

JK LAKSHMIPAT UNIVERSITY, JAIPUR

INSTITUTE OF ENGINEERING AND TECHNOLOGY

EndTerm Examination (Special), Jan.-Feb.2016

B. Tech in Civil Engineering, Semester V

Roll No.....

CE509: ENVIRONMENTAL ENGINEERING II

Time: 3 hours

Max. Marks: 100

Instructions to students:

1. Do not write anything other than your roll number on question paper.
2. Assume suitable data wherever required and mention it clearly.
3. Writing appropriate units, nomenclature, and drawing neat sketches/schematics/ flow chart wherever, required are an integral part of the answer.

Q.1A	Objective type multiple choice questions (10 questions @ 1 mark)	10
i.	Reaction Rate constant K for a WWT reactor depends on : (a) Temperature (b) Presence of Toxicity (c) Availability of nutrients and growth factor (d) All of the above (e) a and c only	
ii.	Primary Treatment Units in a STP reduces the BOD of waste water by about: (a) 75 to 90% (b) 65 to 80% (c) 15 to 30% (d) 50 to 60%	
iii.	The organic matter present in water body can be analyzed in laboratory by determining: (a) BOD (b) COD (c) TOC (d) All of above (e) Two of above	
iv.	The Unit of Turbidity is : (a) NTU (b) JTU (c) FTU (d) All of the above	
v.	Washing water (personal, cloths, floors, dishes etc.) known as: (a) Black water (b) Grey water (c) Storm water (d) Toxic water	
vi.	The sludge volume Index in Activated Sludge Process (ASP) varies from : (a) 50 to 150 mL/g of Suspended Solids (SS) (b)) 150 to 250 mL/g of Suspended Solids (SS)	

	(c)) 250 to 350 mL/ g of Suspended Solids (SS) (d)) 10 to 50 mL/ g of Suspended Solids (SS)	
vii.	The settling of sand particles in a chamber is assumed as : (a) Type -I settling (b) Type -II settling (c) Type -III settling (d) Type -IV settling	
viii.	The recirculation ratio of LRTF is : (a) 0.5 to 3.0 (b) Zero (c) 1.8 to 3.0 (d) 0.32 to 1.0	
ix.	In a water sample , the unit of measurement of color is : (a) TON (b) TCU (c) FNU (d) None of these	
x.	The biological reactor in which the organic matter is decomposed (oxidized) by aerobic bacteria may consist of : (a) Trickling filters (b) Activated Sludge Process(ASP) (c) Oxidation Pond (d) All are correct	

Q.2	Short answer type questions (4 questions @ 2.5 marks)	10
	i. Write short note on the following: a. Sewage b. Sewerage	
	ii. Write short note on the following: a. Concept of CETPs b. NGT	

Q.3A	The dissolved oxygen in an unseeded sample of diluted waste water having an initial DO of 9.0 mg/L is measured to be 3.0 mg/L after 5 days. The dilution fraction is 0.03 and reaction rate constant $k = 0.22 \text{ day}^{-1}$. Calculate: (a) 5 day BOD of the waste (b) Ultimate carbonaceous BOD (c) What would be remaining oxygen demand after 5 days?	05
Q.3B	Explain the different "Types of Samples" to be collected for water and waste water analysis	05

Q.4A	Explain the different types of Sewer Systems.	05
Q.4B	Waste water is expected to have BOD ₅ of about 200 mg/L. The initial DO of dilution water is 8.0 mg/L. Calculate the dilution requirement for BOD determination.	05

Q.5A	Locate the point of generation of liquid waste for a woven fabric finishing process in a textile mill industry with the help of typical industrial process block diagram.	05
Q.5B	Explain briefly the basic engineering approach for developing an industrial waste water treatment system.	05
Q.6A	Write short note on the following terms used in analysis and design of treatment plants: i. Process Loading Criteria ii. Hydraulic Profile	05
Q.6B	Write the " Water Quality Criteria " prescribed by Central Pollution Control Board(CPCB) as per following headings : i. Designated-Best-Use ii. Class of water iii. Criteria	05
	OR	
Q.6B	Define the "Flocculants Settling" and explain how does the efficiency of sedimentation tank affected by different conditions w.r.t. suspended solid and BOD removal.	05
Q.7A	Write short note on the following terms used in analysis and design of treatment plants: i. Process Loading Criteria ii. Hydraulic Profile	05
Q.7B	Draw a curve for BOD exerted and remaining with respect to time for organic waste water and derive the mathematical expression for both.	05
	OR	
Q.7B	Determine the 1 day BOD and ultimate first stage BOD for a waste water whose 5 day 200C BOD is 200 mg/L. The reaction rate constant k (base e) = 0.23 per day	05
Q.8A	Design a Bar Screen Chamber for average sewage flow of 20 MLD, minimum sewage flow of 12 MLD and maximum flow of 30 MLD. Take following assumptions: -Assume manual Cleaning -Angle of inclination of bar with horizontal is 300 -Assume bar size: 9mm × 50 mm × 9 mm facing the flow -Bar Spacing provided is 30 mm -No of bars provided is equal to 30	10
Q.9A	Design a grit chamber for population 50000 with water consumption of 135 LPCD. Assume the following data as: Sewage generation= 80% of water supply Horizontal velocity = 0.2 m/s Detention time period = 1 minute	10
Q.9B	Discuss about the important "Sewage Characteristics" in detail.	10
	OR	
Q.9B	Write down the design criteria for the following filters: i. LRTF ii. HRTF	10