

Semester II Examinations, 2003/2004

Exam Code(s)	<u>4EV2</u>
Exam(s)	<u>4th Year B.Sc. (Environmental Science)</u>
Module Code(s)	<u>MI403</u>
Module(s)	<u>Environmental Microbiology & Waste Management II</u>
Paper No.	<u>1</u>
Repeat Paper	<u>Special Paper</u>
External Examiner(s)	<u>Professor C.M. Brown</u>
Internal Examiner(s)	<u>Professor E. Colleran</u>

Instructions:

Answer THREE Questions

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

Duration	<u>3 Hrs</u>
No. of Answer books	<u>1</u>

Requirements:

Handout	<u></u>
MCQ	<u></u>
Statistical Tables	<u></u>
Graph Paper	<u></u>
Log Graph Paper	<u></u>
Other Material	<u></u>

No. of Pages	<u>2</u>
Department(s)	<u></u>

- Q1. Discuss the variety of organic waste arisings from the agricultural sector; comment on their quantities in Ireland relative to other organic waste sources and compare and contrast current methods for their recycle/disposal.
- Q2. Discuss the advantages and disadvantages of anaerobic digestion of animal manures and slurries. Describe the current operation of a modern Danish Centralised Anaerobic Digestion (CAD) plant.
- Q3. Describe the current trends in Municipal Solid Waste (MSW) generation and recycle/disposal in Ireland.

OR

- "Landfill is still the dominant means of disposal of MSW in Ireland although the number, design and mode of operation of landfills have radically changed in recent years". Critically discuss this statement.
- Q4. "Incineration is being proposed as an option for recovery of the organic fraction of MSW in the majority of the Waste Management Regions in Ireland". Discuss the mode of operation of a modern OFMSW incinerator and critically comment on current environmental and public health concerns.
- Q5. Critically discuss the *in situ* and *ex situ* bacterial bioremediation processes currently used for soils contaminated by organic pollutants of natural or xenobiotic origin.
- Q6. Distinguish between direct and indirect leaching processes in the biomining of metals. In your answer, describe how the processes are currently applied for the recovery of copper from its orebody.
- Q7. Critically discuss the mechanisms involved and comment on the advantages and disadvantages of using microorganisms, or their cellular constituents, for metal removal or recovery from industrial wastewaters.

OR

Write extensive notes on any **two** of the following:

- (a) The use of chemolithotrophs in the "bio-oxidation" of gold ores.
- (b) The application of microorganisms in hydrocarbon recovery from oil shale.
- (c) The application of microorganisms for sulphur removal from coal.