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D – 3402

Reg. No. :

Name :

**Eighth Semester B.Tech. Degree Examination, December 2017
(2008 Scheme)**

08.803 : ENVIRONMENTAL ENGINEERING – II (C)

Time : 3 Hours

Max. Marks : 100

PART – A

Answer **all** questions.

1. Discuss the common impurities that are anticipated in wastewater.
2. Explain the land disposal techniques conventionally practiced in India for wastewater management.
3. Explain with a line sketch the operational units employed in the primary treatment of sewage in a conventional waste treatment plant.
4. Discuss the situations where sanitary engineers prefer 'High-Rate trickling filters' over 'conventional trickling filters'. Is it a suitable option in Indian context ?
5. Explain the health issues you anticipate due to the unscientific disposal of septic tank effluents as practiced in many parts of our country. Suggest a scientific solution to the problem.
6. Explain the philosophy of 'sludge digestion' and the factors affecting the process.
7. Differentiate 'oxidation ponds' and 'aerated lagoons' used in wastewater treatment. Which one is more cost-effective and environment-friendly ?
8. Explain with a neat sketch the various elements of a typical house drainage plan.

(8×5=40 Marks)

P.T.O.



PART – B

Answer **one full** question from **each** Module.

Module – 1

9. a) Discuss the salient features of a BOD progression curve. Explain the significance of BOD/COD ratio in the context of recommending the conventional segregation of 'Biodegradable' and 'non-biodegradable' wastes, as commonly practiced. 10
- b) Determine the 1 day BOD and ultimate first-stage BOD for a wastewater whose 5-day 20°C BOD was 200 mg/L. The reaction rate constant at 20°C (base e) is 0.234/day. 10

OR

10. A Municipal wastewater treatment plant discharges 18000 m³/day of treated wastewater into a stream. The wastewater has a BOD₅ of 30mg/L with de-oxygenation constant of 0.23/d at 20°C (base e). The temperature of the wastewater is 27°C, and the DO is 2.0 mg/L. The stream just above the point of wastewater discharge flows at 0.65m³/s, has a BOD₅ of 5.0 mg/L and is 90% saturated with oxygen. The temperature of the stream is 23°C. After mixing, the stream and wastewater flows at 0.5m/s with a re-oxygenation constant of 0.43/d (base e). Determine :
- a) The DO level of the stream after the 2nd day
- b) Critical DO level and
- c) How far downstream critical DO will occur ? 20

Module – 2

11. Design the dimensions of a septic tank as per IS specifications for a college hostel housing 150 inmates. Draw a cross-sectional elevation of the tank with proper inlet and outlet arrangements. 20

OR

12. Design the dimensions of a high-rate trickling filter for a treatment plant for the following data : Sewage flow 5.5 MLD, Recirculation ratio 1.4, BOD of influent 268 mg/L, final effluent BOD desired 20 mg/L. Assume suitable data if required. 20



Module - 3

13. a) Explain why sanitary engineers recommend 'thickening' of sludge. Explain how it is physically achieved in a wastewater treatment plant. **10**
- b) With sketches explain the scientific methods of sludge disposal. **10**

OR

14. a) Describe the design considerations of a typical sludge digestion tank and explain how the design ensures safety against foaming. **8**
- b) Explain how the design approaches of a 'sewer' differ from that of a water - main. **4**
- c) Determine the size of a circular sewer for carrying a discharge of 0.6 cumecs of wastewater and running half-full. Assume the slope of the sewer as 0.0001 and Manning's N as 0.015. **8**

