

Name _____

**CS 513 Spring 08
Introduction to LAN/WAN
MidTerm Exam
March 24, 2008**

Trivia Question 0 (1 extra credit point)

- a) What is the name of the world's tallest mountain?
1. (10 points) A 6-bit sequence was encoded into a 10-bit sequence using **Hamming code**. During transmission one of the bits was flipped. The sequence received was **0010001101**. Assuming even parity, which bit has an error? **Show all your work!!**
2. (8 points) On a 10 Mbps **CSMA/CD Ethernet LAN**, if the minimum packet length is 200 bits long, calculate the maximum allowable distance between two computers? Assume that the speed of light is 3×10^8 m/s.

3. (6 points) Which is faster? **8-FSK** or **QAM-32**? Calculate the ratio of their speeds?

4. (4 points) Give one example each of **unguided** and **guided** transmission media

5. (5 points) Sketch the **differential Manchester encoding** for the sequence **110111101011**

6. (4 points) Give one positive (pro) for the **OSI model reference model** and one pro of the **TCP/IP reference model**

7. (5 points) In the **IEEE 802.11** wireless LAN standard, mobile devices can conserve battery power by going to sleep. Explain what happens if another node transmits packets to a sleeping node

8. (6 points) Distinguish between the terms **baseband** and **broadband** for coaxial cable transmission

9. (6 points) In **802.11** wireless LANs, what is the **Net Allocation Vector**?

10. (4 points) In socket programming, what does the **bind system call** do?

11. (8 points) In the **binary countdown algorithm** 4 stations with addresses **010101**, **110110**, **010110** and **111000** are trying to access the channel, how many bit time slots are necessary to resolve the contention. Show your work.

12. (5 points) In the **Go Back N** data link protocol, the sender transmits packets numbered **1,2,3,4,5,6,7,8**. The receiver receives packets **1,2,3** and **5,6,7,8** okay. However, packet **4** is damaged. What sequence of actions happens at the sender to recover and what packets are retransmitted?

13. (10 points) If **8-PSK** is used over a 3 KHz channel whose signal-to-noise ratio is 20dB, what is the maximum achievable data rate?
14. (6 points) If the sequence **01111110** is used as a start and end of frame delimiter, what new sequence would be produced if we **bit-stuffed 10111 11111 10111 11110 11111 10101**? Please include the start and end of frame delimiter.
15. (5 pts) In the **binary exponential backoff algorithm** used in Ethernet, **after 6 collisions**, from how many possible slots does the sender randomly choose? Show your work
16. (8 points) Given a sender-receiver pair using $x^3 + x^2 + 1$ as a generating polynomial for **CRC** and a binary message **1011101** at the sender, what is the actual message transmitted including CRC bits (show your calculation)?