REVIEW FOR FINAL EXAMINATION

The final examination will be given on Monday, April 26, 2004, from 2:50pm to 5:40pm in Room C341 of Van Leer. Two pages of notes are permitted and if relationships you need are not available, ask your instructor/proctor. The exam is closed book and will consist of approximately 7 problems of which 5 problems, each worth 20 points for a total of 100 points, must be worked. The 7 problems will fall into two categories, those you must work and those you may work. Below is a list of the material for which you are responsible.

Amplifiers

Voltage gain, current gain, power gain
Two-port models for amplifiers
Amplifiers with finite source and load resistances
Amplifier frequency response – Lower and upper –3dB frequencies, midband gain, BW
Input and output resistance of amplifiers

Operational Amplifiers

Ideal op amp
Analysis of circuits containing ideal op amps
Inverting and noninverting amplifiers
Other types of op amp circuits – summing, difference, integrators, first-order circuits
Cascaded amplifiers
Frequency response of inverting and noninverting amplifiers, cascaded stages

Transistor Amplifiers

The BJT and FET amplifier
Coupling and bypass capacitors – midband gain analysis
DC and ac analysis of amplifiers
Small-signal models – diode, BJT, MOSFET, and JFET
Small-signal model parameters as functions of the large signal variables and model parameters
Common-emitter and common-source transistor amplifier analysis (voltage gain, current gain, input resistance, and output resistance)

Single Transistor Amplifiers

BJT – common emitter, common-collector, common-base and common-nothing (voltage gain, current gain, input resistance, and output resistance)
FET – common source, common-drain, common-gate and common-nothing (voltage gain, current gain, input resistance, and output resistance)
Designing transistor amplifiers

Multistage Amplifiers

AC-coupled multistage amplifiers
Direct coupled multistage amplifiers
Differential amplifiers – differential mode analysis, common mode analysis, CMRR

Frequency Response

Amplifier frequency response
Direct analysis of the roots of an amplifier

Finding the low-frequency cutoff frequency, ω_L, by various methods-dominant pole, multiple poles, and the short-circuit time constant method
High-frequency models for the BJT and FET – unity gain frequency, f_T

Finding the high-frequency cutoff frequency, ω_H, by various methods-dominant pole, multiple poles, and the open-circuit time constant method
Frequency response of multistage amplifiers

Feedback Stability and Oscillators

Concepts of feedback circuits
Two-port network theory applied to negative feedback circuits
Identification of the type of feedback
Finding the voltage gain, current gain, input resistance and output resistance of a transistor amplifier with feedback using the feedback approach (open the loop find A and β, use A and β to find the input and output resistances)
Influence of feedback on the frequency response of an amplifier with feedback
Stability of a feedback circuit – Bode criteria, phase margin
Oscillators – RC and LC

Nonlinear Op Amp Circuits

Precision rectification
Amplitude limitation
Waveform generators