Total No. of Questions : 10]

SEAT No :

P2949

[Total No. of Pages :3

[5154]-501
B.E.(Civil)
ENVIRONMENTAL ENGINEERING-II
(2012 Course) (End Sem.) (401001) (Semester-I)

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 necessary data.***
5) ***Use of scientific calculators is allowed.***

Q1) a) Differentiate between separate and combined sewerage system. **[5]**

b) Explain the procedure for determination of BOD. **[5]**

OR

Q2) a) What are the sources of sewage and how sewage flow quantity is estimated? **[5]**

b) Explain the procedure for determination of COD. **[5]**

Q3) a) Determine diameter and depth of primary sedimentation tank for sewage flow 10 million liters per day. **[5]**

Given data.

i) Detention time = 2.5 hours

ii) Surface loading rate = 40000 $1/m^2/d$

b) Write streeter-Phelps equation, explain the terminology and write its application. **[5]**

OR

P.T.O.

Q4) a) An average operating data for conventional activated sludge treatment plant is as follows **[2+2+2]**

i) Sewage flow = 30000 m^3/d
ii) Volume of aeration tank = 10500 m^3
iii) Influent BOD = 200 mg/l
iv) Effluent BOD = 20 mg/l
v) Mixed liquor suspended solids = 3000 mg/l
vi) Effluent suspended solids = 30 mg/l
vii) Waste sludge suspended solids = 9500 mg/l
viii) Quantity of waste sludge =200 m^3/d

Determine.

1) Food to microorganisms ratio
2) Sludge age
3) Percentage of efficiency of BOD removal

b) Differentiate between single stage and two stage filter. **[4]**

Q5) a) Design an oxidation pond for following data **[8]**

i) Location : 24° Latitude
ii) BOD loading at 24° Latitude : 225 kg/ha/d
iii) Elevation : 900 m above sea level
iv) Mean monthly temperature : 30° maximum and 15° minimum
v) Population to be served : 10000
vi) Sewage flow : 100 lpcd
vii) Desired effluent BOD5 : 20 mg/L
viii) Pond removal constant at 20°C : 0.1/d

b) Write wastewater treatment principle of phytoremediation technology and explain its working with schematic sketch. **[4+4]**

OR

Q6) a) A wastewater flow is 10000 m^3/d, BOD_5 is 200 mg/L, design an aerobic flow through type lagoon to serve a town of 50000 persons, using a ideal complete mixing model. Since the lagoon is proposed to be followed by another treatment unit, its size can be restricted to give a detention time of only 3 days. **[8]**

Given data

k=0.015 per day at 20°C, Y = 0.5, k_d = 0.07 per day

b) Write wastewater treatment principle of root zone cleaning system and explain its working with schematic sketch. **[4+4]**

Q7) a) Draw a neat sketch of upflow sludge blanket (UASB) reactor. Explain the principle of working and its advantages and disadvantages. **[2+2+4]**

b) The sludge is known to be 70% organic and 30% inorganic in nature. Approximately 60% of the organic fraction is converted to liquid and gaseous end products after a 30 day period. The digested sludge has a solids content of 5% and must be stored for periods of up to 85 days. Determine the volume of requirement for a standard rate single stage digester. The raw sludge loading rate is 80 m^3/d. **[8]**

OR

Q8) a) Write principle and stages of anaerobic digestion. Explain factors affecting digestion process. **[4+4]**

b) Explain any two methods of sludge disposal with advantages, disadvantages and application. **[4+4]**

Q9) a) Explain methods of waste water sampling. **[6]**

b) Write short note on equalization and neutralization. **[6]**

c) Draw and explain units of treating dairy wastewater. **[6]**

OR

Q10)a) Explain the following points related to sugar industry. **[4+3+3]**

i) Flow sheet of manufacturing process and wastewater generation

ii) Characteristics of wastewater

iii) Flow sheet of wastewater treatment

b) Explain in brief primary and secondary treatment process adopted for treating industrial wastewater. **[4+4]**

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