

Ollscoil na hÉireann, Gaillimh
National University of Ireland, Galway

GX 1515

Semester II Examinations, 2003/2004

Exam Code(s)	CT323
Exam(s)	Biomedical Systems
Module Code(s)	
Module(s)	
Paper No.	1
Repeat Paper	Special Paper
External Examiner(s)	Prof. P Nixon
Internal Examiner(s)	Dr A. Shearer
	Prof. G. Lyons

Instructions:

Answer three questions with at least one from each section

Duration 2 hours
No. of Answerbooks

Requirements:

Handout
MCQ
Statistical Tables
Graph Paper
Log Graph Paper
Other Material

No. of Pages
Department(s) Information Technology

Section A

1. Describe two methods for reducing background noise in an image.

Micro calcifications are sharp features in a mammogram that might indicate the presence of a breast tumour. They show themselves as fine features in an X-ray. Describe a filter that would enhance such a filter.

2. What is convolution? Describe the process of deconvolution to enhance an image. Describe the problems deconvolution introduces into the image processing of medical X-rays.
3. What is lossy compression? In medical imaging why is lossy compression not generally used.

It is proposed to enhance medical images in NUI, Galway and transmit the result to the Regional Hospital. The size of the images is 5,000 x 5,000 pixels with a 2 byte intensity scale. What problems would this present to the hospital's IT department?

Section B

4. Describe the importance of the internet on the development of automated sequence analysis. Contrast the available databases that are currently being used for DNA sequencing.
5. What is PACS? How relevant is the development of PACS systems for the Irish health care system.
6. Given these two simple, 4 sample sequences

- a. X=TTACTGGATCAG
- b. Y= TGAGCTGGTTCTG

Outline four possible algorithms that might be used to optimally align the sequences. If one scores a +1 for a match, -1 for a mismatch and -2 for a gap, which algorithm is the best?