

Total No. of Questions : 10]

SEAT No. :

P4088

[Total No. of Pages : 3

[5461]-501

B.E. (Civil)

ENVIRONMENTAL ENGINEERING - II

(2015 Pattern)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) Attempt Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8 and Q.9 or Q.10.
- 2) Figures to the right indicate full marks.
- 3) Draw neat figures wherever necessary.
- 4) Assume any missing data if necessary.
- 5) Use of scientific calculators is allowed.

- Q1)** a) Write objective and methodology adopted for cleaning of rivers in National River Cleaning Plan. [5]
- b) Draw a process flowchart for sewage treatment plant (STP) consisting primary and secondary treatment. [5]

OR

- Q2)** a) 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	155	297
2	95	297

- b) What is the sludge bulking? Explain the control measures for the same. [5]
- Q3)** a) Differentiate conventional and high rate tricking filter. [5]
- b) Write the different disposal methods of grit and explain any one method of disposal of grit. [2+3]

OR

- Q4)** a) Write Streeter-Phelps equation and explain the meaning each term involved in it. [2+3]
- b) Write working principle of rotating biological contractor, advantages and disadvantages. [1+2+2]

P.T.O.

Q5) a) Write working principle of purification of wastewater treatment of root zone cleaning system; draw its schematic sketch and write its application. **[2+3+2]**

b) Design an oxidation pond for following data. **[8]**

- i) Location = 28° latitude
- ii) BOD loading at 28° latitude = 200 kg/ha/d.
- iii) Elevation = 1200 m above sea level.
- iv) Mean monthly temperature = 35°C maximum and 15°C minimum.
- v) Sky clearance is more than 75%.
- vi) Population to be served = 25000.
- vii) Sewage flow = 1001 pcd.
- viii) Inlet $\text{BOD}_5 = 200 \text{ mg/l}$
- ix) Desired effluent $\text{BOD} = 20 \text{ mg/l}$
- x) Pond removal constant at $20^{\circ}\text{C} = 0.1/\text{d}$.

OR

Q6) a) Design an aerated lagoon for following data. **[8]**

- i) Raw sewage flow = 20 MLD
- ii) Raw sewage $\text{BOD}_5 = 200 \text{ mg/l}$
- iii) Desired $\text{BOD}_5 = 20 \text{ mg/l}$
- iv) Kinetic constant : $Y = 0.6/\text{d}$ BOD removal rate constant (K_d) at $20^{\circ}\text{C} = 0.1/\text{d}$
- v) Hydraulic retention time (SRT) = 6 days
- vi) Endogenous decay coefficient $k_d = 0.06$
- vii) Mean cell residence time = 10 days
- viii) $f = 0.68$
- ix) Assume depth of aerated lagoon = 2m
- x) Assume length to width ratio = 3

Determine,

- a) Volume and dimensions of aerated lagoon
- b) Oxygen requirement

b) Write working principle of phytoremediation technology for wastewater treatment; draw its schematic sketch and write its application. **[2+3+2]**

- Q7)** a) Write principle and stages of anaerobic digestion. Explain factors affecting digestion process. [2+2+3]
b) Explain any two methods of sludge disposal with advantages disadvantages and application. [8]

OR

- Q8)** a) Draw a neat sketch of up flow anaerobic sludge blanket (UASB) reactor. Explain the principle of working and comment on its suitability for treatment of industrial waste water. [2+3+2]
b) Draw neat sketch of conventional sludge digester and explain the following : [8]
i) Different stages of digestion process.
ii) Design parameters of anaerobic digester.
iii) Capacity of digester.

- Q9)** a) Explain with neat sketch equalization and proportioning as applicable to Industrial Waste Treatment. [8]
b) Explain the following points related to dairy industry. [6]
i) Characteristics of wastewater.
ii) Flow sheet of wastewater treatment.
c) Enlist different units used in preliminary, primary and secondary treatment in industrial wastewater treatment. [2+2+2]

OR

- Q10)** a) Explain with a neat sketch importance of neutralization as applicable to Industrial Wastewater Treatment. [8]
b) What are the process carried out to recycle and reuse of treated wastewater. [6]
c) Explain the following points related to sugar industry: [6]
i) Characteristics of wastewater.
ii) Flow sheet of wastewater treatment.

