MANIPAL INSTITUTE OF TECHNOLOGY
MANIPAL
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MANIPAL INSTITUTE OF TECHNOLOGY

***THIRD** SEMESTER B.TECH (CIVIL ENGINEERING)

END SEMESTER EXAMINATION, NOV 2022

WATER SUPPLY ENGINEERING (CIE 2155)

TIME: 3 HRS.   **MAX. MARKS: 50**

Note: 1. Answer all questions.
2. Any missing data may be suitably assumed.

Q. NO	QUESTION	MARKS	CO
1A	The population statistics pertaining to a town are given below. Estimate the population in 2036 by arithmetic increase and geometric increase methods. <table><tr><td>Year</td><td>Population</td></tr><tr><td>1980</td><td>70000</td></tr><tr><td>1990</td><td>100000</td></tr><tr><td>2000</td><td>150000</td></tr><tr><td>2010</td><td>200000</td></tr><tr><td>2020</td><td>240000</td></tr></table>	4	CO1
1B	Differentiate between i) Canal intake and river intake structures ii) Roto dynamic and displacement pumps.	3	CO1
1C	Explain the significance of turbidity and nitrates in terms of quality of water	3	CO2
2A	A rectangular sedimentation tank is to handle 10 million liters/day of raw water. A detention basin having width as 1/3 of length is proposed to trap all particles larger than 0.05 mm in size. Assume specific gravity of 2.65 for the particles at 20∘ C temperature, velocity of flow as 0.2 m/minute and depth of tank is 3m, compute the basin dimension and calculate detention time.	4	CO3
2B	What are the objectives of aeration? How does aeration work?	3	CO3

2C	13mg of copperas is consumed with lime at a coagulation basin, per litre water. Determine the quantity of copperas and quick lime required to treat 9.5 million litres of water. Molecular weight: Fe -55.85, S-32, O-16, H-1, C-12, Ca-40. $$FeSO_4 . 7H_2O + Ca(OH)_2 \rightarrow CaSO_4 + Fe(OH)_2 + 7H_2O$$ Copperas Hydrated lime Ferrous hydroxide	3	CO3
3A	Explain the working of pressure filter with a neat sketch. What are its advantages over slow sand filter?	4	CO4
3B	Explain the reverse osmosis method with neat sketch used for desalination of water.	3	CO4
3C	Explain any two operational troubles in rapid gravity filters. Also explain the purpose of wash water trough and under drainage system in rapid sand filters	3	CO4
4A	With the help of a neat graph explain the different phases involved in achieving breakpoint chlorination.	4	CO4
4B	Explain lime soda process and different units required for it.	3	CO4
4C	Explain the characteristics and suitability of any three types of pipe material used in water distribution system.	3	CO5
5A	Explain the four different methods used in detecting leakage in water supply pipes.	4	CO5
5B	Explain the features of ring type of water distribution system with neat sketch and mention its advantages and disadvantages over other distribution system.	4	CO5
5C	Explain the working of Jacksons Turbidity meter	2	CO2