

Code: CE6T4

III B.Tech - II Semester – Regular Examinations – May 2017

**ENVIRONMENTAL ENGINEERING-II
(CIVIL ENGINEERING)**

Duration: 3 hours

Max. Marks: 70

PART – A

Answer *all* the questions. All questions carry equal marks

11x 2 = 22 M

1.

- a) What is sewage? List out types of sewage systems.
- b) Define inlet time and gutter flow time.
- c) Define dry weather flow and wet weather flow.
- d) Define aerobic and anaerobic decomposition.
- e) What is the necessity and uses of skimming tanks in India?
- f) Write a note on diffused air aeration.
- g) Define activated sludge process.
- h) Define sludge age.
- i) Write a note on sludge thickening.
- j) How would you classify the industrial solid wastes?
- k) What are the factors that affect generation rates of municipal wastes?

PART – B

Answer any *THREE* questions. All questions carry equal marks.

3 x 16 = 48 M

2. a) Design an outfall circular sewer of the separate system for a town with a population of 1,00,000 persons with a water supply at 180 litres per head per day. The sewer can be laid at a slope of 10 in 10,000 with $n=0.012$. A self-cleansing velocity of 0.75 m/sec is to be developed. The dry weather flow may be taken as $1/3$ of the maximum discharge. Given the following data: 8 M

Proportionate Depth	Proportionate Velocity	Proportionate Discharge
0.31	0.7901	0.2086
0.35	0.8430	0.2629
0.37	0.8675	0.2981
0.39	0.8909	0.3217
0.40	0.9022	0.3370
0.42	0.9299	0.3682

- b) What are the different types of storm water regulators used in a sewerage system? Explain briefly the working of each of these with sketches 8 M

3. a) Calculate the BOD of 5 days and ultimate BOD of sample assuming that the, BOD rate constant is 0.23 day^{-1} (base e) 6 M
- b) Describe the principles involved in the design and construction of i) Septic tank and ii) Grit chamber with the aid of sketches 10 M
4. a) Differentiate between standard rate filters and high rate trickling filters. 6 M
- b) An average operating data for conventional activated sludge treatment plant is as follows: 10 M
- Waste water flow= $35000 \text{ m}^3/\text{d}$
 - Volume of aeration tank= 10900 m^3
 - Influent BOD= 250 mg/l
 - Effluent BOD= 20 mg/l
 - Mixed liquor suspended solids = 2500 mg/l
 - Effluent suspended solids= 30 mg/l
 - Waste sludge suspended solids = 9700 mg/l
 - Quantity of waste sludge= $220 \text{ m}^3/\text{d}$
- Based on the information above, determine
- i) Aeration period
 - ii) Food to microorganisms ratio(F/M) (kg BODper day/ kg MLSS)
 - iii) Percentage efficiency of BOD removal
 - iv) Sludge age (days)

5. a) Explain the disposal of dewatered sludge. 6 M

b) Raw waste water is entering a treatment plant and contains 250 mg/l suspended solids. If 55% of these solids are removed in sedimentation. 10 M

i) Find the volume of raw sludge produced per million litre of waste water. Assume that the sludge has a moisture content of 96 %, and specific gravity of solids is 1.2

ii) Find the unit weight of raw sludge

iii) If 45% of raw sludge is changed to liquid and gas in the digestion tank, find the volume of digested sludge per million litre of waste water. Assume that the moisture content of the digested sludge is 90%

6. a) Explain the collection and disposal of solid wastes from High rise buildings. 8 M

b) Draw the flow sheet for the recovery of ferrous materials and energy from solid wastes. 8 M