

Mid-term Examination

Date: April 10, 2019

Duration: 90 minutes.

SUBJECT: PRINCIPLES OF EE 2

Dean of School of Electrical Engineering

Signature:

Lecturer: Mai Linh

Full name: Mai Linh

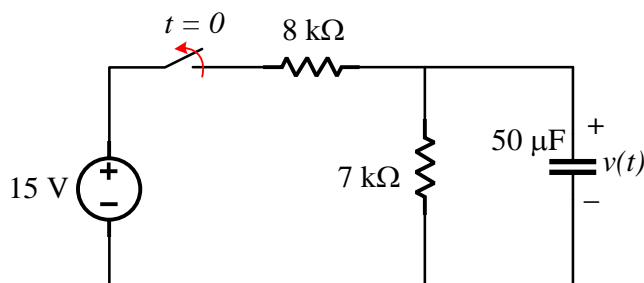
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INSTRUCTIONS: This is an opened-book examination.

Laptop, tablets, & cell phone are not allowed during the exam

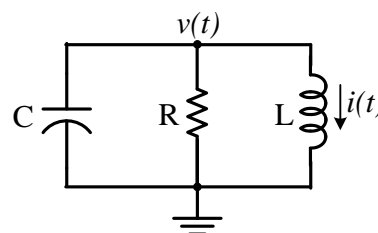
Problem 1: (15 marks)

The switch in Fig. 1 has been closed for a long time, and it opens at $t = 0$. Find $v(t)$ for $t \geq 0$.

*Fig. 1 of problem 1***Problem 2: (30 marks)**

In the parallel RLC circuit shown in Fig. 2, given $R = 2/3 \Omega$, $L = 1 \text{ H}$, $C = 0.5 \text{ F}$.

- Write down the second-order differential equation for this circuit?
- Find the characteristic equation of the circuit? Solve it to obtain the characteristic roots?
- Find the natural response of $v(t)$ for $t > 0$ for $v(0) = 10 \text{ V}$, and $i(0) = 2 \text{ A}$.

*Fig. 2 of problem 2*

Problem 3 (15 marks): Find the inverse Laplace transform $f(t)$ if $F(s)$ is

$$F(s) = \frac{2(5s^2 + 2)}{s(s+1)(s+2)^2}$$

Problem 4 (20 marks): Find the initial and final values of the function whose Laplace transform is

$$F(s) = \frac{s^2 + 10s + 6}{s(s+1)^2(s+2)}$$

Problem 5 (30 marks): For the *s*-domain circuit in Fig. 3, find:

- a) The transfer function $H(s) = V_o/V_i$.
- b) The impulse response.
- c) The response when $v_i(t) = u(t)$ V.

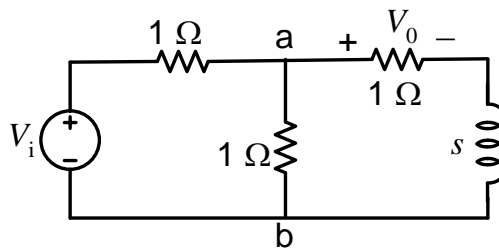


Fig. 3 of problem 3