

*Ollscoil na hÉireann, Gaillimh*  
*National University of Ireland, Galway*

GX 1593

**Spring Examinations, 2002/2003**

Exam Code(s)	<u>3BP1</u>
Exam(s)	<u>Third Year Electronic and Computer Engineering</u>
Module Code(s)	<u>CT303b</u>
Module(s)	<u>Networks and Data Communications</u>
Paper No.	<u>1</u>
Repeat Paper	<u>Special Paper</u>
External Examiner(s)	<u>Professor Paddy Nixon</u>
Internal Examiner(s)	<u>Professor G. Lyons</u>
	<u>Mr. P. Bigioi</u>

**Instructions:**

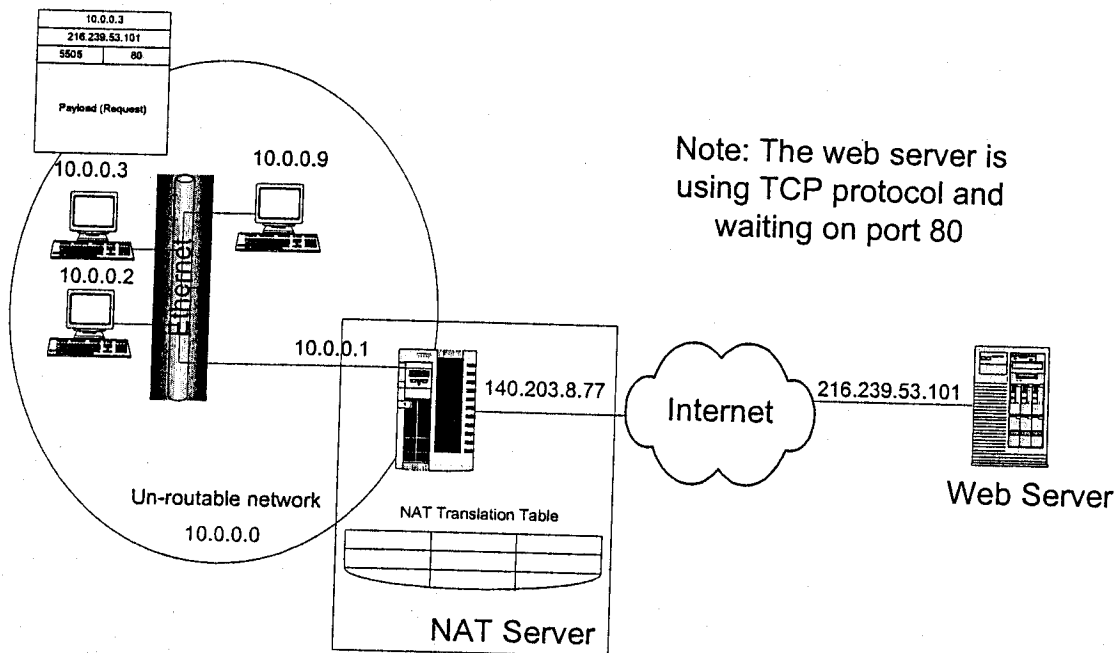
Answer any 3 questions.  
All questions will be marked equally.

Duration	<u>2.5 hrs</u>
No. of Answer Books	<u>1</u>
No. of Pages	<u>3</u>
Department(s)	<u>Information Technology</u>

### Question 1

- Explain briefly the difference between a connection-oriented and connectionless network. In this context, which type of network is the Internet itself (using the IP protocol).  
8 MARKS
- It is known that IPv4 is running out of addresses. What are the two main solutions to cope with the shortage problem. Describe briefly each of them.  
10 MARKS
- Consider the network topology in the figure below.
  - Describe the operation of NAT assuming that the host 10.0.0.3 in the un-routable network 10.0.0.0 makes a web request to the server 216.239.53.101 (web server is waiting on port 80)
  - Show how the request TCP/IP packet is modified on its way from host 10.0.0.3 to the web server.
  - Show how the reply packet from the server 216.239.53.101 to host 10.0.0.3 is modified by NAT.

15 MARKS



### Question 2

- Describe the main differences between UDP and TCP. Why does UDP exist? Would it have been sufficient to have hosts to send raw IP packets?  
8 MARKS
- Describe TCP transmission policy using a simple example (how window management and flow control operate in TCP). What are the performance issues (Nagle's algorithm vs. Clark's solution)  
10 MARKS
- What is the main problem of TCP implementation over wireless networks? What are the typical solutions to deal with this problem?  
15 MARKS

### Question 3

- a) How does the E-mail architecture deal with the fact that not all the machines can send and receive mail at all times? Describe briefly POP3 and IMAP.  
8 MARKS
- b) Using a simple example, describe the architecture of WWW. What is happening on the client machine when the link <http://www.abcd.com/products.html> is selected?  
10 MARKS
- c)
- What is the main role of the HTML forms?
  - Describe dynamic web page generation, at both client and server side.
  - In context of server side dynamic web page generation, describe the steps involved in processing a HTML form requesting user information stored in a database.
- 15 MARKS

### Question 4

Suppose that you are working for a large corporation that has been assigned the IP network address 141.222.0.0 and you are requested to create subnets that can each support up to 1024 hosts per subnet.

- a) Explain how many departments (subnets) the corporation can accommodate and explain the logic. What subnet mask need to be used?  
11 MARKS
- b) What are the valid host addresses on subnet #1  
11 MARKS
- c) What are the valid broadcast addresses for subnet #1  
11 MARKS