EQUATION SHEET FOR TEST 1

$$V_{LSB} = \frac{V_{FS}}{2^n}$$

SNR = 6.02 x n + 1.76 dB

Mega:	1K*1K
Giga:	1K*1K*1K
Tera:	1K*1K*1K*1K
Peta:	1K*1K*1K*1K*1K

$$v_n(drift) = -\mu_n E$$
$$J_n(drift) = -qnv_n(drift)$$
$$J_n(diffusion) = qD_n \frac{dn}{dx}$$
$$J_p(diffusion) = -qD_p \frac{dp}{dx}$$
$$\frac{D}{\mu} = \phi_t$$
$$\theta_c = \sqrt{\frac{2V_r}{V_P}}$$

$$K = KP\frac{W}{L}$$

$$C_{ox}'' = \frac{\epsilon_{ox}}{TOX}$$
$$\epsilon_{ox} = \frac{3.5 \times 10^{-2} fF}{um}$$

$$C_{GC} = C_{ox}'' WL$$

$$C_{BD}(V_{BD}) = \frac{CJ \cdot AD}{(1 - V_{BD}/PB)^{MJ}} + \frac{CJSW \cdot PD}{(1 - V_{BD}/PB)^{MJSW}}$$

$$C_{BS}(V_{BS}) = \frac{CJ \cdot AS}{(1 - V_{BS}/PB)^{MJ}} + \frac{CJSW \cdot PS}{(1 - V_{BS}/PB)^{MJSW}}$$
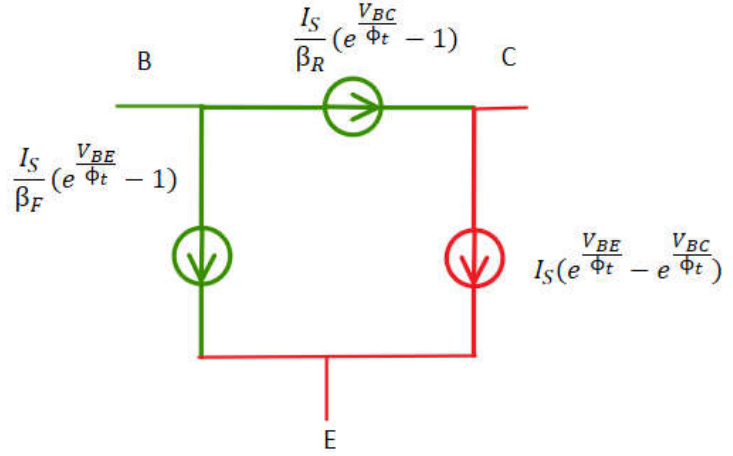
$$V_{GT} = V_{GS} - V_{TH}$$
$$I_{DS} = KP\frac{W}{L}\left(V_{GT}V_{DS} - \frac{V_{DS}^2}{2}\right)$$
$$KP = \mu_n C_{ox}''$$
$$R_{on} = \frac{1}{KP\frac{W}{L}(V_{GS} - V_{TH})}$$
$$I_{DS,sat} = \frac{1}{2}KP\frac{W}{L}V_{GT}^2$$

$$\frac{I_S}{\beta_R}(e^{\frac{V_{BC}}{\phi_t}} - 1)$$

$$\frac{I_S}{\beta_F}(e^{\frac{V_{BE}}{\phi_t}} - 1)$$

$$I_S(e^{\frac{V_{BE}}{\phi_t}} - e^{\frac{V_{BC}}{\phi_t}})$$

$$g_m = \frac{1}{\phi_t}I_C$$

$$C_{diff} = \tau_f g_m$$

$$\beta_{ac} = \frac{1}{j}\frac{g_m/C_{be}}{2\pi f} = \frac{1}{j}\frac{f_T}{f}$$
$$f_T = \frac{g_m}{2\pi C_{be}}$$
$$C_{be} = C_{diff} + C_{dep} = g_m\tau_f + C_{dep}$$