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EE152　　Basic Electrical Science Lab

Session – 2

Verification of Kirchhoff's Laws

1. A.　Introduction:

This session makes students to understand Kirchhoff's Laws (KCL & KVL) and to verify through a simulation platform, MATLAB/Simulink.

1. B.　Objectives:

    a.　Acquire good knowledge on Kirchhoff's Laws

    b.　Verification of the two laws 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= 100 V, $R_x = (10 \times x)$ Ω]

    a.　Using the circuit diagram shown in Fig. 2.a, verify KVL in Matlab/Simulink platform.

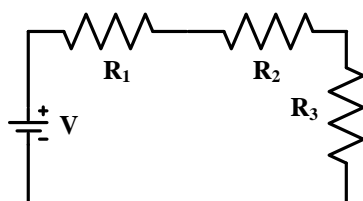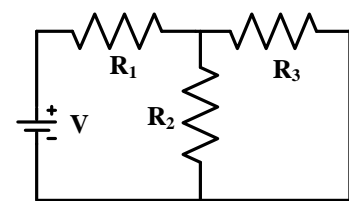   b.　Using the circuit diagram shown in Fig. 2.b, verify KCL in Matlab/Simulink platform

Fig. 2.a　　　　　　　　　　　　　　　　Fig. 2.b

1. E.　Procedure: The general procedure for the two parts of this experiment is same.

    a.　Convert the circuit shown in Fig. 2 into experimental circuit (necessary measuring instruments are to be incorporated in the circuit).

    b.　Construct the experimental circuits in MATLAB/Simulink domain, and simulate it.

    c.　Based on the simulation, fill up the Table-2.1 for KVL. Similarly, prepare a table for KCL experiment, and fill it.

Observation No.	Applied Voltage V (volts)	Voltage across R_1 (volts) (V_1)		Voltage across R_2 (volts) (V_2)		Voltage across R_3 (volts) (V_3)		$V_1+V_2+V_3$ (volts)	
		Theoretical	Simulated	Theoretical	Simulated	Theoretical	Simulated	Theoretical	Simulated
1	100		16.67		33.33		50		100
2	150								
3	200								
4	50								

1. F.   Assignments:

1. Replace constant voltage source by constant current source with the same magnitude in Fig. 2.a & 2.b, do the simulation again.

2. Replace constant voltage source by variable voltage source (sinusoidal source with the same magnitude, ramp input with slope 1) in Fig. 2.a & 2.b, do the simulation again.

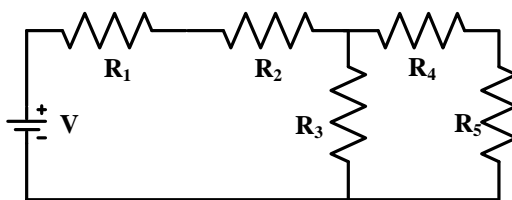3. Using circuit shown in Fig. 2.c, do the experiment again.

Fig. 2.c