Section D
BJT Amplifiers
(Chapters 5 & 7 of your text)

D1: Introduction & Goals

In the last section, we discussed the bipolar junction transistor (BJT) in terms of the basic operational principles of this three-terminal active device, its models, analysis techniques, and fundamental design, biasing and operational considerations for single-stage BJT amplifier configurations. In this section, we’re going expand on this work and investigate each of the four single-stage amplifier configurations in great depth, ultimately developing the tools needed for optimizing single and multistage amplifier design. We will also revisit the concept of bias stability and the importance of considering, and compensating for, the unavoidable parameter variations that arise during device fabrication, as well as amplifier design and operation.

Upon completion of this section of our studies in this section, our goals are for you to be familiar with:

the terminal characteristics of the four single-stage BJT amplifier configurations that perform linear amplification;
the methods for connecting (coupling) amplifier stages;
the analysis, design, and/or simulation of single and multistage amplifier configurations; and
the mechanisms of parameter variation in amplifier operation, the importance of compensation, and the various biasing techniques available to ensure bias stable operational characteristics.

It’s going to be very tempting to “just find the equation” and plug the numbers in. Please do not fall into this trap – many times, the equations given are only valid under a certain restricted set of assumptions. Take some time to understand the situation and verify the constraints and assumptions before slapping numbers into the first thing that looks good. As we get into more complex situations, the simple “plug-and-chug” strategy will somehow, sometime, result in a world of hurt!

Also, don’t be concerned if you need to revisit some of the previous sections’ material – remember that, no matter how well defined, the laws of physics ultimately govern this area of our profession...