# Introduction to Computer Networks

Final Examination

**June 15, 2001**

1. Refer to the network in Figure 3.42 on page 239 of the textbook. Show a set of minimal number of unicast frames that are needed to send by the computers so that all the bridges can learn the locations of all computers? (10%) Show a frame with the notation (frame source-node name, destination-node name). For example, (A, C) indicates a frame sent from node A to node C.
2. Refer to the IP packet header on page 252. Explain why the unit of the **Hlen** field is 32-bit word, unit of the **Length** field is byte, and unit of the **Offset** field is 8 bytes. (15%)
3. Give two schemes by which the IP address depletion (shortage) problem can be avoided, at least temporarily. (10%)
4. For the network given in Figure 4.39 on page 356. Show how the link-state algorithm builds the routing table for node A. (10%) If distance vector routing algorithm is used, give the final global distance-vector table like Table 4.8 on page 286. (10%) Find the routing table for node A from the final global distance-vector table. (5%) A routing table has three columns: destination, cost, nexthop.
5. Give one reason each for using subnetting and supernetting (CIDR).(10%)
6. Refer to the TCP state-transition diagram given in Figure 5.7 on page 381. Describe how a client might leave a server in state FIN_WAIT_2 indefinitely. (5%) How can you solve the problem? (5%)
7. Explain why the "slow start" is used in TCP congestion control algorithm.(5%) What is its main problem caused at the beginning of a TCP connection?(5%)
8. In Random Early Detection(RED) gateways, explain why **MaxThreshold** is actually less than the actual size of the available buffer pool.(10%)
9. State at least two advantages of the public-key cryptography over secret-key cryptography? (10%) State the advantage of using MD5 with RSA digital signature over pure RSA digital signature. (10%)