Reg. No.										

MANIPAL INSTITUTE OF TECHNOLOGY

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IV SEMESTER B.TECH. (CIVIL ENGINEERING)

MAKEUP EXAMINATION, JUNE / JULY 2023

SUBJECT: WASTE WATER MANAGEMENT [CIE-2254]

DATE: – 5 – 2023 **TIME OF EXAM: –** **MAX. MARKS: 50**

Instructions to Candidates:

- Answer **ALL** questions.
- Missing data may be suitably assumed.
- Draw neat sketches wherever necessary.

SL. NO.	QUESTIONS	MARKS	CO's	BL
1A.	Explain the estimation of quantity of sewage and flow variations in sewage.	05	CO1	2
1B.	Explain in brief the systems of sewage disposal.	03	CO1	2
1C.	Explain in brief the significance of nitrogen content in waste water.	02	CO2	2
2A.	Explain the working principle of Trickling filters with a flow diagram. Give the comparison between activated sludge process and trickling filters.	05	CO3	2
2B.	Explain the following: i) First stage BOD ii) Population equivalent iii) Relative stability	03	CO2	2
2C.	Explain with a neat sketch the working of a leaping weir.	02	CO1	2
3A.	Design a high-rate trickling filter for the following data. Sewage flow is 3.5 MLD, Recirculation ration is 1.5, BOD of the raw sewage is 300 mg/l, BOD removal in primary clarifier is 35%, Organic loading rate is 11000 kg BOD/ ha-m.d. Hydraulic loading rate is $20 m^3/m^2/d$. Also find the effluent BOD concentration.	05	CO4	3
3B.	Design a circular settling tank for a primary treatment of sewage at 12 million liters per day. Detention period 2 hrs & surface loading of 40,000 liters/sq.m/day.	03	CO4	3

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3C.	Explain in brief the different types of traps according to their use.	**02**	CO1	2
4A.	A conventional Activated sludge process treatment plant data is as follows: • Wastewater Flow = 15000 m^3/d, Volume of aeration tank = 3500 m^3 • BOD influent = 250 mg/l, BOD effluent = 20 mg/l • Mixed liquor suspended solids (MLSS) = 2500 mg/l • Effluent suspended solids = 30 mg/l, Waste sludge suspended solids = 9700 mg/l • Quantity of waste sludge = 120 m^3/d Determine the Aeration period in hours, F/M ratio, % efficiency of BOD removal and Sludge age in days	**05**	CO4	3
4B.	With the help of a neat sketch explain the step aeration and tapered aeration process of ASP.	**03**	CO3	2
4C.	Explain the following design parameters commonly used in ASP: i) F/M ratio ii) Sludge age	**02**	CO3	2
5A.	With the help of a neat sketch explain the working of a septic tank.	**05**	CO5	2
5B.	Give the comparison between the dilution and land treatment method of sewage disposal.	**03**	CO5	2
5C.	Explain the meaning of sewage sickness and the measures to reduce it.	**02**	CO5	2