ECE 322 Electronics-1, Fall 2018

Test Date: 11/19/2018

Problems: 3

Total Pages: 8

Name: _____

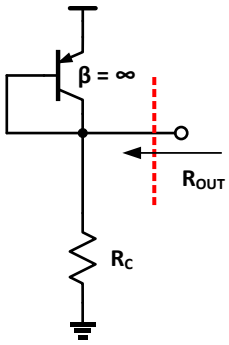
1. **(20 points)** _____
2. **(20 points + 5 Bonus)** _____
3. **(20 points)** _____

Total (60 points) _____

Good Luck!

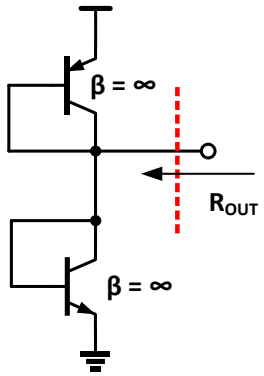
Problem 1 (a) (10 points): For circuit show below, draw the small signal model and derive the small signal resistance R_{OUT}.

R_{OUT} = _____



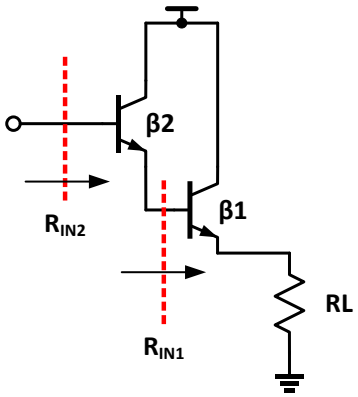
(b) (10 points): For circuit show below, draw the small signal model and derive the small signal resistance R_{OUT}. Transconductance of both BJTs are same – gm.

R_{OUT} = _____



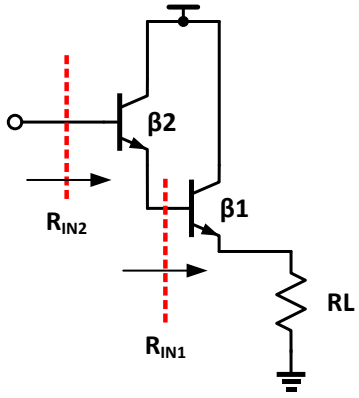
Problem 2(a): (10 points) The circuit shown below is known as Darlington transistor connection. Draw the small signal "Hybrid pi" model and derive the small signal resistance R_{IN1}. You can assume transconductance of the BJTs as gm1 and gm2.

R_{IN1} = _____



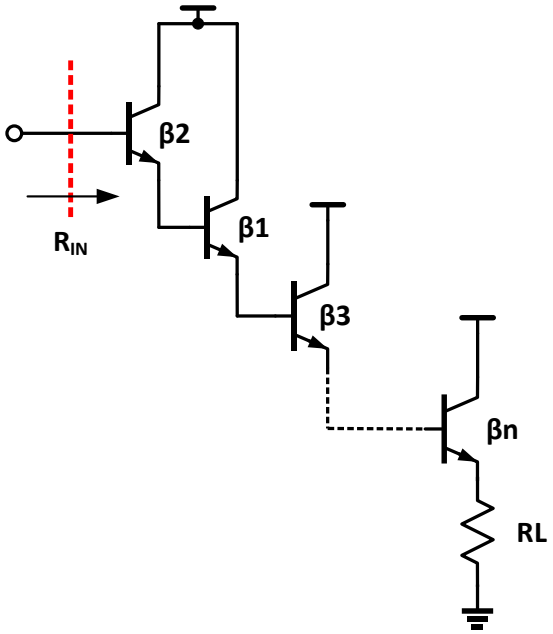
(b): (10 points) For circuit show below, draw the small signal "Hybrid pi" model and derive the small signal resistance R_{IN2}. You can assume transconductance of the BJTs as gm1 and gm2.

R_{IN2} = _____

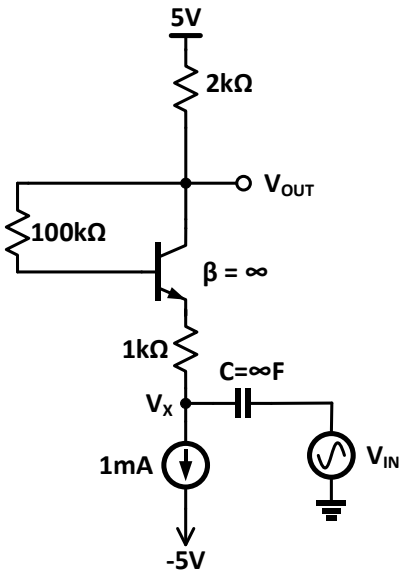


Bonus (5 points) For circuit show below, draw the small signal "Hybrid pi" model and derive the small signal resistance R_{IN}.

R_{IN} = _____



Problem 3: (20 points) For the amplifier circuit shown below, calculate the amplifier gain V_{OUT}/V_{IN} through small signal analysis (show the complete analysis). Assume $|V_{BE}|=0.7V$



Final Answer