INFSCI 1072/TELCOM 2700: Wireless Networks
Fall 2016

Final Exam Part B: December 11th, 2016

This test is to be taken individually. You are free to consult class notes and the reading material and the instructor - **absolutely no one and nothing else**! In particular, you CANNOT use anything except a scientific calculator for calculations and you CANNOT access the Internet.

The exam is due within 24 hours from the time it is picked up or December 12th, Monday, by 10.00 a.m. whichever is earlier. The exam question sheet is to be returned along with all material you wish graded. Sign the honor pledge below after completing the exam.

Pledge:
On my honor, I pledge that I have not given or received aid on this exam. I have not violated the policies stated above. I have also not spent more than 24 hours on the exam after picking it up.

Signature: _____

Name: _____

General Instructions:
Answer all questions. Read the questions carefully to understand what is being asked. Avoid writing unnecessary things in the answers but write all the essential steps in solving any problem. Explain the steps.

If you are not able to do any numerical calculation explain clearly what you would do to solve the problem.

THERE WILL BE NO PARTIAL CREDIT FOR VAGUE ANSWERS OR UNCLEAR STEPS. I SHOULD BE ABLE TO UNDERSTAND WHAT YOU WERE TRYING TO DO WITHOUT YOUR VERBAL EXPLANATION LATER.

1. Show how you calculate and then plot/draw the aperiodic autocorrelation of the following spread spectrum code: [1 1 1 1 -1 -1 -1 -1]. Comment on your results knowing that this code is similar to ones used in IS-95 to separate users within a cell on the forward link, but with a shorter length. Will this code help in combatting frequency selective fading? (20)
2. Suppose that a cellular network operator has 8.4 MHz of spectrum each for the uplink and downlink. Ignore the impact of control channels in all of the cases. With 200 kHz channels and GSM-like TDMA/FDMA, and a reuse cluster size of $N_c = 7$, determine how many users can be active in one cell for a grade of service corresponding to a 10% call-blocking rate. Assume that each active user produces 50mE of traffic load in the busy hour. How does that number change for a 2% call blocking rate? (10)
3. List the processes that can be used for collision avoidance with CSMA. Compare collision avoidance in IEEE 802.11 and HIPERLAN/1. Your answer should not be more than eight lines. (10)
4. Compute the asymptotic cell capacity of an IS-95 CDMA cellular system if the E_b/I_t requirement is 6.5 dB, $f = 0.93$, and the other parameters are the same as those used in class. (10)