

OLLSCOIL NA hÉIREANN
THE NATIONAL UNIVERSITY OF IRELAND, GALWAY

SUMMER EXAMINATIONS 2001

MASTERS IN INFORMATION TECHNOLOGY (NUI,G & IMI)

CT502 IT INFRASTRUCTURE

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Time allowed: THREE hours

Answer 5 questions. All questions carry equal marks
At least two questions must be answered from each section.

SECTION A

- Q1. (a) Discuss the evolution of computer systems from the mid 20th century to the present day, indicating the most significant developments along the way. Briefly outline also what you feel the major developments will be in coming years. (15)
- (b) Briefly describe the recent developments in computer system's internal bus design, focusing on the driving forces for such changes and the technical details of some of the main players. (15)
- (c) Write a brief note on the development of graphics chips. (5)

- Q2. (a) A computer system should be designed to utilise a hierarchy of memory types that together optimise the system performance and cost in the required working environment. Discuss this general statement but focus in particular on the role of cache and main memory design and operation. (20)
- (b) Write a brief note on the importance of RAID architecture focusing on how the deployment of the different RAID levels is context dependent. (10)
- (c) Write a brief note on operation and importance of harddisk defragmentation. (5)
- Q3. (a) In recent years, the rate of development in processing power has surpassed that of other computer system components. Discuss this statement and describe some of the techniques that have been employed to maximise processor utilisation and thus overall system effectiveness. (20)
- (b) Describe the following approaches to parallel computing, outlining their strengths and weaknesses: (15)
1. Symmetric Multi-Processing (SMP)
 2. Distributed Computing & Clusters
- Q4. (a) Answer any three of the following: (30)
1. Describe the principal stages of the generalised instruction cycle and explain how **and** why interrupts are incorporated into the instruction cycle
 2. Describe the operation and importance of Direct Memory Access (DMA)
 3. Write a brief note on the principle of operation and importance of Error-Correcting Circuitry (ECC)
 4. Distinguish between combinational and sequential circuits and outline where each are used in a typical computer system.
- (b) Write a brief note on Reverse Engineering of Integrated Circuits. (5)

SECTION B

- Q5. (a) Asynchronous Transfer Mode (ATM) technology offers Quality-of-Service (QoS) levels to users depending on the data requirements. Briefly describe the operation of ATM, focusing on its QoS features. (10)
- (b) Describe in brief the principal physical characteristics of the following guided media types:
1. Twisted pair
2. Coaxial Cable
3. Optic Fibre (15)
- (c) In the last 10 years the use of optic fibre has greatly surpassed the use of satellite for transoceanic data delivery. Discuss the reasons for this trend. (10)
- Q6. (a) Describe in brief the operation of the POTS (Plain Old Telephone System) for voice transmission. (12)
- (b) Briefly describe the operation of modems and show how they are incorporated into the POTS (Plain Old Telephone System). Outline also how K56 modems can offer higher data rates. (13)
- (c) Outline how ADSL technology can help meet future domestic user requirements for high speed Internet access. (10)
- Q7. (a) Describe briefly the operation of the standard (1 persistent CSMA/CD) 10 Mbps Ethernet LAN, focusing on its strengths and weaknesses. Briefly evaluate the options available to network administrators to provide higher bandwidth to end-users on the LAN. (20)
- (b) Distinguish between a hub and a switch in the LAN environment. (5)
- (c) The Internet protocol version 4 (IPv4) has been described as the 'glue that holds the Internet together'. Despite this the IETF have introduced the IPv6 replacement. Discuss the background to the development of IPv6 and outline its principal advantages over IPv4. (10)

- Q8. (a) The Transmission Control Protocol (TCP) provides a 'reliable bit stream' for Internet applications such as WWW, Email and FTP. Describe the essential operation of TCP in the context of the above statement. (10)
- (b) Enterprise Data Integrity is becoming an increasingly taxing responsibility of network administrators & IT Managers. Discuss this statement, making reference in your answer to the following:
1. Firewalls
 2. Intrusion Detection Systems
 3. Cryptology
- (15)
- (c) Briefly describe the evolution of mobile telephony from 1st Generation to the proposed 3G technologies focusing on the potential for non-voice data transmission. (10)