

Ollscoil na hÉireann, Gaillimh
National University of Ireland, Galway

GX 0092

Semester I Examinations, 2005/2006

Exam Code(s)	<u>1SD1</u>
Exam(s)	<u>1SD1 Higher Diploma (Software Design & Development)</u>
Module Code(s)	<u>CT861</u>
Module(s)	<u>Computer Architecture and Operating Systems</u>
Paper No. 1	<u>1</u>
Repeat Paper	<u>Special Paper</u>
External Examiner(s)	<u>Professor S. McClean</u>
Internal Examiner(s)	<u>Dr. M. Madden</u>
	<u>Dr. A. Golden</u>

Instructions

Answer any 4 questions.
All questions will be marked equally.

Duration	<u>2hrs</u>
No. of Answer Books	<u>2</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></u>
Department(s)	<u>I.T.</u>

Answer Any 4 Questions. All questions carry equal marks

1. (i) What is meant by the Von Neumann architectural design for computing machines - specifically, how does this design facilitate computation? (15)
(ii) Detail the evolution of the computer from a hardware and software perspective since the 1950's. What do you regard as the potential bottlenecks in a modern computer? (10)
2. (i) Describe the various types of *internal* computer memory giving some idea of their individual characteristics - describe how these various memory components interact. (15)
(ii) What is meant by static and dynamic RAM? (10)
3. (i) Give an approximate outline how the CPU and localised registers perform an elementary computation, such as the addition of two numbers. (15)
(ii) What is meant by the instruction cycle - and how the issue of interrupts may be incorporated into this framework? (10)
4. (i) What is meant by the term 'Locality of Reference' and how is this principle implemented to optimise the use of memory resources in a computer system. (15)
(ii) Discuss the various components in the memory hierarchy of a computing system - explain how internal and external memory devices are clearly delineated in this hierarchy, and discuss methods to optimise their communication. (10)
5. (i) What is meant by the PCB? Explain how the operating systems manages processes using this construct. (15)
(ii) Using a block diagram, outline the 5 state process life cycle. (10)
6. (i) What is meant by deadlock in a computer system - describe ways in which the operating system ensures such a situation may not occur. (15)
(ii) Why are threads seen as a much more effective approach to process management than using individual processes on their own? Use examples to illustrate your answer. (10)
7. (i) Discuss the various strategies which implement file allocation in a modern computing systems, outlining the pros and cons of each. (13)
(ii) In memory management, what is meant by dynamic partitioning, and how are such approaches implemented. In your answer explain how the issue of fragmentation may be dealt with. (12)
8. (i) Describe the various types of security threats that exist to an operating systems - in what ways can these be countered? (15)
(ii) Discuss the issue of robustness with an operating system - in what way can the design of an operating system be implemented in such a way so as to avoid the possibility of an operating system 'crash'?