Name: **Enrolment No:**	

UPES

End Semester Examination, May 2024

Course: Environmental Engineering **Semester: IV**

Program: B.Tech. Civil Engineering **Time: 03 hrs.**

Course Code: CIVL2021 **Max. Marks: 100**

Instructions: All questions are compulsory to attempt.

SECTION A
(5Qx4M=20Marks)

S. No.		Marks	CO
Q 1	State sequentially the various wastewater treatment processes along with their function/purpose.	**04**	**CO2**
Q 2.	What are secondary pollutants and state the various important secondary pollutants?	**04**	**CO3**
Q 3.	Define the terms: a. Biochemical Oxygen Demand (BOD) b. Chemical Oxygen Demand (COD) and mention their relevance in wastewater characterization.	**04**	**CO1**
Q 4.	What is "refuse" and enlist the various constituents of refuse. State the various methods used for the disposal of refuse?	**04**	**CO4**
Q 5.	Enumerate the various ways (additions/subtractions) for estimation of sewage discharge from water supply.	**04**	**CO1**
SECTION B **(4Qx10M= 40 Marks)**			
Q 6.	State the relevance of the term "Equivalent noise level". Estimate the Equivalent noise level for fluctuating noise levels of 60 minutes in which 60 dB lasts for 30 minutes, 50 dB lasts for 20 minutes, and 40 dB lasts for 10 minutes.	**10**	**CO3**
Q 7.	Analyze the "Inversion" condition in regard to atmospheric stability? Explain the various inversion types with their key points. OR Assess the various atmospheric stability conditions along with their critical points.	**10**	**CO3**
Q 8.	Detail the composting process alongside an illustrative diagram. Discuss the diverse composting techniques commonly employed for managing municipal solid waste in rural regions of India.	**10**	**CO4**
Q 9.	a. State the principle behind the plain sedimentation process for water treatment.	**03+07**	**CO2**

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<tr><td></td><td>b. Determine the settling velocity of a discrete particle in water under laminar conditions. The diameter and specific gravity of the particle is $5x10^{-3}$ cm and 2.65, respectively. The water temperature is 20^{o}C and kinematic viscosity of water at 20^{o}C is $1.01x10^{-2}$ cm^2/sec.</td><td></td><td></td></tr>
<tr><td colspan="4">SECTION-C
(2Qx20M=40 Marks)</td></tr>
<tr><td>Q 10.</td><td>Design a sanitary circular sewer to serve a population of 1,30,000 with the daily per capita water supply allowance of 125 liters. The slope available for the sewer to be laid is 1 in 930 with n=0.011. A self-cleansing velocity of 0.73 m/sec is to be developed. The dry weather flow may be taken as 1/4 of the maximum discharge and proportionate velocity is 0.98 m/sec.
OR
Design an unlined trapezoidal storm water drain for a catchment area of 80 hectares and maximum rainfall depth is 20 cm obtained in 4 hours rainfall. The classification of the surface of the area is as follows:
<table><tr><td>Percent of total surface area</td><td>Type of surface</td><td>Coefficient of runoff</td></tr><tr><td>20</td><td>Roofs</td><td>0.90</td></tr><tr><td>20</td><td>Pavements</td><td>0.85</td></tr><tr><td>5</td><td>Paved yards</td><td>0.80</td></tr><tr><td>15</td><td>Macadam roads</td><td>0.40</td></tr><tr><td>35</td><td>Lawns</td><td>0.10</td></tr><tr><td>5</td><td>Wooded area</td><td>0.05</td></tr></table>The drain is to be constructed in cutting with maximum permissible flow velocity as 0.92 m/sec. Assume any other data and figures wherever needed according to design guidelines.</td><td>20</td><td>CO5</td></tr>
<tr><td>Q 11.</td><td>A city has a population of 1,70,000 and average daily water demand of 110 lpcd. Design a rapid sand filter for the above city requirement with details of under drainage system and back water washing including wash water gutter arrangement. Assume suitable data and figures wherever needed according to design guidelines.</td><td>20</td><td>CO5</td></tr>
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