KFUPM - COMPUTER ENGINEERING DEPARTMENT

COE-540 – Computer Networks – Assignment 2 – Due Sat Oct 22nd, 2011

Student Name:
Student Number:

Problem 1: Compute the Fourier series expansion for the periodic function $f(t) = At$ for $t \in [0, T]$. A is a nonzero constant representing the signal amplitude in voltage, while T is the period in seconds.

Problem 2: Assume it is desired to put the T1 carriers on a 50-kHz line. Compute the required signal-to-noise ratio (SNR) that is needed? Would it be possible to carry more bits per second for the computed SNR if high order modulation schemes such as 16-QAM or even 64-QAM are used? Why or why not?

Problem 3: Consider an ADSL system using the DMT modulation while allocating 3/4 of the available data channels to downstream link. If the system is using 64-QAM modulation on all the channels, then compute the maximum capacity of the downstream?

Problem 4: What is the percent overhead on a T1 carrier? That is, what percent of the 1.544 Mb/s are not delivered to the end user? How does this related to the percent overhead in OC-1 or OC-768 lines? State any (reasonable) assumption.

Problem 5: Given the typical frequency allocation for cable TV shown in Figure 2-52 and the allowed upstream and downstream modulation schemes by the DOCSIS standard, what would be the maximum bit rates for the upstream and downstream. Show your calculations and reasoning.

Problem 6: On the topic of SONET/SDH:

a) Explain very briefly the following terms: STS-n, SPE, OC-n?

b) Explain the different between the designations OC-3 and OC-3c?

c) What is the available user bandwidth in an OC-12c connections?

Problem 7: On the topic of line encoding techniques:

a) Explain briefly the Multi-Level Transmit 3 (MLT-3) line encoding techinque?

b) Encode the following data sequence: 10100111001? Assume that the initial state for the encoder is 0.

c) Estimate the minimum bandwidth needed to achieve a bit rate of B bits/sec if the signal is transmitted using NRZ, MLT-3, and Manchester encoding? Explain.

Problem 8: On the topic of wireless and mobile systems:

a) Explain briefly how the handoff procedure in GSM is different than that for the AMPS system.

b) Explain briefly the difference between hard handoff and soft handoff.