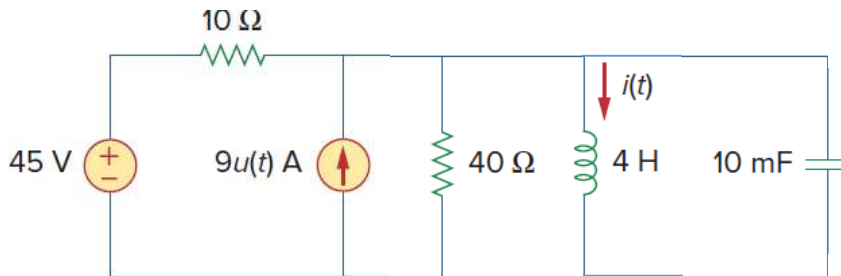


EKT101-Electric Circuit Theory

Assignment 3 (CAA)

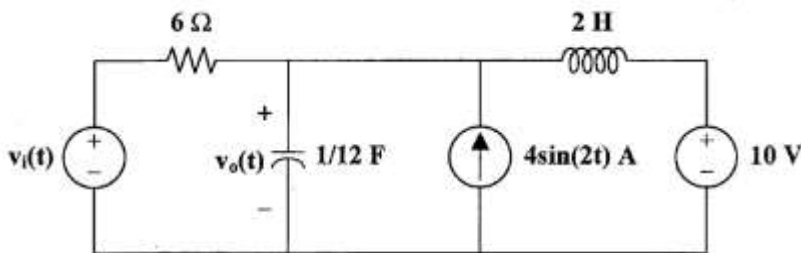
(C4, CO2, PO2)

1. Find $i(t)$ for $t \geq 0$



(C4, CO3, PO4)

2. Analyse the circuit and Calculate for the $v_o(t)$ in the circuit
(Hint: Superposition technique)



(C4, CO3, PO4)

3. A series RC circuit consists of resistor with a resistance of 50.0Ω and a capacitor with capacitance value of $22 \mu\text{F}$. The instantaneous voltage across the resistor (V_R) is given as

$$V_R = 10 \cos(2000\pi t)$$

- a) Derive an equation for the instantaneous current that flows in the circuit.
- b) Calculate the reactance of the circuit
- c) Derive an equation for the instantaneous voltage across the capacitor, V_c
- d) Sketch a phasor diagram of the circuit.
- e) Determine the equation for the instantaneous voltage of the ac source, V_s

(C4, CO3, PO4)

4. A 2000 kW turbine –generator of 0.85 power factor operates at the rated load. An additional load of 300kW at 0.8 power factor is added. Determine the required kVAR of capacitor to operate the turbine generator but keep it from being overloaded.

(C4, CO3, PO4)

5. A 5 xx kW induction furnace at 0.78 power factor operates 20 hours per day for 26 days in a month. Evaluate the electricity bill per month for the given information which based on the tariff below:

Energy charge: 45 cents per kWh for the first 100,000 kWh, and 37 cents per kWh for the remaining energy

Power factor credit: 0.1 percent of energy charge for every 0.01 that pf exceeds 0.85

Power factor penalty: 0.1 percent of energy charge for every 0.01 that pf falls below 0.85

[xx is taken from third and 2nd last digit of your matric number, e.g. 2010220454, xx = 45, thus, 545kW]