

Total No. of Questions :6]

SEAT No. :

P50

OCT. -16/BE/Insem. - 101

[Total No. of Pages :3

B.E. (Civil)

ENVIRONMENTAL ENGINEERING - II

(2012 Course) (401001) (Semester - I)

Time : 1 Hour]

[Max. Marks :30

Instructions to the candidates:

- 1) Attempt Q1 or Q2, Q3 or Q4, Q5 or Q6. Figures to the right indicate full marks.
- 2) Draw neat figures wherever necessary.
- 3) Assume necessary data.
- 4) Use of scientific calculators is allowed.

Q1) a) A 600 mm diameter sewer is to flow at 0.35 depth on a grade ensuring a degree of self - cleaning equivalent to that obtained at full depth at a velocity 0.7 m/sec. [5]

Given data:

$$\frac{\text{area (a)}}{\text{Area (A)}} = 0.315, \quad \frac{\text{perimeter (p)}}{\text{Perimeter (P)}} = 0.472, \quad \frac{\text{radius (r)}}{\text{Radius (R)}} = 0.7705,$$

$$N = 0.014$$

Determine

- i) Required grade
 - ii) Associated velocity
- b) Determine treatability index of wastewater for given data and suggest type treatment with respect to treatability index. [5]

Given data:

Sr. No.	BOD ₅ day(mg/L)	COD (mg/L)
1	97	249
2	47	249

OR

P.T.O.

- Q2)** a) Write short note on classification of rivers as per MoEF & CC, Govt. of India. [5]
- b) BOD of a sewage at 5 day 30°C is 150 mg/L. Calculate its 5 day 20°C BOD. Assume deoxygenation constant at 20°C $K_{20} = 0.1$. [5]

- Q3)** a) Design a bar screen for a peak discharge average flow 45 million liters day. [5]

Given data:

- i) Size of bar 9 mm × 50 mm, with 9 mm dimensions facing the flow.
 - ii) Clear spacing between the bars 36 mm
 - iii) Bars are kept an inclination of 45° with vertical
 - iv) Velocity through screen is 0.8 m/sec. at peak flow.
- b) Draw flowchart of conventional sewage treatment plant and explain significance of each unit in brief. [5]

OR

- Q4)** a) Design a grit chamber for a maximum sewage flow of 10000 m³/d, to remove particles upto 0.2 mm diameter having a specific gravity of 2.65. The settling velocity of these particles is found from 0.02 m/sec, maintain a constant flow through velocity of 0.3 m/sec. Assume depth 1m. [6]
- b) Draw a schematic sketch of circular primary sedimentation tank. Write principle of sedimentation tank of removal of solids particle. [4]

- Q5)** a) The mixed liquor suspended solid concentration (MLSS) in an aeration tank is 3000 mg/L and sludge volume after 30 minutes of settling in a 1000 ml graduated cylinder is 135 ml. [5]

Calculate

- i) SVI
 - ii) Required return sludge ratio
 - iii) Suspended solids concentration in the recirculated sludge
- b) Write short note on rotating biological contractor. [5]

OR

Q6) a) Define sludge bulking. Write any four causes and remedial measures for sludge bulking. **[5]**

b) Determine the size of a high rate trickling filter for the following data **[5]**

- i) Sewage flow = 4MLD
- ii) Recirculation ratio = 1.5
- iii) BOD of raw sewage = 230 mg/L
- iv) BOD removed in primary sedimentation tank = 30%
- v) Final effluent BOD = 20 mg/L
- vi) Depth of filter = 2m

