

OLLSCOIL NA hÉIREANN
THE NATIONAL UNIVERSITY OF IRELAND

NATIONAL UNIVERSITY OF IRELAND, GALWAY

SUMMER EXAMINATIONS 2000

FIRST YEAR BSc in INFORMATION TECHNOLOGY
FIRST YEAR BSc in BIOMEDICAL SCIENCE

COMPUTING SYSTEMS (CT101)

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Time allowed: Three hours

Answer FIVE questions

At least two questions must be answered from each section
All questions carry equal marks

SECTION A

- Q. 1**
- i) Distinguish between graphical user interfaces and command line interfaces discussing the main features of each. Give examples where applicable.
 - ii) One of the Operating System's tasks is to manage main memory. Discuss what is meant by memory management and, in particular, discuss options for *fetch*, *placement* and *replacement* strategies that the Operating System might adopt to move data from secondary storage to main memory.
 - iii) Discuss what is meant by each of the following with respect to Operating System resource allocation:
 - critical region.
 - deadlock.
 - spooling.

Q. 2 i) What is the functionality of the following protocols:

- SMTP
- FTP
- HTTP

ii) What are search engines? Discuss the main features of search engines which are currently available on the World Wide Web.

iii) Discuss the role that encryption has to play with respect to the Internet. With the aid of an example, describe any simple encryption system.

Q. 3 i) What is meant by file compression and why is it necessary?

ii) Distinguish between lossless and lossy compression techniques, detailing where each can be used.

iii) With the use of an example describe the operation of run length encoding. What type of data files are best suited to the use of run-length encoding techniques?

Q. 4 i) What is meant by the term *software engineering*? Describe some features that *quality* software should possess.

ii) Summarise each of the phases in the software development life cycle. Distinguish between the waterfall software life cycle model and the spiral software life cycle model.

iii) Spreadsheets are one of the most popular types of general purpose application software available. With respect to such programs discuss:

- circular references.
- relative and absolute addressing.
- advantages and disadvantages of using charts to represent data.

Section B

5. (i) Convert the following decimal numbers to binary, using two's complementary arithmetic where necessary;
128; -1; 19; -64
- (ii) How are floating point numbers represented in binary? Taking your birthday of the form day.monthyear (e.g. 25.1200 would be 25th December 0 A.D.), show how this is stored. What steps would be required to add two FP numbers?
- (iii) Describe both the NAND & NOR gates in terms of schematic diagrams & truth tables, and discuss the role these logic circuits play in contemporary integrated circuit design.
6. (i) Outline the typical sequence of operations involved during the Fetch-Execute Cycle of the CPU.
- (ii) Discuss the activities of the Control Unit, using an example the addition of two numbers stored in main memory.
- (iii) Write short notes on each of the following – registers; multiplexor; address bus; ALU.
7. (i) Discuss the following LAN topologies – star, ring & bus in terms of security, cost, reliability and appropriate environments for their implementation.
- (ii) Security issues are paramount in the modern IT environment. Discuss both internal and external threats to the integrity of a computer system, and remedies to at worst limit and at best remove such threats.
- (iii) In the new IT Building on campus, several computer labs are planned – what sort of network and security system would you implement for these?
8. (i) Discuss how information is stored on and read from the following – a RAM chip, a Hard Disk, and on an Optical storage device. Outline the advantages and disadvantages of each as memory devices.
- (ii) Write brief notes on the design, operation and appropriate environments for usage of two input and two output devices.