JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT
END-SEMESTER EXAMINATION (May- 2015)
B.Tech ((VIII Sem.) / M. Tech. (II- SEM.)

COURSE CODE: 14M31CE216   MAX. MARKS: 45
COURSE NAME: Hazardous Waste Management
COURSE CREDIT: 3   MAX. TIME: 3 HRS

Note: Attempt all Questions. Assume suitable data if required.

Section A – (9 x 1 = 9 Marks)

1. **Answer the following:**

a) Name the oxidizing agents which are commonly used for hazardous waste management.

b) How organically modified clay helps in stabilization of hazardous waste

c) What are the similarities and differences among composting and soil pile treatment systems?

d) In addition to biodegradation, what physical/chemical processes are involved in natural attenuation?

e) Why are anaerobic biodegradation processes so important in monitored natural attenuation projects?

f) Explain the difference between soil vapour extraction (SVE) and bioventing.

g) Explain how biosparging systems can also encourage aerobic biological activity in the vadose zone.

h) How are phytovolatilization and phytotransformation different from each other?

i) Distinguish between "Macroencapsulation" and "Microencapsulation"

Section B – (13.5 Marks)

2. With the help of a neat figure, describe the functioning of a packed tower air stripper. What are the design considerations for a packed tower air stripper? **[4.5 Marks]**

3. a) Discuss the functional differences between air stripping and steam stripping. **[02 Marks]**

   b) Mention three advantages and disadvantages of biological treatment of hazardous wastes with physical-chemical treatment **[2.5 Marks]**

4. Analyze the following reaction data and determine the order of reaction and rate constant

   [4.5 Marks]

Time, min	0	12	24	36	48	60
C, mg/L	7.5	5.25	3.68	2.48	1.73	1.13

Section C (22.5 Marks)

5. 200 mL of a solution with a para-xylene concentration of 500mg/L is placed in each of six containers with activated carbon and shaken for 24hours. The samples are filtered and the concentration of p-xylene measured, yielding the following analyses: **[05 Marks]**

Container:	1	2	3	4	5	6
Carbon, g	24	20	16	12	8	4
p-xylene(mg/L)	10.7	14.6	23	29	48	107

   i)   Determine the Freundlich constants K and n, and plot the isotherm.

   ii)   Using the above isotherm data, determine the amount of carbon required to treat 40,000 Litres/day of water contaminated with 500mg/L p-xylene. Assume a required effluent of 10mg/L and that the facility will operate at the same temperature and pH for which the isotherm was developed. Determine daily carbon usage for a batch reactor.

6. What do you mean by supercritical fluids? Describe the process in which contaminants are extracted from the contaminated stream into extraction fluid. **[05 Marks]**

7. a) Why are microbial communities important in biodegradation? **[2.0 Marks]**

   b) Why in situ treatment processes are typically preferred for subsurface remediation over pump and treat processes? **[2.0 Marks]**

8. What are the three membrane processes used in HWM and discuss their modes of operation. What are their limitations in the treatment of hazardous waste? **[05 Marks]**

9. Describe how Portland cement can stabilize metallic wastes **[3.5 Marks]**