Ollscoil na hÉireann, Gaillimh
National University of Ireland, Galway

GX1618

Semester 2 Examinations, 2005

Exam Code(s)	4EV2
Exam(s)	4th Year B.Sc. (Environmental Science)
Module Code(s)	MI403
Module(s)	Environmental Microbiology and Waste Management II
Paper No.	2
Repeat Paper	
External Examiner(s)	Dr. Peter D. Moore
Internal Examiner(s)	Professor E. Colleran

Instructions: **Answer THREE Questions**

Please indicate clearly the numbers of the questions answered on the first page of your Answer Book

Duration	3 hrs
No. of Answer books	
Requirements:	5
Handout	
MCQ	
Statistical Tables	
Graph Paper	
Log Graph Paper	
Other Material	
No. of Pages	
Department(s)	Microbiology

Q.1 (i) The EPA has recently announced that it hopes to see the installation of 40 Centralised Anaerobic Digestion (CAD) plants in Ireland for energy recovery from, and management of, agricultural and other organic waste arisings. Discuss the mode of operation, advantages and disadvantages of the Danish model CAd plants (18 marks)

(ii) Comment on your views re their potential installation in Ireland (2 marks)

OR

"Landspreading is regarded by many as the most logical and environmentally sustainable means of recycling animal manures and slurries". Comment critically on this statement in the context of Irish manure/slurry arisings, taking into account perceived advantages and disadvantages.

Q.2 Planning permission has recently been granted in Co. Meath for a Waste-to-Energy Combustion Plant (Incinerator) for the organic fraction of Municipal Solid Waste (MSW). As an environmental scientist, how would you explain the operation, advantages and disadvantages of such a plant to the local community? (20 marks)

Q.3 (i) Discuss the current requirements for the siting and mode of operation of modern, state-of-the art landfills in Ireland (15 marks)

(ii) Comment, critically, on the role landfill plays in the disposal of municipal solid waste (MSW) in Ireland (5 marks)

Q.4 Discuss the environmental factors which govern rates of bacterial bioremediation of organic pollutants *in situ* in soils, sediments and aquatic ecosystems

Q.5 "Lignolytic fungi, such as *Phanaerochaete chrysosporium*, are regarded as key agents for future bioremediation of xenobiotic-contaminated soils, sediments and waterbodies". Critically discuss why these species are particularly suited to the potential bioremediation of sites contaminated by aromatic xenobiotics.

Q.6 (i) "Biomining involves both the direct and indirect involvement of chemolithotrophic species". Explain both of these processes and their role in biomining (12 marks)

(ii) Describe how these processes are used to bioleach copper from its orebody (8 marks)

Q.7 Critically discuss the use of microorganisms, or their cellular components, for the removal and/or recovery of metals from industrial and mining wastewaters