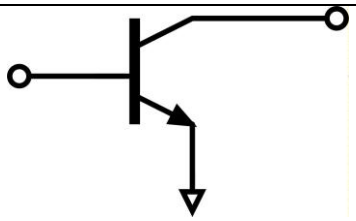
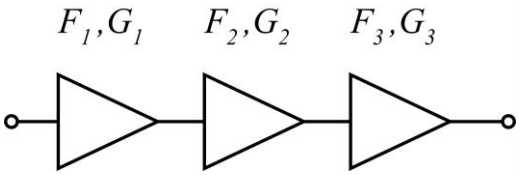
ECE 145b problem set (noise)

Problem 1: The transistor has β=200, R_{bb}=50Ω, $R_{ex} = R_c = 0$ Ω. (a) At f~0Hz, and I_C = 1 mA, find Fmin and Zopt. (b) if Z_{gen} = 1k Ω, find the spectral density of the *total* input referred noise voltage. (c) if Z_{gen} = 1k Ω, what collector bias current minimizes the noise figure ?

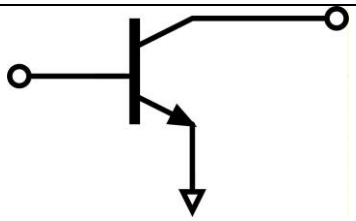


Problem 2: Stages 1,2, and 3 have noise figures of 2, 4 and 6 dB respectively, and gains of 6, 9, and 12 dB respectively. What is the noise figure of the overall system (answer in linear units and in dB) ? What is the noise measure of the overall system (answer in linear units)? What is the noise temperature of the overall system, assuming that the reference temperature is 290 Kelvin.



ECE 218B problem set (noise)

Problem 1: The transistor has β=200, R_{bb}=50Ω, $R_{ex} = R_c = 0$ Ω. (a) At f~0Hz, and I_C = 1 mA, find Fmin and Zopt. (b) if Z_{gen} = 1k Ω, find the spectral density of the *total* input referred noise voltage. (c) if Z_{gen} = 1k Ω, what collector bias current minimizes the noise figure ?



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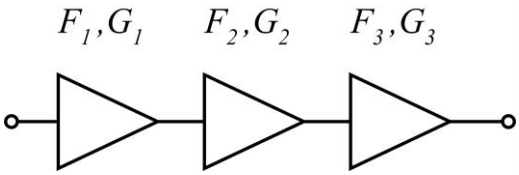

Problem 3: With the source grounded, (a) calculate the spectral densities of En, the total input short-circuit noise voltage, In, the total input open-circuit noise current, and the cross spectral density of En and In, assuminging that the spectral density of $I_{N,ch}$ is $4kT\Gamma g_m$, that R_g has normal thermal noise, and that R_{DS} is noiseless (b) With ft=200 GHz, Rg=1/gm, Γ =1, Rgen= 50 Ω, gm=50 mS, find the (50 Ohm source impedance) noise figure at 10 GHz. (c) With these same values, find Fmin and Zopt.