

**UNIVERSITY OF CALIFORNIA**  
College of Engineering  
Department of Electrical Engineering  
and Computer Sciences

**EECS122, Fall 1992**  
**First Midterm**  
**Professor F. Wu**

Problems 1-7 (1) points each; Problem 8 (3) points.

**Problem #1**

When is circuit-switching preferred to packet-switching?

- a. Always
- b. When the traffic is bursty
- c. When delays have to be small

**Problem #2**

What do virtual-circuits implement?

- a. Datagrams
- b. Connection-oriented communication services
- c. Circuit-switched communications

**Problem #3**

Why is SRP more efficient than ABP?

- a. It retransmits only incorrect packets
- b. It is used with faster links
- c. It does not wait as much

**Problem #4**

In the OSI model the transport layer protocol of one node communicates with that of another node through:

- a. Direct electrical or optical signals
- b. Virtual communication by way of network layer services
- c. Services of the application layer

### Problem #5

Suppose a random variable  $X$  has an exponential distribution  $P \{ X > t \} = e^{(-bt)}$ ,  $t \geq 0$ . The conditional probability  $P \{ X > a + t \mid X > a \}$  is

- a. Less than  $P \{ X > t \}$
- b. Equal to  $P \{ X > t \}$
- c. Greater than  $P \{ X > t \}$

### Problem #6

An electromagnetic wave travels through a fiber with an attenuation of 0.1 dB/km. After 10 km the reduction in signal power is equal to

- a. 1
- b.  $10^{(-1)}$
- c.  $10^{(-0.1)}$

### Problem #7

A board is built to implement a packet-voice transmission by grouping bits arriving at 64 kbps into packets of 48 bytes. The packetizing per packet is

- a.  $48/64,000$  sec.
- b.  $48 \times 8/64,000$  sec.
- c.  $48/(64,000 \times 8)$  sec.

### Problem #8

Packets are transmitted using the ABP over a full-duplex 5-km coaxial cable with a 10 Mbps transmission rate. The packets and ACKs are 100 bits long. The transmitter and receiver use a CRC chip and their processing time is negligible?

- a. How many packets are transmitted every second when there is no transmission error?
- b. Suppose the packet error probability is 0.1% and timeout is set at the round-trip time for transmitting a packet and receiving the acknowledgement. What is the average number of packets transmitted every second?

## Solutions!

1. C
  2. B
  3. C
  4. B
  5. B
  6. C
  7. B
8. a)  $S = 2 \text{ PROP} + 2 \text{ TRANS}$ ; rate =  $1/S$  --> rate = 15,753.4 pkts/sec  
b)  $E\{X\} = S + (P * \text{TIMEout}) / (1-P)$ ;  $\text{TIMEout} = S$ ;  
rate =  $1 / E\{X\}$  --> rate = 15,737.7 pkts/sec

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