EE 4429 – Advanced Electronics

Final Exam

Due: December 19, 2014 (by 5:00 p.m.)

Your Name: ____________________       Total Points: _________

Last 5 of Bengal ID: _____________

There are 3 groups of questions. Full score is 100 points. For maximum credit, show and organize all your work neatly.

Topics covered in this Final Exam include:

A. Ideal op-amp amplifier circuit application (30 points)
B. DC and AC load lines for a BJT amplifier (40 points)
C. Current-voltage characteristics of CMOS (30 points)
Q1. Consider the following op-amp circuit:

a. (10 points) What is this circuit typically called? Explain in sufficient details.

b. (20 points) Express $v_O$ in terms of $v_{i1}$, $v_{i2}$, $v_{i3}$, $R_1$, $R_2$, $R_3$ and $R_F$ only.
Q2. Consider the following multistage circuit. For the PNP transistor, $\beta = 150$, $V_{EB(ON)} = 0.7$ V, and if necessary the Early voltage $V_A = \infty$.

a. (20 points) Determine and draw the DC load line for this BJT amplifier.

b. (20 points) Determine and draw the AC load line for this BJT amplifier.
Q3. Consider the CMOS inverter circuit below:

a. (15 points) Justify the current-voltage curve below for the NMOS in sufficient details.

b. (15 points) Justify the current-voltage curve below for the PMOS in sufficient details.