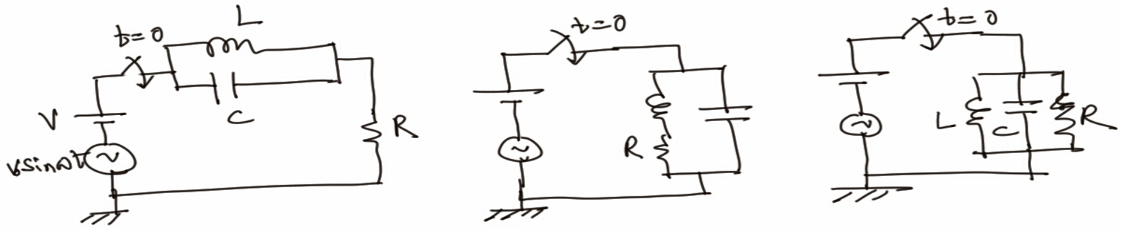
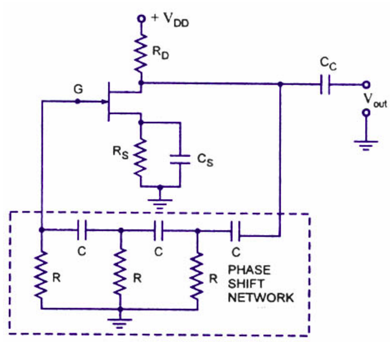
Assignment-7	EE204 - Analog Circuits	24^{th} Mar 2018
Submission Deadline-17.00 2^{nd} Apr 4, 2018.	Submission Protocol: Drop hardcopy in the EE office	Comment: None

1. Find the current as a function of time for all the circuits:



Show that the assumption near resonance as done during the class is valid for circuit (c)

2. Design a phase-shift oscillator using a single MOSFET using the topology shown below such that the oscillation frequency is 2 kHz. Find out the value of C required. Assuming r_0 to be very large find the minimum value for R_D such that the loop gain becomes unity.



Phase Shift Oscillator

Assume the transistor to be nMOS (ignore the symbol) with g_m = 10 mS, R = 10 kΩ.

3. We have argued that when Aβ>1 for a +ve feedback network, the circuit can oscillate and the gain will itself adjust in such a way that Aβ = 1. In such cases, the non-linearity of the gain comes into picture.
Prove the same graphically assuming that the open loop voltage of the amplifier as a function of the input is given by, $v_0 = 10(1-\exp(-v_i))$.

4. Consider the circuit shown below:

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	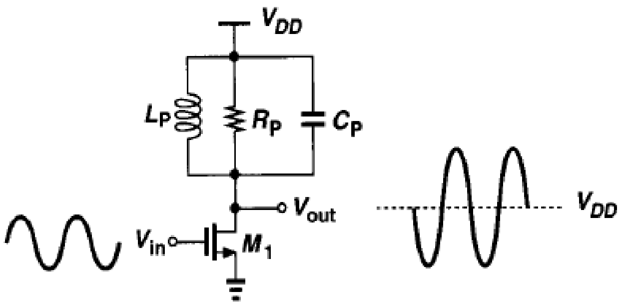 Design the circuit in a such a way that peak to peak swing is larger than V_{DD}. You can choose design and MOSFET parameters to prove the same.