PHYS 315   Circuit Analysis F2018 Study Guide for Final

Final exam format will be similar to past tests. Study the past two tests (Test #1 and Test #2) and the related materials.

1. Node-voltage method.



2. Op-Amp <https://www.youtube.com/watch?v=yfbQFWp4-So>



3. Op-Amp: Find *V0* as a function of *VS* in terms of the resistors shown.



3. Designing and analyzing (BJT) amplifier circuits.
$I\_{C}=βI\_{B}$ $r\_{e}=\frac{26 mV}{I\_{C}}$ $Vgain=-\frac{R\_{C}}{r\_{e}}$ $V\_{BE}=0.7 v$

<https://www.youtube.com/watch?v=7ukDKVHnac4>

1. Explain why the BJT Common Emitter is an inverting amplifier.

2a. Calculate the following DC bias conditions: VB, VE, IE, IC, IB, VC, VCE, Power dissipated in the transistor and the ac voltage gain.
(Assume that the transistor is a Si type, with β=100, $V\_{BE}=0.7 v$)

2b. How will you modify the emitter resistance for a gain of 100?.



Designing amplifier circuits with BJT and Op=Amp:
$I\_{C}=βI\_{B}$ $r\_{e}=\frac{26 mV}{I\_{C}}$ $Vgain=-\frac{R\_{C}}{r\_{e}}$ $V\_{BE}=0.7 v$

3. Design the following two-stage non-inverting amplifier with an overall voltage gain of 400. Use an op-amp for the final (second) stage with a gain of 4 and a Si BJT (β = 100) as the first stage with the following restrictions: Ic = 2.0 mA, Vcc = 5 V, Vce = 1.4 V, and IR2 ≥10IB.