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| Image result for adamas university logo | **ADAMAS UNIVERSITY**  **END SEMESTER EXAMINATION**  (Academic Session: 2020 – 21) | | |
| **Name of the Program:** | M.Tech. (CE) in Environmental Engineering | **Semester:** | I |
| **Paper Title:** | Physico-Chemical Processes in Environmental Engineering | **Paper Code:** | ECE61101 |
| **Maximum Marks:** | 50 | **Time Duration:** | 3 Hrs |
| **Total No. of Questions:** | 17 | **Total No of Pages:** | 2 |
| *(Any other information for the student may be mentioned here)* | 1. At top sheet, clearly mention Name, Univ. Roll No., Enrolment No., Paper Name & Code, Date of Exam. 2. All parts of a Question should be answered consecutively. Each Answer should start from a fresh page. 3. Assumptions made if any, should be stated clearly at the beginning of your answer. | | |

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| **Group A**  **Answer All the Questions (5 x 1 = 5)** | | | |
| 1 | What is the amount of daily per capita demand of water for an average Indian city? | **R** | **CO5** |
| 2 | Briefly explain about different categories of Solid Wastes. | **Ev** | **CO1** |
| 3 | What do you mean by “Optimum Alum Dose”? | **R** | **CO2** |
| 4 | Find the amount of ‘Total Organic Carbon’ in 900 mg/lit of C6H12O6. | **R** | **CO3** |
| 5 | Demonstrate two advantages of ‘Zeolite Method’. | **U** | **CO4** |
| **Group B**  **Answer All the Questions (5 x 2 = 10)** | | | |
| 6 a) | Classify water based on its hardness value. | **An** | **CO1** |
| **(OR)** | | | |
| 6 b) | Briefly demonstrate the function of “Infiltration Well”. | **U** | **CO1** |
| 7 a) | Determine the quantity of alum required in order to treat 13 million litres of water per day at a treatment plant, where 12 ppm of alum dose is required. | **Ev** | **CO2** |
| **(OR)** | | | |
| 7 b) | Explain the purpose of using ‘Slow Sand Gravity Filter’. | **U** | **CO2** |
| 8 a) | What are the requirements for an ideal disinfectant? | **R** | **CO3** |
| **(OR)** | | | |
| 8 b) | What are the advantages of rapid sand gravity filter? | **R** | **CO3** |
| 9 a) | Explain the properties of a HDPE Tank. | **Ev** | **CO4** |
| **(OR)** | | | |
| 9 b) | What do you mean by “Combined gravity and pumping system”? | **R** | **CO4** |
| 10 a) | Distinguish between Intermittent and Continuous supply system of water. | **An** | **CO5** |
| **(OR)** | | | |
| 10 b) | Illustrate the standard of purification required for waste water with a dilution factor varying from 140 to 550. | **U** | **CO5** |
| **Group C**  **Answer All the Questions (7 x 5 = 35)** | | | |
| 11 a) | The population of 5 decades from 1940 to 1980 are given as 26000, 29000, 35000, 43000, 48000. Find out the population after one, two and three decades beyond the last known decade, by using Incremental Increase Method. | **R** | **CO1** |
| **(OR)** | | | |
| 11 b) | Mention and discuss the factors that influence per capita demand. | **Cr** | **CO1** |
| 12 a) | What is the procedure of Presumptive test for Untreated water in finding MPN? | **R** | **CO2** |
| **(OR)** | | | |
| 12 b) | A Water treatment plant treating 9 x103 m3/day of water requires 20 mg/lit of filter alum. Water has 7 mg/lit of alkalinity as CaCO3. Determine the total alkalinity required in the water in the form of CaCO3. Also determine the quantity of CaO required per year for this given situation. | **Ev** | **CO2** |
| 13 a) | Explain the method of Chlorination during the process of disinfection. | **U** | **CO3** |
| **(OR)** | | | |
| 13 b) | An effluent at a flow rate of 2680 m3/day from a sewage treatment is to be disinfected. The data of disinfection study with a chlorine dosage of 14 mg/lit yield the model Nt = N0. e-0.148t where Nt is no. of microorganisms surviving at time t min and N0 is no. of microorganisms present at t = 0. Determine the volume of disinfection unit (in cubic meter) required to achieve 98% kill of microorganisms. | **Ev** | **CO3** |
| 14 a) | With a sketch of Dead end system discuss advantage and disadvantage of this system. | **Cr** | **CO4** |
| **(OR)** | | | |
| 14 b) | Compare between Radial and Ring system of water distribution technique. | **U** | **CO4** |
| 15 a) | Discuss the cation exchange method in softening on water. | **Cr** | **CO4** |
| **(OR)** | | | |
| 15 b) | The hardness of a ground water sample was found to be 450 mg/lit as CaCO3. A softener containing ion exchange resins was installed to reduce the total hardness to 75 mg/lit as CaCO3 before supplying to 4 households. Each household gets treated water at the rate of 540 lit/day. If the efficiency of the softener is 92%, determine the bypass flow rate in lit/day. | **Ev** | **CO4** |
| 16 a) | Explain the degree of nuisance occurring if heavy load sewage is disposed over a clayey soil land. | **Ev** | **CO5** |
| **(OR)** | | | |
| 16 b) | Find out the total amount of organic carbon present in 900 ppm of Mithane and Glucose. | **R** | **CO5** |
| 17 a) | Determine 1 day 37°C BOD of sewage sample whose 5 days 20°C BOD is 100 mg/lit. Assume k at 20°C as 0.23 per day and temperature coefficient as 1.047. | **Ev** | **CO5** |
| **(OR)** | | | |
| 17 b) | Briefly discuss the method “Trickling Filter System” with a rough sketch during treatment of waste water. | **Cr** | **CO5** |