TUTORIAL-4
EE 101: Basic Electronics
DEPARTMENT OF ELECTRONICS & ELECTRICAL ENGINEERING
INDIAN INSTITUTE OF TECHNOLOGY GUWAHATI
(First question is the Pre-Tutorial Assignment problem to be solved in the space provided.)

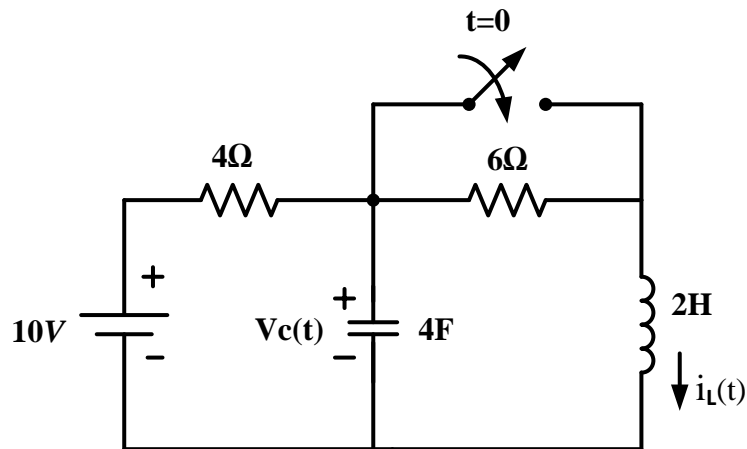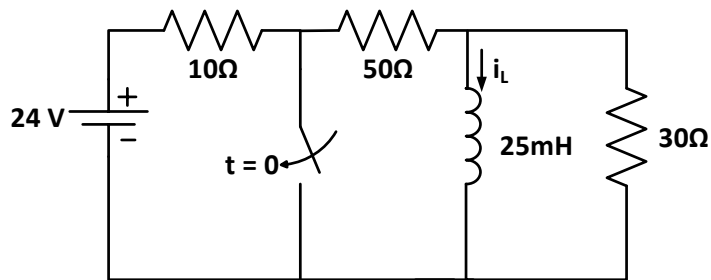Name: Roll No.   Tutorial Group:

Q.1 If the switch in the following circuit is closed at time $t = 0$, then find

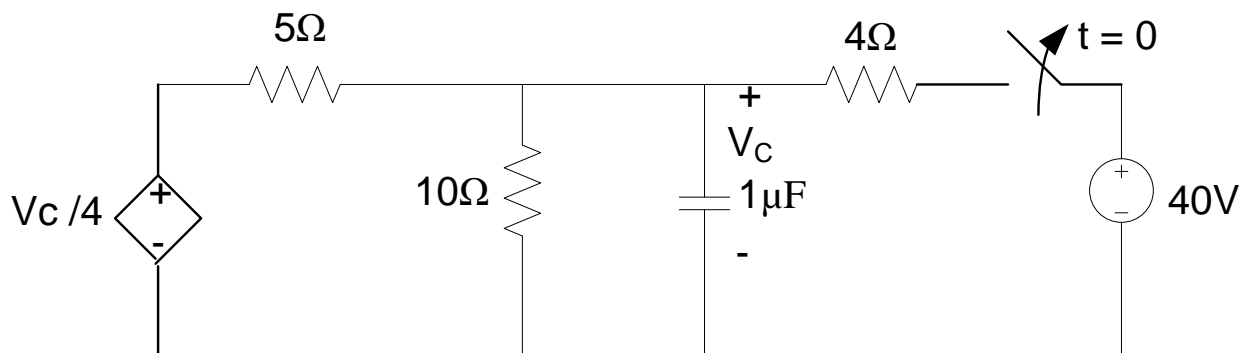   a) $V_c(0^-)$ b) $V_c(0^+)$ c) $dV_c(0^-)/dt$ d) $dV_c(0^+)/dt$ e) $di_L(0^-)/dt$ and f) $di_L(0^+)/dt$

Q.2 For the circuit shown below, the switch were open for a long time before it closes at time t = 0. Find $i_L(t)$ for t >0.
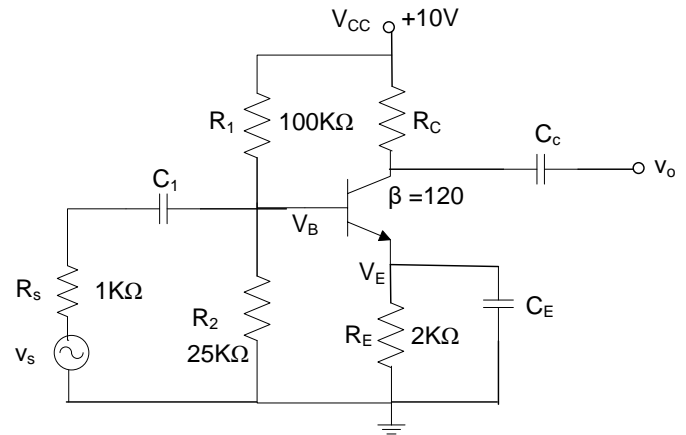

Q.3 In the following circuit, the switch was closed for a long time before opening at t = 0.

Find Vc(t) for t > 0.

Q.4 Consider the transistor amplifier shown below assuming that the capacitors are large enough to be ignored (short-circuited) for AC analysis. The transistor is assumed to have β=120 and the output resistance r_o of the transistor can be ignored. Assume V_T= 26 mV

(a) For this amplifier, choose R_C such that a voltage gain of $A_v=v_o/v_s$= -160 can be provided.

(b) For this choice of R_C, what is the Q-point of the transistor?

Q.5

(a) Your friend assembled the circuit shown in the figure in the lab and he measured the DC voltages at A, C and E (with respect to ground) to be V_A=3.45 V, V_C=9.39 V and V_E=2.63 V. Using these measurements, calculate the r_e and β of the transistor.

(b) Consider the same circuit once again but assume that r_e=0.05 KΩ and β=20. Do the small signal analysis of this circuit and find its voltage gain, input impedance and output impedance