

Name:  
Enrolment No:



**UNIVERSITY OF PETROLEUM AND ENERGY STUDIES**  
**Online End Semester Examination, December 2020**

**Course: Environmental Engineering II**  
**Program: B.Tech (Civil Engineering)**  
**Course Code: CIVL 4001**

**Semester: VII**  
**Time 3 hrs.**  
**Max. Marks: 100**

**Instructions: All questions are compulsory to attempt.**

**SECTION A (30 Marks)**

S. No.	Question	Marks	CO
Q 1.	The various forms of nitrogen which can be present in wastewater are _____, _____, _____ and _____.	5	CO2
Q 2.	Enlist the different processes of preliminary sewage treatment.	5	CO3
Q 3.	Define the terms: Relative Stability and Population Equivalent.	5	CO2
Q 4.	Define the terms: Time of Concentration and Critical Rainfall Duration.	5	CO1
Q 5.	The various forces which are likely to act on the sewer pipes in a sewerage system are _____, _____, _____ and _____.	5	CO1
Q 6.	The four different zones of pollution in a river stream are _____, _____, _____ and _____.	5	CO4

**SECTION B (50 Marks)**

Q 7.	Explain the various natural forces of purification which can affect the self-purification process of natural streams.	10	CO4
Q 8.	Discuss the egg shaped sewer sections along with its critical points.	10	CO1
Q 9.	The BOD of a sewage sample incubated for 3 days at 28°C was found to be 180 mg/l. Calculate the value of 5 day 20°C BOD for the sewage sample. Assume k at 20°C as 0.23 per day.	10	CO2
Q 10.	Design a septic tank for a small colony of 230 persons provided with an assured water supply from the municipal load works at a rate of 125 liters per capita per day. Assume suitable data wherever needed in accordance with design guidelines	10	CO3
Q 11.	A sludge digestion tank has to be designed for the primary sludge with an average sewage flow of 18 Mld. The total suspended solids concentrations in raw sewage is 280 mg/l and the moisture content of digested sludge comes out to be 85%. Design a sludge digestion tank for the above stated purpose. Assume any other suitable data according to design guidelines.	10	CO4

**SECTION-C (20 Marks)**

Q12.	<p>a. Explain the hydraulic loading rate and organic loading rate parameters for a trickling filter.</p> <p>b. Design suitable dimensions for a conventional circular trickling filter treating sewage having flow of 7 Mld and BOD content=250 mg/l. Also design the central column dimensions of rotary distributor for the above flow taking assumptions according to the design considerations.</p> <p style="text-align: center;">OR</p> <p>A conventional activated sludge plant (ASP) with diffused aeration system has to construct for treatment of domestic sewage from a town with population of 50,000. The average sewage flow is 183 lpcd and BOD of raw sewage is 230 mg/l. Before the treatment in ASP, the BOD removal in primary treatment is found to be 35% and overall BOD reduction desired is 95%. Take F/M ratio as 0.33 and MLSS concentration as 2000 mg/l. Calculate the efficiency required in activated sludge plant and the volume of the aeration tank required for the above treatment. Also check for the hydraulic retention time and volumetric loading for the plant.</p> <p>.</p>	05  15          20	CO3
------	--	--	-----