Department Of Electrical & Computer Engineering

Course ECSE 335 **Session 24/Fall**

Introduction To Microelectronic Circuits
Assignment 1

Amplifier Biasing:

Choose any three of the following 5 biasing problems:

1. Bias a CS NMOS amplifier in a 1 µm CMOS process described by $\mu_n C_{OX}$ = 0.1 mA/V, V_t =0.5 V and λ'_n=2x10^{-7} m/V such that its output is set at 1.65 V. Assume a 3.3 V supply level and that the source terminal is set at 0 V. Ensure that the device is operating in its saturation region. Verify your result using SPICE.

2. Bias a CS PMOS amplifier in a 1 µm CMOS process described by $\mu_p C_{OX}$ = 0.05 mA/V, V_t =-0.6 V and λ'_p=5x10^{-7} m/V such that its output is set at 1.65 V. Assume a 3.3 V supply level and that the source terminal is set at 3.3 V. Ensure that the device is operating in its saturation region. Verify your result using SPICE.

3. Bias a CG NMOS amplifier in a 1 µm CMOS process described by $\mu_n C_{OX}$ = 0.1 mA/V, V_t =0.5 V and λ'_n=2x10^{-7} m/V such that its output is set at 2.2 V. Assume a 3.3 V supply level and that the source terminal is set at 1.2 V. Ensure that the device is operating in its saturation region. Verify your result using SPICE.

4. Bias a CB npn amplifier in a bipolar process described by V_A = 100 V and I_S =1x10^{-15} A such that its output is set at 5 V. Assume a ±12 V split supply level and that the base terminal is set at 0 V. Ensure that the device is operating in its active region. Verify your result using SPICE.

5. Bias a CD PMOS amplifier in a 1 µm CMOS process described by $\mu_p C_{OX}$ = 0.05 mA/V, V_t =-0.6 V and λ'_p=5x10^{-7} m/V such that its output is set at 1.65 V. Assume a 3.3 V supply level. Ensure that the device is operating in its saturation region. Verify your result using SPICE.