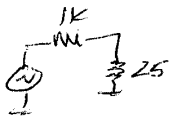
MID-TERMS ANSWERS

EE 322 FEB 05

1) $I_s = I_s(e^{q_i V_D / kT} - 1)$

$I_s = \frac{q_i A D_p p_{no}}{L_p}$ ASSUME $L_p = \sqrt{D_p \tau_p}$

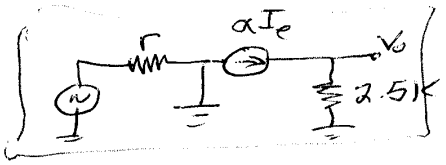
$I_{DC} = 1mA$ $r = \frac{25mV}{I}$ $r = 25\Omega$



$V_o = \frac{25}{1K} \times 40mV = 1mV$

$V_o = 1mV$

2)



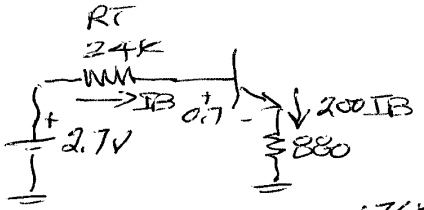
$r = \frac{25mV}{I}$ $r = 25\Omega$

$A_V = \frac{R_L}{r} = 100 = A_V$

$A_i = \alpha \approx 1 = A_i$

$Z_{in} = 25\Omega$

3)



$2V = 24K(I_B) + 176K(I_B)$

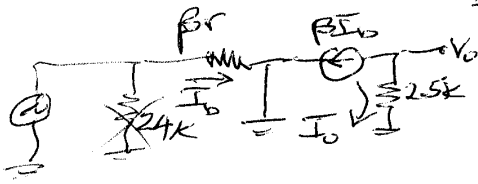
$2V = 200K\,I_B$ $I_B = 10\mu A$

$I_B = 10mA$

$I_C = 2mA$

$V_{CE} = 6.8V \approx 7V$

If $I_C = 1mA$



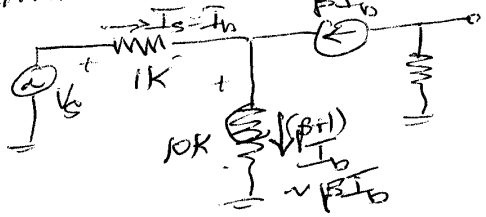
$r = 25\Omega$

$A_V = -100$

$A_i = -100$

$Z_{in} = 2.5K$

4) easy way CHANGE TO T-MODEL



$V_s = I_s 1K + (\beta+1) I_b 10K$

$V_s = I_s(1K + 100K)$

$I_s = V_s / 100K$

$V_s = 100K I_b$

$V_o = \beta I_b R_L$

$= 10 I_b 100K$

$= 1000K I_b$

$\frac{V_o}{V_s} \approx \frac{\beta I_b R_L}{r_\pi I_b + (\beta+1) I_b R_E}$

$\frac{V_o}{V_s} \approx 10$

$Z_{in} \approx 100K$