Total No. of Questions : 10] **SEAT No. :**

P3015 **[Total No. of Pages : 4**

[5354]-501
B.E. (Civil)
ENVIRONMENTAL ENGINEERING - II
(2012 Pattern)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:-

1) ***Solve Q.No. 1 or 2, 3 or 4, 5 or 6, 7 or 8, 9 or 10.***
2) ***Figures to the right indicate full marks.***
3) ***Draw neat diagram wherever necessary.***
4) ***Use of logarithmic table, slide rule and electronic pocket calculator are allowed.***
5) ***Assume suitable data if necessary, stating it clearly.***

Q1) a) Explain the method of estimating quantity of domestic sewage flow. Hence determine the quantity of maximum sewage flow generated from a town having population of 40000 and water supply rate of 150 lpcd. Take peak factor of 3. **[6]**

b) State various formulae used for computing velocity of flow in sewer, explain any one. **[4]**

OR

Q2) a) Explain the principle and working of following appurtenances. **[6]**

i) Oil and grease trap

ii) Automatic flushing tank.

b) During BOD measurement, 20 ml of sample was diluted to l000ml. If Initial DO of the sample = 9.2mg/L and DO after 5 days = 4mg/L, determine 5day BOD of the sample. The experiment was conducted at 20° C. **[4]**

Q3) a) Enlist different methods used for secondary treatment of sewage and hence explain any one method with flow chart. **[6]**

b) What is self purification of a river? Hence explain the factors responsible for self purification of a polluted river. **[4]**

P.T.O.

OR

Q4) a) Differentiate between completely mixed activated sludge process and extended aeration process. **[6]**

b) What is DO deficit? How DO deficit can indicate pollution status of a river? **[4]**

Q5) a) Differentiate between aerated lagoon and oxidation pond. **[4]**

b) Write short note on rotating biological contactors (RBC). **[4]**

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

i) Raw sewage flow = l0 MLD

ii) Raw sewage BOD_5 = 200mg/L

iii) Desired BOD_5 of treated effluent = 20 mg/L

iv) BOD removal rate constant = 0.l/d

v) BOD loading rate for the given latitude of the place = 250Kg/Ha/d.

vi) Elevation of the place = 550m above MSL

Determine,

A) Area of the oxidation pond

B) Detention time required

C) Dimensions of the pond

OR

Q6) a) Differentiate between aerated lagoon and facultative aerated lagoon. **[4]**

b) Write short note on root zone treatment system for sewage treatment. **[4]**

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

i) Raw sewage flow = l0 MLD

ii) Raw sewage BOD_5 = 200mg/L

iii) Desired BOD_5 of treated effluent = 20 mg/L

iv) kinetic constants:

Y = 0.6, Kd = 0.06/d, BOD removal rate constant(Kd) at 20°C = 0.l/d

v) SRT = 06 days

Determine,

A) Volume and dimensions of aerated lagoon

B) Biological solids produced during treatment

C) Oxygen requirement

Q7) a) What is sludge thickening? Hence write short note on gravity thickener. **[4]**

b) Differentiate between standard rate and high rate digester. **[4]**

c) Design a standard rate digester for treatment of sludge produced from a sewage treatment consisting activated sludge process using following data. **[10]**

i) Sewage flow =6MLD,

ii) Raw sewage BOD = 200 mg/L,

iii) Suspended solids in raw sewage = 420 mg/L,

iv) Solid content in primary sludge = 4% and specific gravity of solids = 1.10

v) Efficiency of primary clarifier = 70%,

vi) MLSS = 3000mg/L,VSS/SS = 0.8, MCRT = l0days, Y = 0.6 and K_d = 0.06

vii) Solid content in secondary sludge = 1.5% and specific gravity of solids = 1.02

viii) Percentage of volatile matter in raw mixed sludge = 70% and fixed matter = 30%

OR

Q8) a) Explain the principle and working of UASB reactor. **[4]**

b) Explain the principle and working of septic tank and comment on the quality of treated effluent. **[4]**

c) Draw a flow chart of sewage treatment plant consisting of activated sludge process as method of secondary treatment. Show all important flow lines. Write principal of working of each unit and the impurities removed in each stage of the treatment plant. **[10]**

Q9) a) Explain the principle of working and need of following treatment units **[8]**

i) Equalization and

ii) Neutralization

b) State the sources and characteristics of dairy wastewater and draw suitable treatment flow sheet. **[8]**

OR

Q10) State the sources and characteristics of following wastewater. Hence draw suitable flow diagram for treatment of these wastewater. **[16]**

a) Distillery wastewater

b) Sugar factory wastewater