

- 1a Given a 2400 baud modem, what is the maximum time to transfer a 7 KByte binary file? 5pt
- 1b What is frequency modulation and why is it used? 5pt
- 1c Explain how frequency division multiplexing works. 5pt

- 2a The following table shows how parity bits are used in the Hamming code. Suppose the string "000 1110 0101" is received. Which string had been sent? 5pt

	b1	b2	b3	b4	b5	b6	b7	b8	b9	b10	b11
1	X		X		X		X		X		X
2		X	X			X	X			X	X
4				X	X	X	X				
8								X	X	X	X
RECEIVED:											
	0	0	0	1	1	1	0	0	1	0	1

- 2b In practice, error detection schemes are used more often than error correcting schemes. Why? Give an example where error correction is preferable. 5pt
- 3a What is the difference between contention protocols and collision-free protocols in the MAC sublayer? 5pt
- 3b Explain why it is necessary to specify a maximum cable length for Ethernet networks. Be precise! 10pt
- 3c Explain why we need to insert delays in some token ring networks. 5pt

Grading: The final grade is calculated by accumulating the scores per question (maximum: 45 points), and adding 5 bonus points. The maximum total is therefore 50 points.