EE411 Midterm Exam, 2 Hours
27th November, 2002 18.00

Question 1 (10 points):

Design a shunt-series amplifier with a transistor of g_m=5 millisiemens such that :

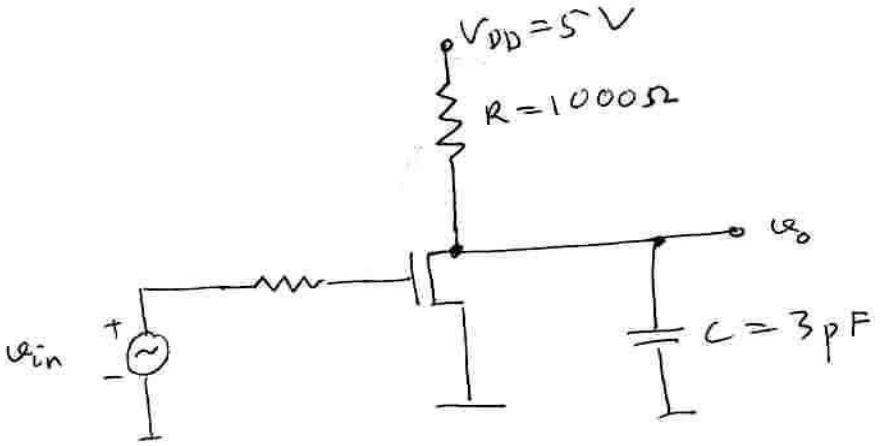
a) The output and the input impedances are 1000 Ohms.

b) The voltage gain is 7.

Question 2 (15 points):

Design a lowpass L-match circuit to match 7.5 Ohms to 75 Ohms to operate at 159 MHz. Draw the circuit and show the component values.

Question 3 (15 points):

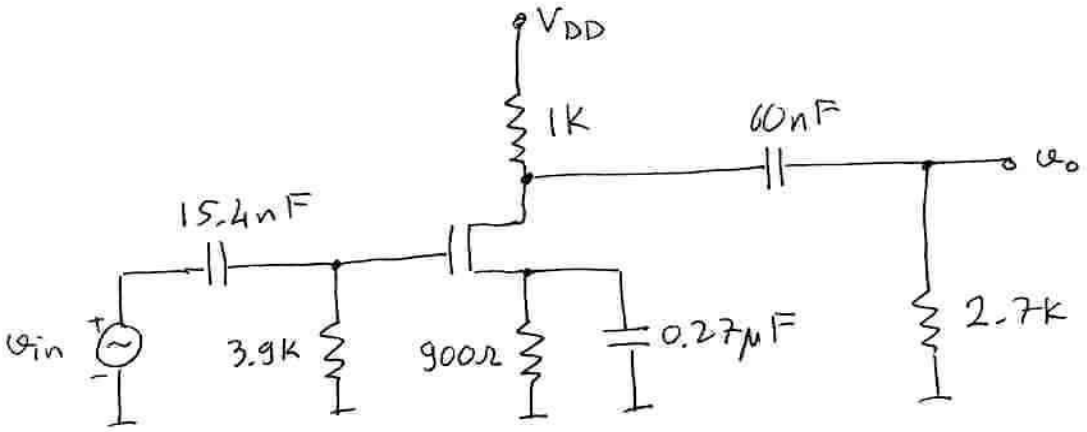


The design of the amplifier shown above is to be improved. The load of the amplifier consists of only a 3 pF capacitor. The low frequency voltage gain of the amplifier is 5. Modify the circuit such that the high frequency 3dB cutoff is at least 97 MHz (g_m of the transistor is 5 millisiemens).

Question 4 (20 points):

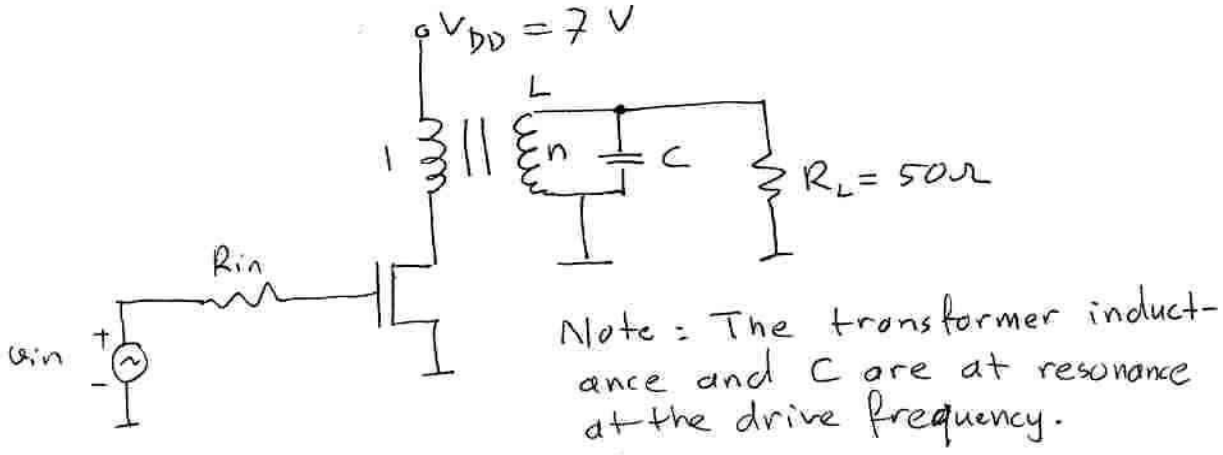
Design a highpass matching circuit to match 10 Ohm load into 50 Ohms. The ratio of the center frequency of the matching circuit to the bandwidth of the match must be 10. Find the impedances of the circuit elements and draw the circuit.

Question 5 (20 points):



Estimate the lower 3dB cutoff frequency of the amplifier given above in cycles/sec.
Note: g_m= 10 millisiemens

Question 6 (20 points):



Given the Class A amplifier configuration above, we want to deliver 6 Watts into 50 Ohm load. The transistor is designed to operate with a supply voltage of 7 Volts.

a) Find the minimum quiescent supply current and the associated transforming ratio n in order to deliver this power into the load with maximum efficiency.
b) Find the transistor dissipation at this power level.
c) Find the transistor dissipation at 0 drive.