國 立 臺 北 科 技 大 學

九十八學年第一學期電機系博士班資格考試

電腦網路理論試題

注意事項：

1. 本試題共【8】題，配分共 100 分。
2. 請按順序標明題號作答，不必抄題。
3. 全部答案均須答在試卷答案欄內，否則不予計分。
4. 考試時間:二小時。

1. (10 points) Suppose that a selective-reject ARQ is used where W=4. Show, by example, that a 3-bit sequence number is needed.

2. (10 points) Explain how the Adaptive Retransmission Timeout Interval is calculated in TCP.

3. (15 points) Explain the following items.
   (a) What are SIFS and DIFS, and why are they needed?
   (b) An 802.11 header contains two destination addresses. Explain the purpose of each.

4. (15 points) Let's consider the operation of a learning switch in the context of the Figure 1. Suppose that (1) A sends a frame to D, (2) D replies with a frame to A, (3) C sends a frame to D, (4) D replies with a frame to C. The bridge table is initially empty. Show the state of the bridge table before and after each of these events. For each of these events, identify the link on which the transmitted frame will be forwarded.

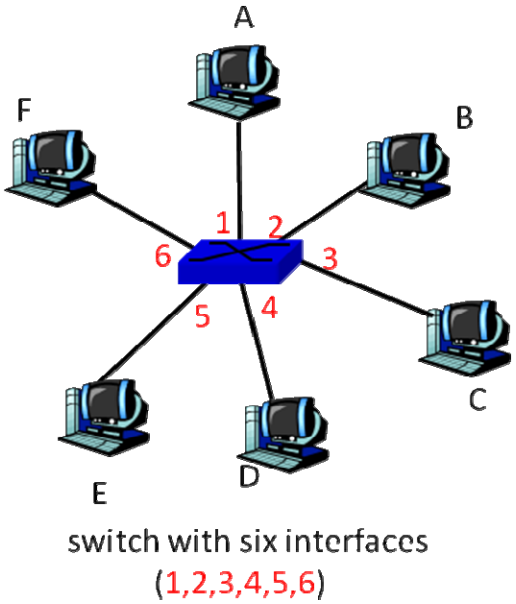

Figure 1

5. (10 points) What is the difference between priority queuing and WFQ queuing?

6. (15 points) Consider the leaky bucket polices that polices the average rate and burst size of a packet flow. We now want to police the peak rate, as well. Show how the output of this leaky bucket polices can be fed into a second leaky bucket policer so that the two leaky buckets in series police the average rate, peak rate, and burst size.

7. (15 points)　As shown in Figure 2, consider the following steps.

   - Step 0 : initialize system.
   - Step 1: Node *2* sends DV message to *3*, *5*, and *6*
   - Step 3: Node *3* sends DV message to *6*

   Please list *N*, *V*, *D*, *C* (define in Figure 3) and the routing table in node 6 for each steps.

   (Distance Vector algorithm is shown in Figure 3)

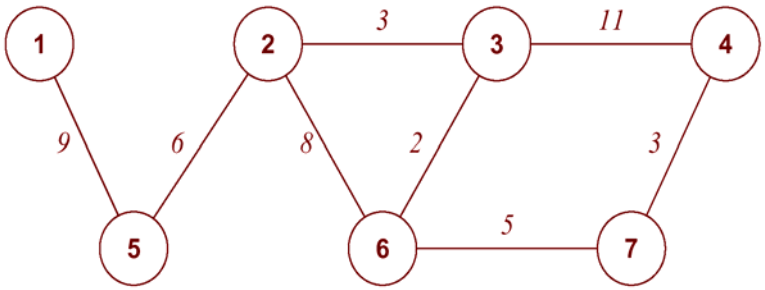

Figure 2

```
Given:
    a local routing table, a weight for each link that connects to another
    switch, and an incoming routing message
Compute:
    an updated routing table
Method:
    Maintain a distance field in each routing table entry;
    Initialize routing table with a single entry that has the destination equal to the local packet switch,
    the next-hop unused, and the distance set to zero;
    Repeat forever {
        wait for the next routing message to arrive over the network from a neighbor;  Let N be the sending switch;
        for each entry in the message {
            Let V be the destination in the entry and let D be the distance;
            Compute C as D plus the weight assigned to the link over which the message arrived;
            Examine and update the local routing table:
            if (no route exists to V) {
                add an entry to the local routing table for destination
                    V with next-hop N and distance C;
            } else if (a route exists that has next-hop N) {
                    replace the distance in existing route with C;
            } else if (a route exists with distance greater than C) {
                    change the next-hop to N and distance to C;
            }
    }
```

Figure 3

8. (10 points) As shown in Figure 4.

(a) Please assign IP address to each router (R1,R2,R3) interface.

(b) Please show the routing table in R2.

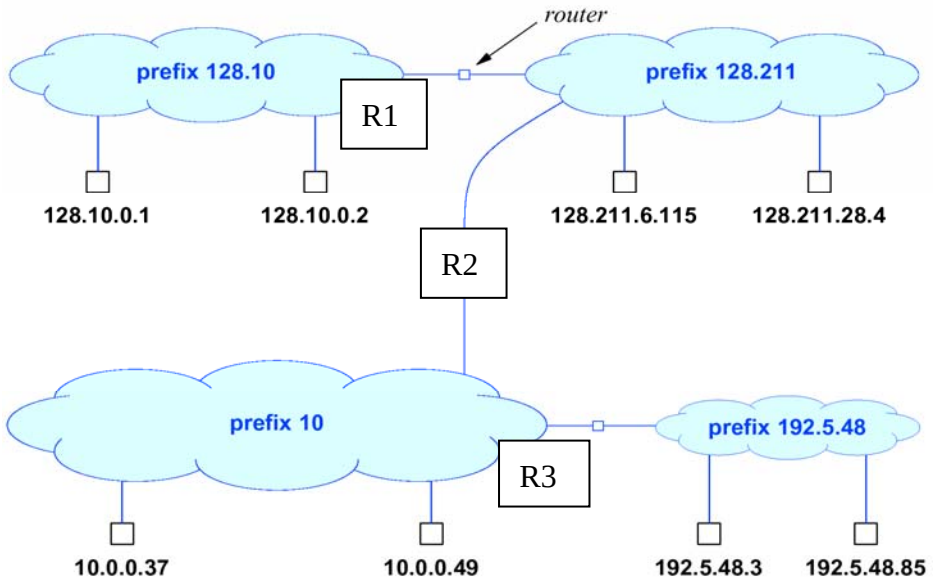

Figure 4