Total No. of Questions : 8]

SEAT No. :

P4049

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M.E. (Civil) (Water Resources and Environmental Engineering)

ENVIRONMENTAL CHEMISTRY & MICROBIOLOGY

(2013 Course) (Semester - I) (501082)

Time : 3 Hours] *[Max. Marks :50*

Instructions to the candidates:

1) ***Answer any five questions.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Use of calculator is allowed.***
5) ***Assume suitable data, if necessary.***
6) ***Use data sheet.***

Q1) Attempt the following (Any Five) : **[10]**

a) Various types of chemical reactions.

b) Various laws in mass transfer.

c) Air sampling technique in ambient air.

d) Automobile pollution.

e) Lapse Rate.

f) AAS.

Q2) Attempt any five : **[10]**

a) What is bio-kinetic coefficient?

b) What are the application of bio-kinetic constant?

c) Explain working of trickling filter.

d) Write the working of ASP.

e) Give Design steps of Septic tank.

f) What is Anoxic treatment?

P.T.O.

Q3) Attempt any two : **[10]**

a) Explain Growth of Rate Curve.

b) Various characteristics of Bacteria.

c) Write short note on Prokaryotic & Eukaryotic cell.

d) Differentiate between aerobic & anerobic metabolism.

Q4) a) Given the following data of operating ASP. **[8]**

i) Waste water flow Q = 35000 m^3/d.

ii) Inffluent total solids = 600 mg/d.

iii) Inffluent suspended solids = 120 mg/l.

iv) Inffluent BOD S_0 = 175 mg/l.

v) Effluent total solids = 495 mg/l.

vi) Effluent suspended solids = 22 mg/l.

vii) Effluent BOD S = 20 mg/l.

viii) MLVSS x = 2500 mg/l.

ix) Return sludge concentration x_r = 9800 mg/l.

x) Volume of aeration basin = 1000 m^3.

Determine :

1) Aeration period.

2) BOD load in Kg/m^3/d.

3) F/M Ratio.

4) Recirculation Ratio.

5) Total solid, suspended solids & BOD Removal efficiency.

b) Explain Waste generation Rate & Energy Recovery from SWM. **[2]**

Q5) Estimate size of aerobic digestion required to treat the sludge from PST designed to treat 80 MLD Waste Water check the volumetric & Estimate the % stabilization of atm. of gas produced per capita per day, for the waste water to be treated. It has been found that the quantity of dry solids & BOD ultimate removed is 0.2 kg/m^3 & 0.4 kg/m^3 resp. Assume that the sludge contain 99% moisture & has a specific quantity of 1.03. Other design assumptions are as follows : **[10]**

a) Sludge age = 10 days at 30ºC.

b) Efficiency of utilization = 0.6.

c) Y = 0.05.

d) Kd = 0.03 per day.

Q6) Explain how Environment is polluted by Natural contaminants & particulate matter. **[10]**

Q7) a) Design multi cyclone chamber for Flue gas of 12 m^3/sec. Assume all the necessary data. **[6]**

b) Explain working of absorption process in details. **[4]**

Q8) a) A Fabric filter must process 3.5 m^3/S of flue gas. Design the bag house filter with air to cloth ratio of 4.5 $m^3/min/m^2$. Determine no. of bags and physical arrangement. Take dia. of each bag as 210 mm. **[6]**

b) Explain radiation and types of radiation. **[4]**