1. Consider a communication link between a workstation on Earth and a satellite that acts as a server. The distance between the earth and the satellite is 4 * 10⁴ km. What is the best-case delay in response to a request?

        A. 133.33 m sec   B. 266.67 m sec
        C. 400.00 m sec   D. 533.33 m sec

2. One hundred stations on a pure ALOHA network share a 1-Mbps channel. If frames are 1000 bits long, find the throughput if each station sends 10 frames per second. (e= 2.72)

    A. 13.53   B. 12.12   C. 10.12   D. 14.12

3. The data rate of 10Base5 is 10 Mbps. How long does it take to create the smallest frame
    A. 512 µs   B. 512 s   C. 5.12 µs   D. 51.2 µs

4. Consider a link with a transmission rate of R. Assume N packets are reached to link simultaneously. What is the average queuing delay for N packets if each packet is of size L? Currently, no packet is transmitted or queued.

        A. (N-1)(L-1)/(2R)   B. (N)L/(2R)
        C. (N-1)L/(4R)   D. (N-1)L/(2R)

5. Ten thousand airline reservation stations are competing for the use of a single-slotted ALOHA channel. The average station makes 18 requests/hour. A slot is 125 µsec. What is the approximate total channel load?

    A. 0.672   B. 0.241   C. 0.00625   D. 0.0254

6. Suppose four active nodes - nodes A, B, C, and D are competing for access to a channel using slotted ALOHA. Assume each node has an infinite number of packets to send. Each node attempts to transmit in each slot with probability p. The first slot is numbered Slot 1, the second slot is numbered Slot 2, and so on. What is the probability that the first success occurs in slot 3?

        A. $(1 - p(1-p)^3)\ 4\ p(1-p)^3$ B. $(1 - 4\ p(1-p)^3)^2\ *4\ p(1-p)^3$
        C. $(1 – p(1-p)3)^2*\ 4\ p(1-p)^3$ D. $(1 - 4\ p(1-p)^3)*\ 4\ p(1-p)$

7. Suppose users share a 3 Mbps link. Also, each user requires 150 kbps when transmitting,

but each user transmits only 10 percent of the time. When a circuit switching is used, how many users can be supported?

   A. 20   B. 10   C. 50   D. 15

8. In Ethernet, when Manchester encoding is used, the bit rate is:

(A) Half the baud rate.   (B) Twice the baud rate.
(C) Same as the baud rate.   (D) none of the above

\9. If the k-bit maximum frame sequence numbers field is available. What is the maximum window size for data transmission using the selective repeat protocol and Go Back N protocol?

(A) 2^k+1, K+1   (B) $2^{(k-1)}$, 2^k-1 (C) $2^k - 1$, $2^{(k-1)}$ (D) $2^{(k-2)}$, $2^{(k-1)}$

10. if 10 packets are sent from sender to receiver using stop & wait ARQ. If every fourth packet is lost, then what is the total number of transmissions required?
      (A) 12   (B) 15   (C) 13   (D) 16