UNIVERSITY *of* LIMERICK

OLLSCOIL LUIMNIGH

COLLEGE *of* INFORMATICS *and* ELECTRONICS
Department of Computer Science and Information Systems

End-of-Semester Exam

Academic Year:	2005/2006	**Semester:** Spring
Module Title:	Data Communications Computer Networks	**Module Code:** CS5222 and CS4225
Exam Duration:	2½ Hours	**Total Marks:** 85
Lecturer:	Dr. N. S. Nikolov	

Instructions to Candidates:

ALL questions should be attempted.

Please write all answers in the answer booklet.
State clearly any assumptions you make.

Part I. Physical Layer (18 marks)

Q1. (5 marks)
Draw a graph that represents the Manchester encoding of the data stream 001010001110.

Q2. (10 marks)
Which characteristics of an analog signal can be changed in order to modulate a digital signal? Describe briefly each digital-to-analog modulation mechanism you are familiar with (one sentence per modulation mechanism). Give an example of a modulated signal with a bit rate higher than its baud rate.

Q3. (3 marks)
Why is the ADSL technology called *asymmetrical*?

Part II. Data Link Layer (26 marks)

Q4. (10 marks)
A system is using Go-Back-*N* ARQ. Consider the following scenario. The sender sends frames

0, 1, 2, 2, 3, 4, 5, 3, 4, 5, 6, 7, 0, 1.

What is the size of the sliding windows? Why does the sender repeat the transmission of some of the frames? Draw the sender and the receiver windows at each step of the transmission.

Q5. (6 marks)
Draw the general structure of the HDLC frame. Which of its fields can be used for flow control? How many types of HDLC frames do you know?

Q6. (10 marks)
Describe the multiple access method used by the traditional Ethernet.

Part III. Network Layer (26 marks)

Q7. (18 marks)
Suppose an organization has been allocated the address block 193.168.10.0. The organization has 10 separate buildings, each having its own network. Seven of the separate networks have from 18 to 30 devices that need addresses, whereas the three remaining networks are small, having no more than six devices each that need addresses. Describe how the addresses should be allocated.

Q8. (8 marks)
A router has the following RIP routing table:

Net1	4	B
Net2	2	C
Net3	1	F
Net4	5	G

What would the contents of the table be if the router receives the following RIP message from router C:

Net1	2
Net2	4
Net3	3
Net4	7

Part IV. Transport and Application Layers (15 marks)

Q9. (3 marks)
UDP needs the _____ address to deliver the user diagram to the correct application program.

a. Port
b. Application
c. Internet
d. Physical

Q10. (5 marks)
Fill in the gaps with either **UDP**, or **TCP**.

_____, unlike _____, is a stream-oriented protocol. A process may deliver several chunks of data to the _____, but _____ treats each chunk independently without seeing any connection between them. _____, on the other hand, allows the sending process to deliver data as a stream of bytes and the receiving process to obtain data as a stream of bytes.

Q11. (4 marks)
IP is responsible for _____ communication while TCP is responsible for _____ communication.

a. Process-to-process; host-to-host
b. Node-to-node; process-to-process
c. Host-to-host; process-to-process
d. Process-to-process; node-to-node

Q12. (3 marks)
The server program is _____ because it is always available, waiting for a client request.

a. Active
b. Passive
c. Finite
d. Infinite