[4760]-91

M.E. (Civil) (Water Resources and Environmental Engg.)
INDUSTRIAL WASTE MANAGEMENT
(2012 Course) (Semester - II) (Elective - III) (501611)

Time : 3 Hours]   *[Max. Marks :100*

Instructions to the candidates:

   1) Answers to the two sections should be written in separate answer books.

   2) Attempt any three questions from each section.

   3) Neat diagrams must be drawn wherever necessary.

   4) Figures to the right side indicate full marks.

   5) Use of calculator is allowed.

   6) Assume suitable data if necessary.

   7) Use data sheet.

SECTION - I

Q1) a) Explain physical, chemical & biological characteristics of industrial waste water. **[8]**

    b) Explain design of CETP. **[8]**

Q2) a) Explain sampling technique. **[8]**

    b) Explain techniques for reduction of waste. **[8]**

Q3) a) Plot the BOD curve and calculate K_t & L_t for the following data **[8]**

Time days	2	4	6	8	10
BOD mg/L	10	20	23	25	30

    b) Explain the concept of self purification of stream. **[8]**

Q4) a) Explain different methods for removal of TDS. **[8]**

    b) Explain working of digester. **[8]**

P.T.O.

Q5) a) The BOD of industrial W.W. for 1 day at 30°C has been found to be 110 mg/L What will be the 5 day BOD at 20°C. Take $K_D(20°C) = 0.1$. **[9]**

b) Explain the concept of anaerobic sludge digestion with three phases such as hydrolysis, acidogensis, methonagesis and also explain conventional sludge digester with diagram. **[9]**

SECTION - II

Q6) a) The treated W.W. with flow of 2000 L/min is to be treated with PAC to reduced concentration of total organic nitrogen from 5 mg/L to 1 mg/L. The removal follows Freundlich adsorption isotherm in which capacity factor and intensity parameter are 160 mg/gm $(L/mg)^{1/n}$ & 0.5 respectively. Determine PAC dose, PAC requirement and annual cost of PAC. Assume PAC cost to be Rs. 50/- per kg. **[8]**

b) Explain operation and maintenance problem of CETP. **[8]**

Q7) a) Draw a flow diagram for treating W.W. of dairy industry & show all treatment unit. **[8]**

b) Draw a flow diagram for treating W.W. of textile industry and show all treatment unit. **[8]**

Q8) a) Explain the electro dialysis process and determine power required for electro dialysis process for the following data. **[8]**

i) $Q = 4000 \ m^3/d$,

ii) TDS = 2000 mg/L,

iii) No of Cells = 300

iv) Cation and anions concentration = 0.011 Eq/L,

v) Salt removal Efficiency = 50%, Current efficiency = 90%., R = 50 ohm Use data sheet if required.

b) Explain importance of treatability index in waste water treatment. **[8]**

*Q9)*a) Explain the characteristics of sugar industrial waste with value and state disposal method of industrial treated waste with flow diagram. **[8]**

b) Write short note on water pollution act 1978. **[8]**

*Q10)*a) Design CETP for following data **[9]**

i) Q = 150 m^3/d,

ii) pH = 11 - 12.

iii) BOD at 27°C = 70 mg/L

iv) TDS = 3000 mg/L

v) TS = 6000 mg/L

vi) Iron concentration = 700 mg/L

vii) COD = 5000 mg/L at 27°C

Find

1) Volume of sedimentation tank.

2) Acid required for neutralization if 3 lit acid required for 1 m^3/d of E/F pH.

3) Quantity of lime required for removal of Iron take lime consumption as 1 mg/L of Iron required 0.5 mg/L of lime.

4) Select suitable method for removal of COD and BOD

5) F/M ratio

b) Write short note on hazardous waste management. **[9]**

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