

# University of San Francisco

## CS486: Network Security

### Examination II

- This exam must be done **individually**.
- Your solution must be uploaded to Canvas by **October 27th at 10:00 pm**.
- All your solutions must be in one file exam2.{pdf, doc(x), txt}.
- Include your name and student ID at the top of the document.
- Total Points: 100
- No extension will be granted and submissions after October 27th 10:00 pm will receive no credit.

Student's Name: \_\_\_\_\_

Student's ID: \_\_\_\_\_

Professor: Dr. Vahab Pournaghshband

| Question       | Score |
|----------------|-------|
| Problem 1 (15) |       |
| Problem 2 (15) |       |
| Problem 3 (20) |       |
| Problem 4 (15) |       |
| Problem 5 (15) |       |
| Problem 6 (20) |       |
| Total          |       |

Q.1)

5/10=15 points

- a) What is the key used to encrypt plaintext 0111101, to ciphertext 1001000, when using one-time pad encryption?
- b) What is the main problem, in Strict Priority Queuing when it comes to low priority traffic?

Does Traffic Shaping have this problem?

How about Weighted Fair Queuing?

Q.2)

7.5/7.5=15 points

- a) What is the primary causes of packet loss on the network?
- b) What is the main cause of RTT variation? For instance, running ping at different times of the day results in different values which might be small but large but almost never constant.

Q.3)

4/4/4/4/4=20 points

A router is using the “longest prefix match” rule for forwarding packets, through the following routing table:

| Address        | Next hop |
|----------------|----------|
| 212.73.56.0/22 | Router 3 |
| 212.73.60.0/22 | Router 4 |
| 165.53.40.0/23 | Router 1 |
| 0.0.0.0/0      | Router 2 |

For each of the following IP addresses, to which router it will forward the packet if a packet with that address arrives?

(a) 212.73.63.10

(b) 212.73.57.14

(c) 212.46.52.2

(d) 165.53.40.7

(e) 165.53.56.7

Q.4)

15 points

A router has just received the following new IP addresses: 57.6.96.0/21, 57.6.104.0/21, 57.6.112.0/21, and 57.6.120.0/21. If all of them use the same outgoing line, can they be aggregated? If so, to what? If not, why not?

Q.5)

15 points

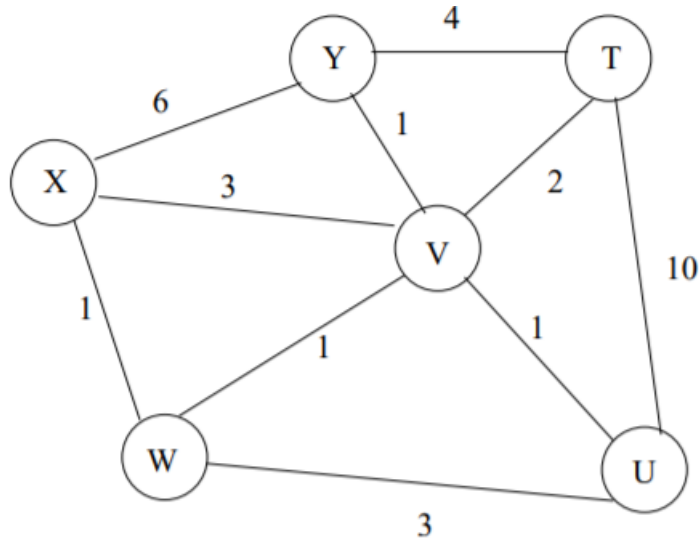
What is IPv6 address with the corresponding compact version?

fe80::2000:aff:fea7:f7c

Q.6)

15/5=20 points

- a) Consider the following network topology. What is the next hop and cost (distance) used in the node T's routing table?



| Destination | NextHop | Distance |
|-------------|---------|----------|
| X           |         |          |
| Y           |         |          |
| U           |         |          |
| V           |         |          |
| W           |         |          |

- b) Assume node V needs to be brought down for maintenance (e.g., upgrade its software). A common way to deal with this is to increase the cost of the links associated with the node to  $\infty$ , then node V is brought down. Consequently, all routing tables including that of T's are updated. Given the new set of routing tables, is this network still connected? That is can remaining nodes still send and receive packets from other nodes? (Assume the network has reached convergence, i.e., a stable routing.)