

March 12, 2003

**Graduate Comprehensive Exam  
Computer Networks  
Spring 2003**

Student Name: \_\_\_\_\_ Student ID: \_\_\_\_\_

Answer **all** questions on the exam. You may use the back of the page if necessary for additional space.

Total: 100 points. Good Luck.

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- [1] (30 pts):
- a) What is a network reference model and why it is necessary?
  - b) Contrast the differences between TCP and OSI.
  - c) If a printer can interpret physical addresses but cannot interpret an IP address, at what layer it is failing?  
Explain your answer
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- [2] (30 pts) In routing:
- a) Discuss fairness and optimality and describe the conflict that occurs between these two routing goals.
  - b) What is the difference between adaptive and non-adaptive routing algorithms?
  - c) Describe one adaptive **and** one non-adaptive routing algorithm.
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- [3] (20 pts) Given that  
Latency = Propagation Delay + Transmit Time + Queue  
Transmit Time = Size / Bandwidth  
Calculate:
- a) the approximate total time (in seconds) required to transfer 1.5MB(Megabyte) file given that the RTT (Round-Trip Time) is 200ms, the bandwidth is 2Mbps(Megabit/sec), packet size is 1KB (Kilobyte) but all data packets can be sent continuously.
  - b) the same as above but there is an initial handshaking before the data is sent which costs  $2 * RTT$
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- [4] (20 pts) UDP and TCP
- a) Discuss the main difference between UDP and TCP.
  - b) Discuss two tradeoffs in choosing UDP or TCP.
  - c) Discuss and application protocol for which UDP is more appropriate. Explain.
  - d) Discuss and application protocol for which TCP is more appropriate. Explain.
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