | **L1** | **CO2** |
| **10** | Name the various types of water demand. | **2 Marks** | **L1** | **CO1** |

**Part B**

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| **Answer the Questions Total 80 Marks** |
| **11.** | **a.** | The process of passing the water through beds of sand or other granular materials is known as filtration. Explain the theory of filtration. | **10****Marks** | **L2** | **CO2** |
| **or** |
| **12.** | **a.** | The jar test is a common laboratory procedure used to determine the optimum operating conditions for water or wastewater treatment. This method allows adjustments in pH, variations in coagulant or polymer dose, alternating mixing speeds, or testing of different coagulant or polymer types, on a small scale in order to predict the functioning of a large scale treatment operation. Demonstrate Jar test to determine optimum dosage of coagulant. | **10****Marks** | **L2** | **CO2** |
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| **13.** | **a.** | Particles that will settle within a reasonable period of time can be removed in a sedimentation basin (also called clarifier). Sedimentation tank is usually rectangular or circular with either a radial or upward flow pattern. Explain the zones across which the raw water passes during treatment. | **10****Marks** | **L2** | **CO2** |
| **or** |
| **14.** | **a.** | Chlorination serves not only for disinfection, but as an oxidant for other substances like iron, manganese, cyanide and for taste and odor control in water. Depict break point chlorination.  | **10****Marks** | **L2** | **CO2** |

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| **15.** | **a.** | Disinfection is a process of killing disease causing pathogens present in water. Explain any three methods of disinfection of water. | **10****Marks** | **L2** | **CO2** |
| **Or** |
| **16.** | **a.** | Calculate number of (20 X 10) m size slow sand filters required to treat 10 MLD of water with ROF 200 liters/hr/m2. | **10****Marks** | **L2** | **CO2** |

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| **17.** | **a.** | Identify the probable population of a town for the year 2034, 2044, 2054 from the population data using arithmetic increase method and geometric increase method.

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| Year | 1984 | 1994 | 2004 | 2014 | 2024 |  |  |  |  |
| population | 25000 | 28000 | 34000 | 42000 | 47000 |  |  |  |  |

 | **15****Marks** | **L3** | **CO1** |
| **Or** |
| **18.** | **a.** | A water supply scheme has to be designed for a city having a population of 200,000. Estimate the important kinds of draft which may be required to be recorded for an average water consumption of 350 lpcd. Also record the required capacities of the major components of the proposed water works system for the city using a river as the source of supply.  | **15****Marks** | **L3** | **CO1** |

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| **19.** | **a.** | Ion exchange is a water treatment process commonly used for water softening or demineralization, but it also is used to remove other substances from the water. Illustrate Ion exchange process of water treatment. | **15****Marks** | **L2** | **CO3** |
| **Or** |
| **20.** | **a.** | In 1789, [Jan Rudolph Deiman](https://en.wikipedia.org/wiki/Jan_Rudolph_Deiman) and [Adriaan Paets van Troostwijk](https://en.wikipedia.org/wiki/Adriaan_Paets_van_Troostwijk) used an electrostatic machine to make electricity that was discharged on gold electrodes in a [Leyden jar](https://en.wikipedia.org/wiki/Leyden_jar). In 1800, [Alessandro Volta](https://en.wikipedia.org/wiki/Alessandro_Volta) invented the [voltaic pile](https://en.wikipedia.org/wiki/Voltaic_pile), while a few weeks later English scientists [William Nicholson](https://en.wikipedia.org/wiki/William_Nicholson_%28chemist%29) and [Anthony Carlisle](https://en.wikipedia.org/wiki/Anthony_Carlisle) used it to electrolyse water. Demonstrate electrolysis of water. | **15****Marks** | **L2** | **CO3** |

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| **21.** | **a.** | The water distribution pipes are generally laid below the road pavements, and as such their layouts generally follow the layouts of roads. There are general, four different types of pipe networks; any one of which either single or in combinations, can be used for a particular place. Build water distribution network layouts and discuss about it. | **20****Marks** | **L3** | **CO3** |
| **Or** |
| **22.** | **a.** | For efficient distribution system adequate water pressure required at various points. Depending upon the level of source, topography of the area and other local conditions, the water may be forced into distribution system generally in three ways. Build water distribution systems based on topography and discuss about it. | **20****Marks** | **L3** | **CO3** |

**\*\*\*\*\* BEST WISHES \*\*\*\*\***