MODEL QUESTION PAPER
SEVENTH SEMESTER B.TECH DEGREE EXAMINATION
CHEMICAL ENGINEERINGBRANCH
(2013 Scheme)
13.705.1 Environmental Biotechnology (H)

Time: **3 Hrs**   Max. Marks: **100**

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Part A

*Answer **all** questions. Each question carries 2 marks*

1. Define competitive inhibition
2. Distinguish between the meanings of the term mixed culture and pure culture.
3. Gram negative eubacteria is usually much easier to disrupt by sonic oscillation than gram positive eubacteria. Explain?
4. State any two disadvantages of fluidized bed biofilm reactor.
5. Explain hybrid biofilm processes with an example.
6. Define bioaugmentation
7. List any two factors leads to recalcitrance of an organic molecule discharged to soil
8. Define biobeneficiation
9. Explain carbon dioxide sequestration
10. Describe phytovolatilization   (10 x 2=20 Marks)

Part B

*Answer **any one** question from **each** Module. Each full questions caries **20** marks*

Module I

11. A) Outline the effects of environment on enzyme activity   **10**
    b) Discuss the environmental significance of bacteria and algae   **10**

Or

11. Consider a chemostat operating at a detention time of 2 hours. The following growth constants apply: the maximum specific substrate utilization is 48 g/gVSS$_a$-d; Yield is 0.5 gVSS$_a$/g; concentration giving one half the maximum rate, K = 100 mg/l; endogenous decay constant is 0.1/d; fraction of active biodegradable biomass is 1.0. Calculate the steady state concentration of substrate for the influent substrate concentration of 10000, 1000, and 100 mg/l. Also calculate the steady state concentration of cell, soluble microbial product concentration, and the minimum detention time below which washout would occur for each influent substrate concentration.   **20**

Module II

12. Explain the working of rotating biological contactors, trickling filters, and granular media filters **20**

Or

13. A CSTR with settling and recycle is being used for aerobic treatment of a wastewater containing 600 mg/l of acetate at a flowrate of 15 m³/s, solid retention time of 6 d, total volatile solid concentration is 2000 mg/l. Determine the reactor volume, biological sludge production rate, oxygen demand rate, and requirements for the biological nutrients nitrogen and phosphorus. Assume there are no suspended solids or nutrients in the influent stream. The appropriate coefficients are: the maximum specific substrate utilization is 12 g acetate/g cells-d; Yield is 0.55 g cells/g acetate; concentration giving one half the maximum rate, K = 10 mg acetate/l; endogenous decay constant is 0.15/d; fraction of active biodegradable biomass is 0.8. **20**

Module III

14. a) Explain the Insitu and Exsitu bioremediation with their merits and limitation **10**
    b) Describe a biotreatment technology for industrial wastewater and surface water **10**

Or

15. Describe how physical composition of soil influences the magnitude and diversity of the microbial flora

Module IV

16. Show how biosensors used for environmental monitoring and biomonitoring **20**

Or

17. a) Write a note on phytoremediation **10**
    b) Outline the biodegradation of lignocellulose and PAH **10**