Total No. of Questions :6]

P50

SEAT No. :

[**Total No. of Pages :3**

OCT. -16/BE/Insem. - 101
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 m^3/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

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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