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# EE152 Basic Electrical Science Lab

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## Session – 4

## DC Transient Analysis

**1. A. Introduction:**

This session makes students to understand transient analysis of DC circuits through a Simulation platform, MATLAB/Simulink.

**1. B. Objectives:**

a. Acquire a good knowledge on the transient behavior of the DC electrical circuits.

b. Verification of the theoretical knowledge on transient behavior of DC electrical circuits in MATLAB/Simulink Platform.

**1. C. Theory:** Refer to the notes or necessary materials mentioned in EE151 course.

**1. D. Statement of Experiments:**

This session consists of two parts. [$V_{in}$ = 10 V, R = 10 Ω, C = 10 μF, L = 10 mH]

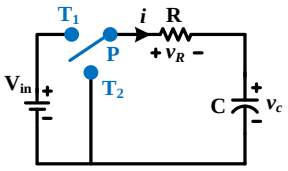


Fig. 4.a

a. Using the circuit diagram shown in Fig. 4.a, characterize the circuit in Matlab/Simulink platform.

b. Replace the capacitor by an inductor in Fig. 4.a, characterize the circuit in Matlab/Simulink platform.

**1. E. Procedure:**

**a. Part 1.D.a : DC RC circuit**

i. Convert the circuit in Fig. 4.a into experimental circuit.

ii. Construct the experimental circuits in MATLAB/Simulink domain, and simulate it in following condition:

- Connect P to $T_1$ at t = 0 sec, and run the simulation for 2 second.
- Connect P to $T_1$ at t = 0 sec, and then connect P to $T_2$ at t = 1 sec. Run the entire simulation for 2 sec.

iii. Based on the simulation, fill up the Table - 4.1.

iv. Find expression of various responses in the circuit, like current voltage across elements.

**b. Part 1.D.b: DC RL circuit**

Follow the same procedure as mentioned in part 1.E.a., and based on the simulation, prepare an appropriate table and fill up it. Also, find expression of various responses.

**1. F. Assignments:**

Using circuit shown in Fig. 4.b, Connect P to $T_1$ at t = 0 sec, keep it for 0.2 sec and note down voltage across the capacitor and current through the inductor. Then connect P to $T_2$ at t = 0.2 sec and run the simulation for 2 second. Prepare an appropriate table and fill up it. Also, find expression of various responses under the condition when P is connected to $T_2$.

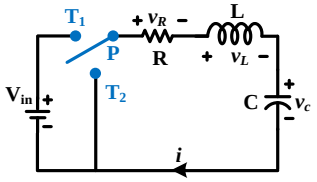


Fig. 4.b

Table - 4.1

| Sl. No | Applied Voltage, $V_{in}$ ( volts) | Time Constant, τ (Sec) | | Rise Time, $T_r$ (Sec) | | Settling Time, $T_s$ (Sec) | |
|---|---|---|---|---|---|---|---|
| | | Theoretical | Simulation | Theoretical | Simulation | Theoretical | Simulation |
| 1 | 10 | | | | | | |
| 2 | 15 | | | | | | |
| 3 | 20 | | | | | | |