Student Name: .....
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Question 1

Consider the circuit shown in Fig. 1, where $i_s(t)$ is a positive-value bounded signal and diode is ideal.

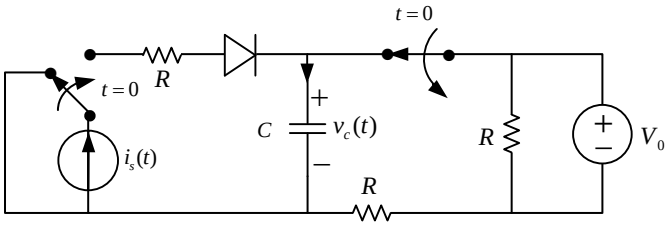

Figure 1: A circuit with a capacitor.

(a) Find an expression for the capacitor voltage $v_c(t)$ valid for all time t.

(b) Find the steady state response of $v_c(t)$ when $i_s(t) = 1$.

(c) Find the steady state response of $v_c(t)$ when $i_s(t) = e^{-t}$.

Question 2

Find an expression for $i_C(t), t > 1$ in Fig. 2, where

1. **The resistor is LTV with the resistance $R(t) = t$.**
2. **The inductor is LTV with the inductance $L(t) = t^2$.**
3. **The capacitor is LTI with the capacitance $C = 1$.**
4. **The voltage source is $v_s(t) = t, t > 1$.**
5. **The initial conditions are $v_C(1^+) = 0$ and $i_L(1^+) = 0$.**

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Question 2 continued on next page...

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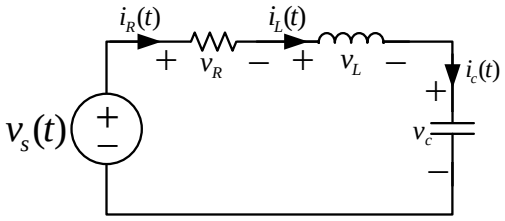

Figure 2: A second-order circuit.