

Ollscoil na hÉireann, Gaillimh
National University of Ireland, Galway

GX 1492

Spring Examinations, 2003/2004

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| 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:

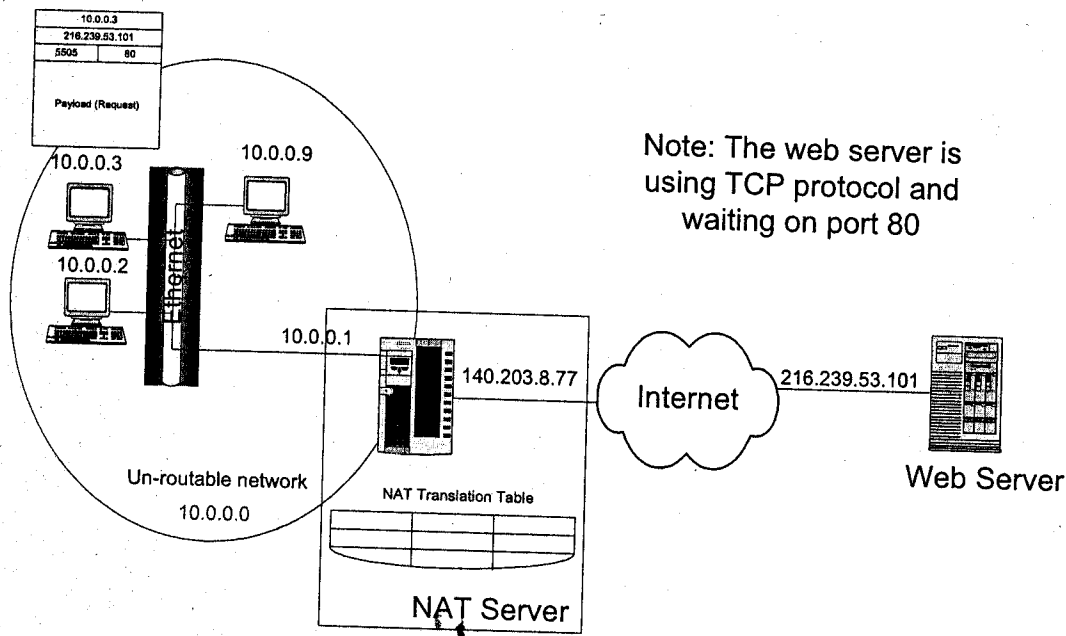
Answer any 3 questions.
All questions will be marked equally.

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|---------------------|-------------------------------|
| Duration | <u>2.5 hrs</u> |
| No. of Answer Books | <u>1</u> |
| No. of Pages | <u>34</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 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 with TCP (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 needs 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