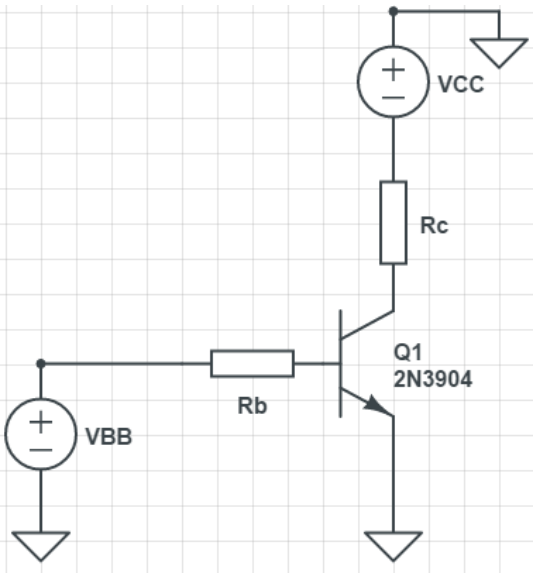
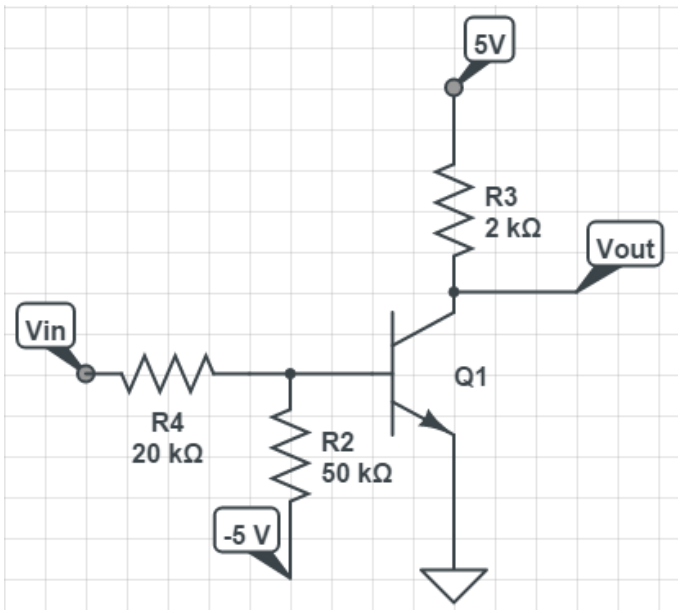
Tutorial 6
EE 101
BJT Circuits

Q1. For circuit 1 shown in the figure, suppose R_B = 270K, R_C = 1.5K, V_{BB} = V_{CC} = 6V, and $\beta = 120$. Find whether BJT operates in active region or saturation region? Find I_C, I_B, and V_{CE} . If the value of R_C is changed to 3K, find whether BJT is in active or saturation region?



Circuit:1

Q2. For the inverter circuit shown in figure 2, BJT has $\beta = 100$. Find noise margins NM_L and NM_H.

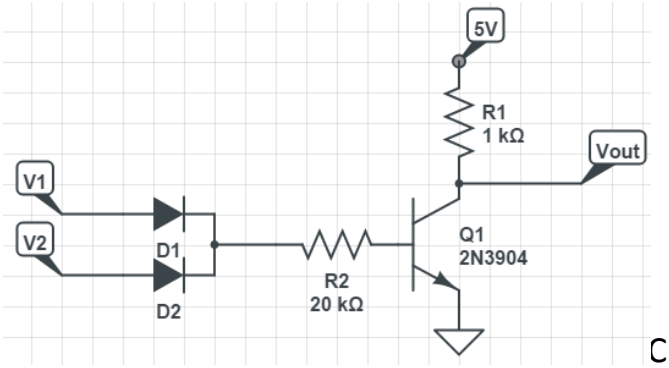


Circuit: 2

Q3. The DTL circuit shown in the circuit 5 is a NOR gate. Suppose that the voltage across a forward biased diode is 0.7V. If the low voltage is 0.2 V and high voltage is 5 V, find:

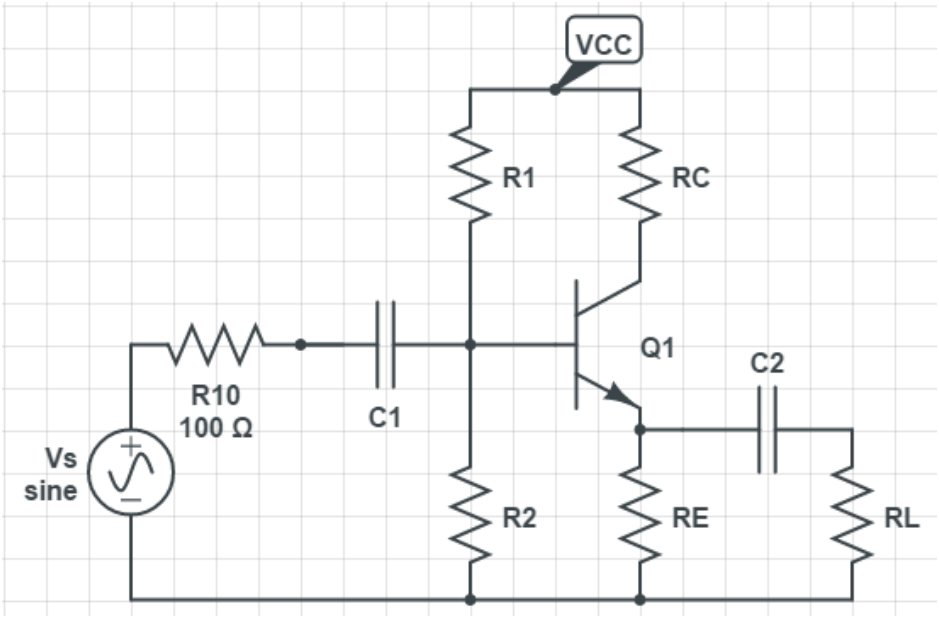
(a) The mnimum value of β required for proper operation.

(b) Noise margin for the case when β is 100.



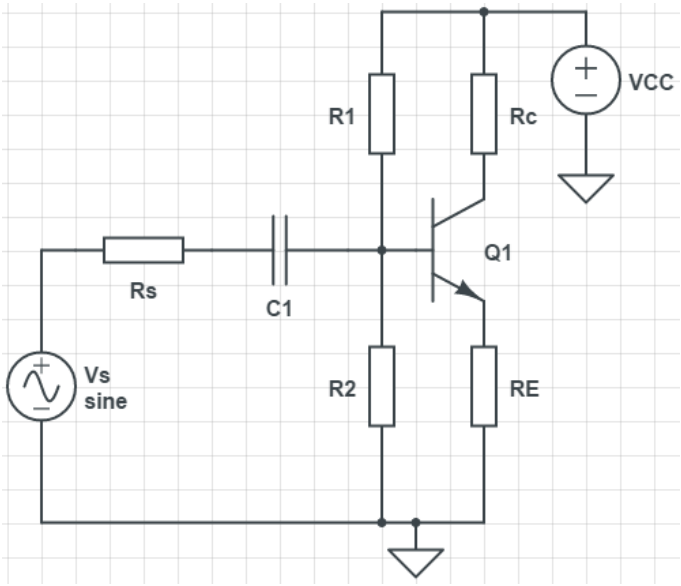
Circuit: 3

Q4. For the amplifier above, $h_{fe}=h_{FE}=100$, R1=R2=400 kΩ, $R_E=R_s=1k\Omega$, $R_L=9$ kΩ, and VCC=20V. Given that $I_{CQ}=3.09$ mA, find (a) A_v, (b) R_{in}, (c) $A_i=i_L/i_b$, (d) R_o. Does this amplifier act as a unity gain amplifier with high input resistance and low output resistance?



Circuit: 4

Q5. For the circuit given in figure suppose h_{FE} = h_{fe} =100, R1 = R2 = 26K, R_C = 980, R_E = 2K and V_{CC} = 10V. Find:g_m, r_e, R_{in} and A_v.



Circuit: 5

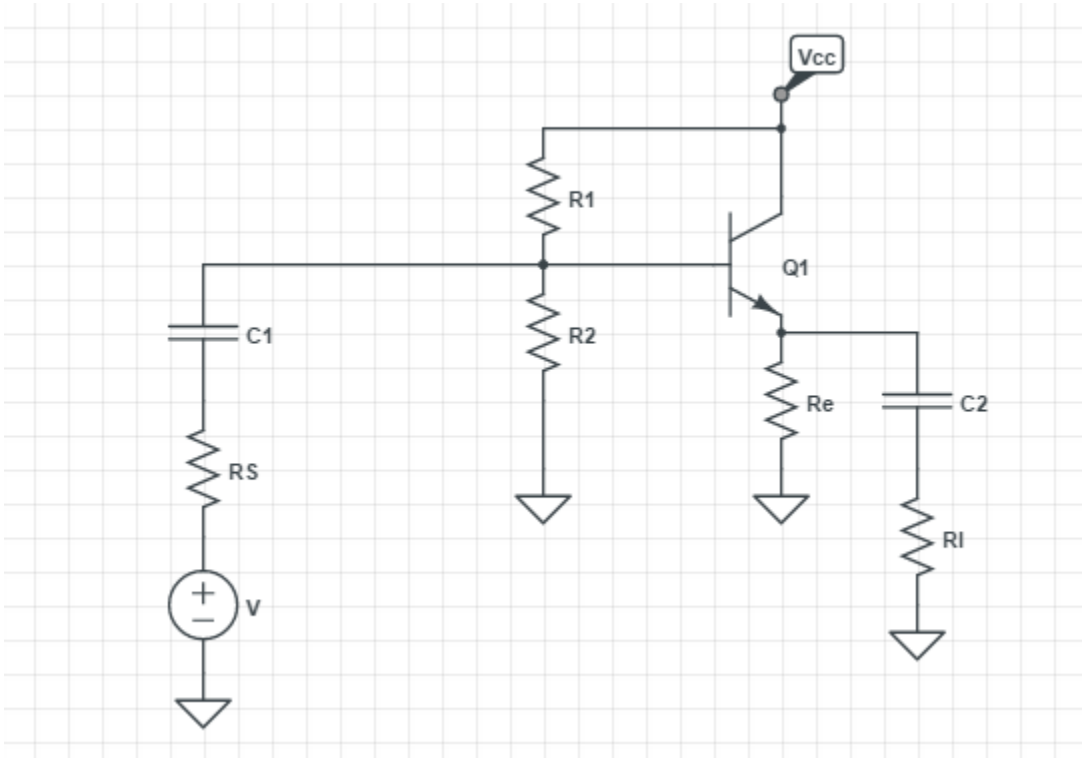


Fig.6

Problem 6. For the emitter follower circuit in figure suppose that hFE=hfe=100, R1=R2=26k-ohm, Re=Rl=2kohm, Rs=1k ohm and Vcc=10V. Find (i) Ve/Vb, (ii) Rin and (iii) Ro

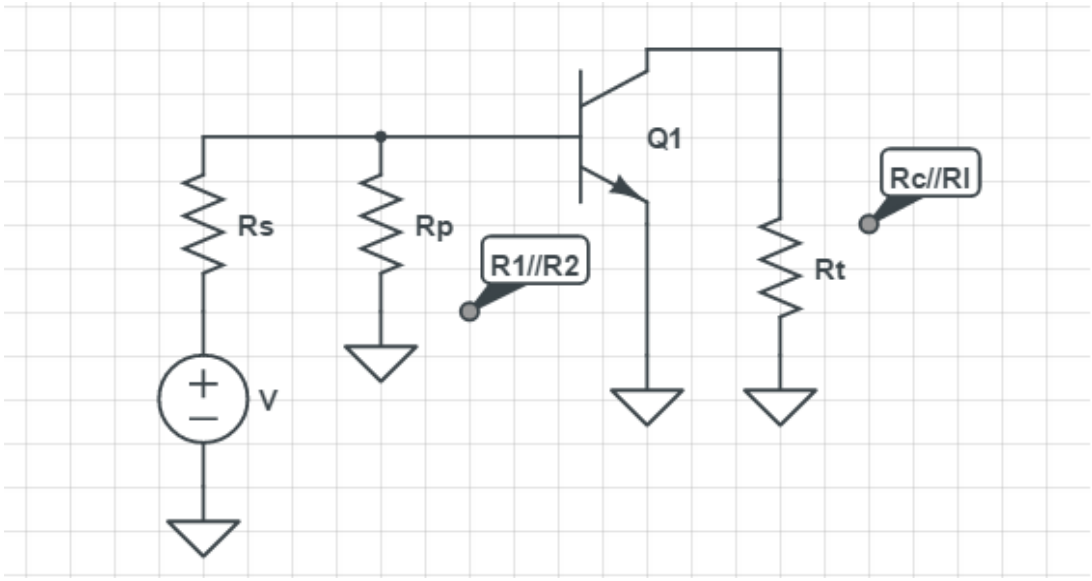
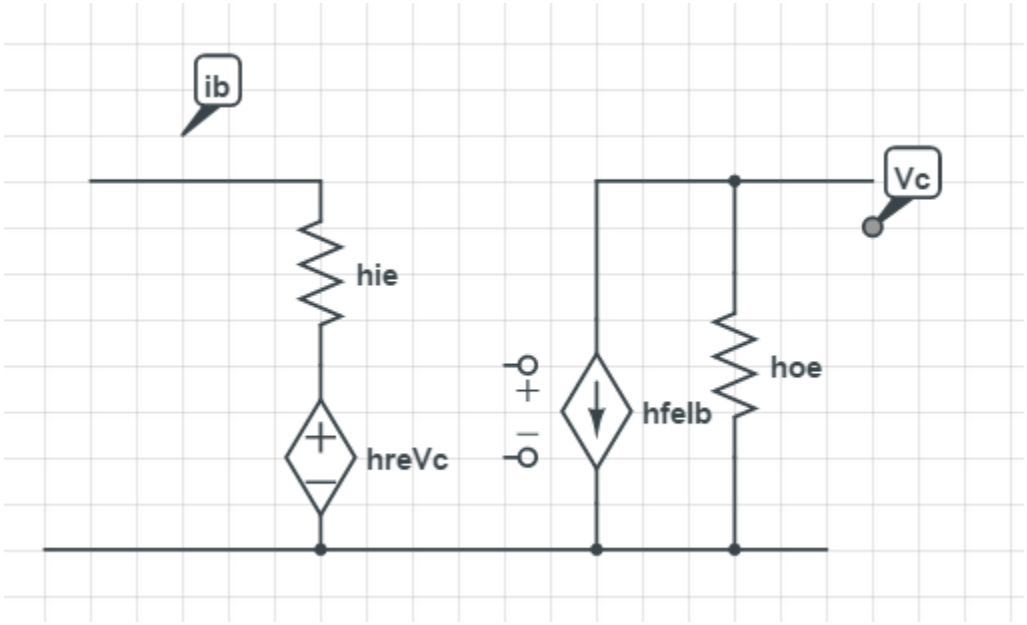


Fig.8 (a)



(b)

Problem8. Assume figure 8b to be the equivalent small signal model of the transistor in figure 8a. Calculate Vc/Vb for the circuit in the figure taking Rc=RL=2k ohm, hie=1.3K ohm, hre=10^{-4}, hfe=100, hoe=10^{-5} mho. Now, repeat the calculation without hre and hoe. How does the answer differ.