JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -3 EXAMINATION- 2025

B.Tech 5th Semester (CE)

COURSE CODE (CREDITS): 18B11CE512 (3) MAX. MARKS: 35

COURSE NAME: Sewage Treatment and Disposal

COURSE INSTRUCTORS: Dr. Rishi Rana Kalia MAX. TIME: 2 Hours

Note: *(a) All questions are compulsory.*

(b) The candidate is allowed to make Suitable numeric assumptions wherever required for solving problems

*(c)**SCIENTIFIC CALCULATOR IS ALLOWED***

Q. No	Question	CO	Marks
Q1	Briefly explain the process involved in self-purification? Also discuss in details about the stratification and zones of pollution in a lake water body?	CO- 3	**4 Marks**
Q2	a) Explain the need for sanitation along with different sewerage systems.	CO-1 & 2	**2 Marks**
	b) The 5 day BOD at 30° C of a sewage sample is 320 mg/L. Calculate 5 days BOD at 20°C. Assume deoxygenation constant at 20°C, K = 0.1/day.		**3 Marks**
Q3	a) Write short notes on: a) Sewage sickness and b) Sewage farming	CO- 4 & 3	**3 Marks**
	b) A town has an average domestic sewage flow of 73,856 m^3/day with a BOD concentration of 650 ppm. A neighboring industrial estate adds about 31,325 m/day of sewage having 8060 kg of BOD to it. Compute the concentration of BOD in industrial and the combined sewage, the probable population and per capita flow of sewage and the population equivalents based on the BOD load and hydraulic load.		**4 Marks**
Q4	Explain the working of conventional activated sludge process (ASP) with flow diagram	CO-4	**4 Marks**
Q5	A main combined sewer is to be designed to serve an area of 12 sq.km with a population density of 250 persons/hectare. The average rate of sewage flow is 250 LPCD. The maximum flow of 100% in excess of average together with the rainfall equivalent of 15 mm in 24 hours, all of which are runoff Determine the capacity of the sewer. Taking the maximum velocity of flow as 3 m/sec., determine the size of the circular sewer.	CO- 3	**3 Marks**
Q6	Explain the significance and difference between BOD, COD, TOC and ThOD. Establish a possible correlation between these parameters.	CO-2	**2 Marks**
Q7	The population data for a certain town is given below. Find out the	CO- 1	**2**

	population in the year 2000 and 2010 by geometrical (using GM and AM) and decrease rate of growth methods respectively: **Year** / **Population** 1950 / 75,000 1960 / 110,000 1970 / 150,000 1980 / 200,000 1990 / 242,000	& 2	**Marks**
Q8	a) Design a rapid sand filter to treat a city of population 100000 with an average per capita demand of 160 lpcd.	CO- 4	**2 Marks**
	b) Design a grit chamber for a maximum wastewater flow of 10000 m^3 /day to remove particles up to of 0.25 mm diameter, having specific gravity of 2.65. The settling velocities of these particles are found to range from 0.02 to 0.025 m/sec. Maintain a constant flow through velocity of 0.28 m/sec through the provision of a proportional flow weir.		**2.5 Marks**
Q9	A treated wastewater is discharged at the rate of 1.5 cubic meters per second into a river of minimum flow of 5 cubic meters per second. The temperature of river flow and wastewater flow may be assumed as 25°C. The BOD removal rate constant K_1 is 0.12/ day (base 10). The BOD_5 at 25°C of the wastewater is 200 mg/l, and that of the river water upstream of the wastewater outfall is 1 mg/l. The efficiency of wastewater treatment is 80%. Evaluate the following: (i) BOD_5 at 25°C if river water receives untreated wastewater, (ii) BOD_5 at 25°C if river water receives treated wastewater, and (iii) Ultimate BOD of the river water after it receives treated wastewater.	CO-3 &4	**3.5 Marks**