Reg. No.



MANIPAL INSTITUTE OF TECHNOLOGY MANIPAL

A Constituent Institution of Manipal University

VII SEMESTER B.TECH. (CIVIL ENGINEERING) END SEMESTER EXAMINATIONS, NOV/DEC 2016 SUBJECT: ENVIRONMENTAL ENGINEERING II [CIE 407]

REVISED CREDIT SYSTEM (06/12/2016)

Time: 3 Hours

MAX. MARKS: 50

Instructions to Candidates:

- ✤ Answer ANY FIVE FULL questions.
- ✤ Missing data may be suitable assumed.

1A.	Discuss the importance of i) Sewer ventilation ii) Antisiphonage pipes iii) Self cleansing velocity iv) Limiting velocity.	04
1B.	A stone ware sewer, 30cm m diameter is laid at a gradient of 1 in 100. Using Manning's rugosity coefficient as 0.013, calculate the velocity, discharge and Chezy's constant when the sewer is running full.	02
1C.	Explain the terms of concentration, time of inlet and time of flow. What is significance of time of concentration in sewer designs?	04
2A.	Explain with neat sketch the purpose and working of oil and grease trap in sewage system.	03
2B.	Describe the working principle of airlift pump with a neat sketch.	03
2C.	Find the-minimum velocity and gradient required to transport coarse sand through a sewer of 60cm dia with sand particles of 1mm diameter. And specific gravity 2.66. Assume β =0.06 and f=0.02. Assume the sewer to run half full. Take Manning's coefficient as 0.012.	04
3A.	The BODs of the wastewater has been measured as 600 mg/1 . If k =0.36/day (base e) at 30° C, what is the ultimate BOD of the wastewater? What proportion of the ultimate BOD would remain unoxidised after 20 days?	03
3B.	Write a short note on i) Communutors ii) Skimming tank	04
3C.	Explain with the neat sketch zones of pollution along the stream when wastewater is discharged in to it.	03
4A.	The average operating data for conventional activated sludge treatment plant as follows: (i). Wastewater flow = $35000 \text{ m}^3/\text{ day}$ (ii). Volume of aeration tank = 10900m^3	04

	(iii). Influent $BOD = 250 \text{ mg/l}$	
	(iv). Effluent $BOD = 20 \text{ mg/l}$	
	(v). Mixed liquor suspended solids (MLSS) = 2500 mg/l	
	(vi). Effluent suspended solids = 9700 mg/l	
	(vii). Quantity of waste sludge = $220 \text{ m}^3/\text{ d}$	
	Based on the information above, Determine:	
	(a) Aeration period	
	(b) Food to Microorganism ratio	
	(c) Percentage efficiency of BOD removal	
	(d) Mean cell residence time	
4B.	What is recirculation ratio? List the advantages of recirculation in Trickling filter	03
4C.	Explain different process in anaerobic digestion of sludge.	03
	Define the following	
5 ^	(i). Hazardous waste	
	(ii).E waste	05
57.	(iii). CETP	00
	(iv). Zero effluent discharge	
	(v). Relative stability	
5B.	Explain the different methods adopted for solid waste collection	05
6A.	With the neat sketch briefly explain any three methods of sewage farming	03
6B.	list the various impacts of steel industry effluent on water bodies and treatment	04
	facilities	
6C.	Define Disinfection. List various disinfectants used in sewage treatment. Explain	03
	how bleaching powder acts as disinfectants.	