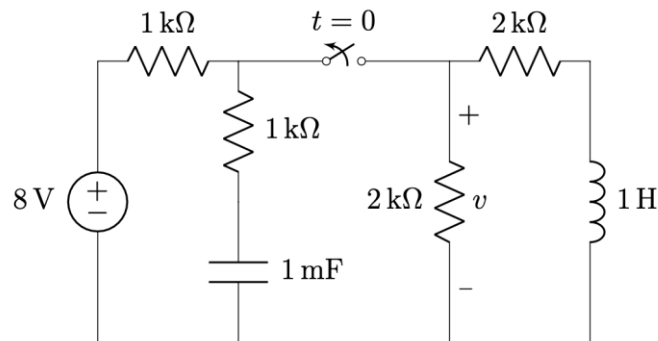# ESC201A Assignment 3

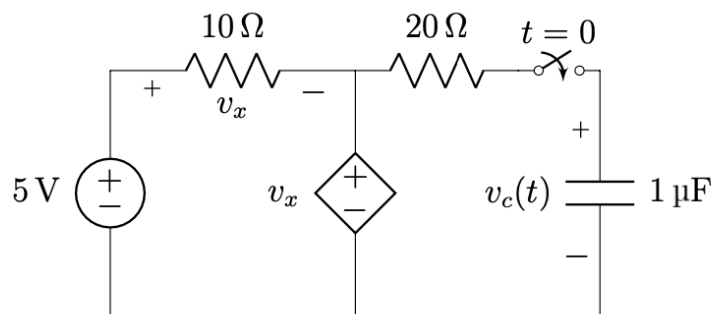Instructor Abhishek Gupta

2023-2024 Semester I

Topics

Transient analysis, Steady state, Sinusoidal sources, Phasors

## Questions

1. For the circuit shown below, determine the voltage across the 2K resistor (vertical) as a function of time after the switch is opened at $t = 0$.


2. Find $v_c(t)$ for $t > 0$ in the following circuit if the capacitor voltage is zero for $t < 0$.

3. Assuming that the capacitor does not have any initial charge, determine the voltage across the capacitor $V(t)$ as a function of time after the switch is closed at $t = 0$.
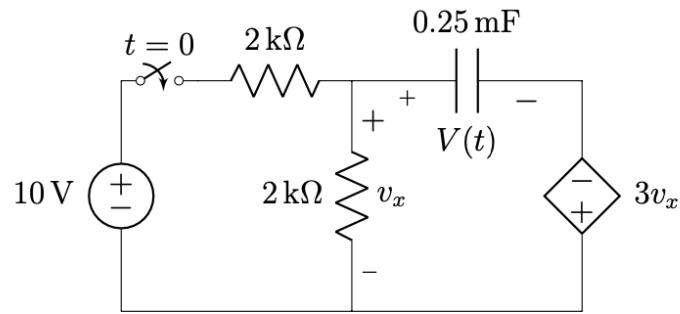
4. In the following circuit the switch S1 is closed and S2 is left open for a long time. At t=0, S1 is opened and S2 is closed. Determine the current, i_5, through the 5Ω resistor for all time
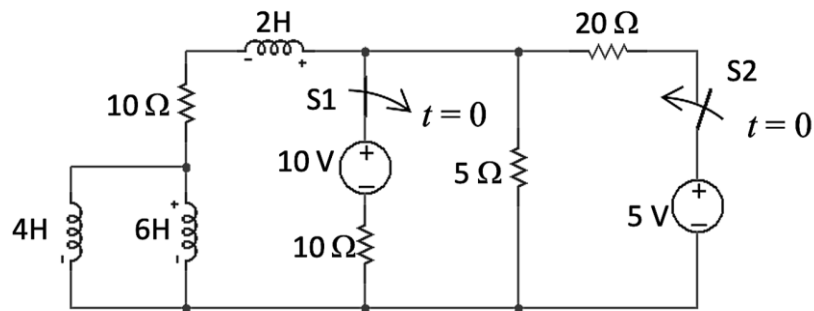
5. Express the following sinusoidal signals in the canonical form $V_m\cos(\omega t + \theta)$:

(i) $v(t) = -110\cos(\omega t + 30^o)\,V$

(ii) $v(t) = 220\sin(\omega t + 220^o)\,V$

(iii) $v(t) = 10\sin(\omega t + 110^o) + 4\cos(\omega t + 110^o)\,V$

(iv) $v(t) = 10\cos(\omega t + 370^o) * 4\sin(\omega t + 10^o)\,V$

Wherever needed, you may use phasors to make your task easier.

6. Determine the output voltage as a function of time using the method of phasors for an input voltage of $V_s = 5\cos(100t)\,V$.