1. Consider the following message M = 1010001101. The cyclic redundancy check (CRC) for this message using the divisor polynomial $x^5+x^4+x^2+1$ is

A. 01110 B. 01011 C. 10101 D. 10110

2. How many data elements can be carried by each signal if the signal has a bit rate of 9000 bps and a baud rate of 3000 baud?

A. 0.336 bits/baud B. 3 bits/baud
C. 120,00,000 bits/baud D. None of these

3. Consider an error-free 64-kbps satellite channel used to send 512-byte data frames in one direction, with very short acknowledgements coming back the other way. What is the maximum throughput for window sizes of 1, 7, 15, and 127? The earth-satellite propagation time is 270 msec.

A. 6.4Kbps, 47.48Kbps, 9.6Kbps, 81.7Kbps
B. 6.4Kbps, 47.36Kbps, 64 Kbps, 64 Kbps
C. 6.4Kbps, 52.2Kbps, 101.6Kbps, 81 Kbps
D. 6.4Kbps, 47.3Kbps, 59.6Kbps, 64Kbps

4. A bit stream 10011101 is transmitted using the standard CRC method. The generator polynomial is x^3+1. Suppose the third bit from the left is inverted during transmission. What will be the bit string at the receiver's end?

A. 1 0 1 1 0 1 0 1 1 0 0 B. 1 0 1 1 1 1 0 1 0 0 0
C. 1 0 0 1 1 1 0 1 1 0 0 D. 1 0 1 1 1 1 0 1 1 0 0

5. Suppose the information portion of a packet contains 10 bytes consisting of the 8-bit binary representation of the numbers 1 through 10. Compute the Internet (IP) checksum for this data.

A. 11100110 11100001 B. 11100110 11101001
B. 00011001 00010110 D. 00011001 00011110

6. Consider the generator, G=10011, and suppose that data in binary is 1010101010. What is the data ready to be sent after CRC calculation?

A. 10101010101100 B. 10101010100101
C. 10101010100100 D. 10101010101000

7. …… control refers to a set of procedures used to restrict the amount of data that the sender can send before waiting for an acknowledgement.

(A) Error (B) Flow (C) Transmission (D) All of the these

8. Assuming that you are designing the sliding window protocol for a 1 Mbps point-to-point link to the moon. Which has a one-way latency(Delay) of 1.25 sec. Assume that each frame carries 2 KB of data; what is the minimum number of bits needed for the sequence number?

(A) 10 (B) 8 (C) 9 (D) 7

9. Suppose there is exactly one packet switch between a sending host and a receiving host. The transmission rates between the sending host and the switch and between the switch and the receiving host are R1 and R2, respectively. Assuming that the switch uses store-and-forward packet switching, what is the total end-to-end delay in sending a packet of length L?

(Ignore queuing, propagation delay, and processing delay.)

A. 2L/(R1 + R2). B. L/R1 + L/R2.
C. 2L/R1*R2. D. L*R1 + L*R2.

10**. Assume there is a satellite communication link between the moon and Earth with a capacity of 1 Mbps. The communication is happening between the moon and earth with 1000-bit frames and takes 270-ms one-way delay. What is the maximum link utilization if we use**

1. Stop-and-wait flow control and
2. Flow control with a window size of 7.

A. 1→ 0.012, 2 → 0.022

B. 1→ 0.002, 2 → 0.013

C. 1→ 0.02, 2 → 0.0013

D. 1→ 0.017, 2 → 0.002