P4088

[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]**

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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= 1001pcd.

viii) Inlet BOD_5 = 200 mg/l

ix) Desired effluent BOD =:20 mg/l

x) Pond removal constant at 20°C = 0.1/d.

OR

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

i) Raw sewage flow = 20 MLD

ii) Raw sewage BOD_5= 200mg/l

iii) Desired BOD_5= 20mg/l

iv) Kinetic constant : Y = 0.6/d BOD removal rate constant (K_d) at 20C = 0.1/d

v) Hydraulic retention time (SRT) = 6 days

vi) Endogenous decay coefficient kd = 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]**

<div align="center">OR</div>

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]**

<div align="center">OR</div>

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.

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