

JK LAKSHMIPAT UNIVERSITY, JAIPUR

INSTITUTE OF ENGINEERING AND TECHNOLOGY

End Term Examination (Regular), Nov.-Dec.2015

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.	COD/BOD ratio for the sewage is around: (a) 2.7 (b) 3.8 (c) 5.9 (d) 1.7	
ii.	Water containing feces, urine and flush water from flush toilets is known as: (a) Black water (b) Grey water (c) Storm water (d) Toxic water	
iii.	The kinetics of BOD reaction can be formulated in accordance with (a) Second order reaction kinetics (b) First order reaction kinetics (c) Zero order reaction kinetics (d) Pseudo order reaction kinetics	
iv.	The correlation between BOD and COD for readily biodegradable waste, such as dairy waste: (a) $COD = BOD_u / 0.56$ (b) $COD = BOD_u / 0.65$ (c) $COD = BOD_u / 0.92$ (d) $COD = BOD_u / 0.29$	
v.	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)	
vi.	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	

vii	Attached- culture system of waste water treatment consist of : (a) Trickling filters (b) Rotating Biological Contactors (c) Both a & b are correct (d) Both a & b are incorrect	
viii	In a WWT plant , the submerged area of the surface of the screen, including bars and opening should be about : (a) 300% of the cross sectional area of the incoming sewer for separate system (b) 200% of the cross sectional area of the incoming sewer for combine system (c) 200% of the cross sectional area of the incoming sewer for separate system (d) 100% of the cross sectional area of the incoming sewer for combine system	
ix	The settling of grit particles in a chamber is assumed as : (a) Type -I settling (b) Type -II settling (c) Type -III settling (d) Type -IV settling	
x.	In a STP the appropriate location of Equalization basin is : (a) Before primary treatment (b) After primary treatment and before biological treatment (c) After Secondary treatment and before tertiary treatment (d) After tertiary treatment	
Q.2	Short answer type questions (4 questions @ 2.5 marks) i. Write short note on the following terms w.r.t. ASP: a. Solid Retention Time (SRT) or Mean Cell Residence Time (MCRT) b. Sludge Volume Index ii. Write the design features of : a. LRTF b. HRTF	10
Q.3A	The treated waste water is being discharged in to a river of 15 °C. The BOD rate constant determined in the laboratory for this mixed water is 0.12 per day. What fraction of maximum oxygen consumption will occur in first four days?	05
Q.3B	Determine the 1 day BOD and ultimate first stage BOD for a waste water whose 5 day 20°C BOD is 200 mg/L. The reaction rate constant k (base e) = 0.23 per day.	05
Q.4A	Write down the factors on which the efficiency of biogas generation depends, in a biogas plant.	05
Q.4B	Write brief note on the following types of Anaerobic digesters : a. Low rate digesters b. Two-stage digesters	05
Q.5A	Explain about the "flow patterns of reactors" .	05
Q.5B	Discuss about the important "Sewage Characteristics" in detail.	05

Q.6A	Classify the types of sludge generated during waste water treatment and explain each in detail.	05
Q.6B	Explain the difference between Effluent Standard System and Stream Standard System w.r.t. protection of Stream Quality.	05
OR		
Q.6B	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.7A	Describe the recommendations and specifications for designing of Primary Settling Tank (PST).	05
Q.7B	Define the "Flocculant Settling" and explain how does the efficiency of sedimentation tank affected by different conditions w.r.t. suspended solid and BOD removal.	05
OR		
Q.7B	Write the requirements and specifications for the design of Bar Screen.	05
Q.8A	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.9A	Design a Primary settling tank to treat waste water with average flow rate of 10 MLD and peak flow of 22.5 MLD. Assume the following data as: detention time = 1.5 h width= 6.0 m	10
Q.9B	Explain in detail the following "Aeration Units" with diagram , used for aeration purpose in activated sludge process (ASP): a. Diffused air aeration unit b. Mechanical aeration unit	10
OR		
Q.9B	Design a Low Rate Trickling Filter (LRTF) to treat 6.0 MLD of sewage of BOD of 210 mg/L. The final effluent should be 30 mg/L and organic loading rate is 320 g/m ³ /d.	10