1) Spring 2015 ENGR 210: Intro to Circuits and Instrumentation Lab 3 Pre-Lab Assignment [3pts]

Date: Sept 15th, 2015 Bench #: 15

Student Names (Print): Quinn Foley

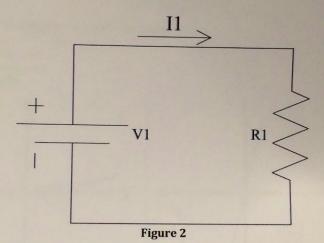
CaseID: Q F CaseID: <u>jaa134</u>
CaseID: <u>jal 88</u> Student Names (Print): Jose Alspaw
Student Names (Print): Justin Lee The pre-lab assignment is used to check your preparedness for the lab. Complete 1 pre-lab per group. To receive credit, a Lab TA must approve your pre-lab. Problem 1: Identify the following 4 I-V curves from the list below: - LED Low resistance High resistance Light bulb LOW Lisht LED Bulb Figure 1: I-V Curves Page 1 of 2

Problem 2:

Reference: Textbook, section 1.5 "Voltage and Power"

In the circuit drawn in Figure 2, identify whether the power of V1 and R1 is positive or negative. The I-V curve for V1 is shown in Figure 3. Circle the region of the I-V curve where V1 is operating (i.e., which quadrant). **Remember the passive sign convention.

Pri: Neg
Pri: DOS



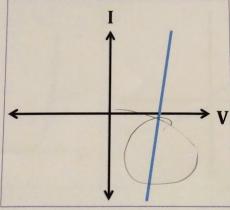
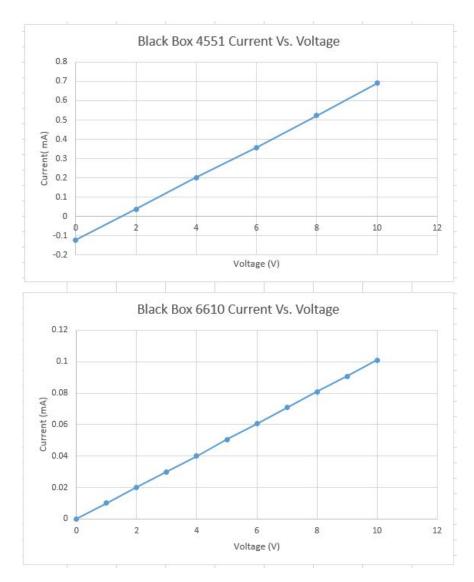


Figure 3: V1 I-V Curve

Justin Lee, Jacob Aralpon, Quinn Foley ENGR 210 Lab #3 A Black Bos, 45t 1 Input Voltage 3 98 V R VR Pag Tp Lee 72 kn 0.433V 3.55V 0.200 pm/ 10 kn Geo & n Selected 2.2 kn + vary V V Nee Inp 2 D.03(AA 4 0.202 pm/ 6 0.257 AA 9 0.572 pm/ 10 0.690 pm/ 0.690 pm/ 0.502 pm/ 10 0.690 pm/ 0.702 pm/ 10 0.690 pm/ 1	-)	Turke 1 .	Total Andrews	Duran Fale				
Lob #3 A Black Bo, 45t1 Input Voltage 3.98 V R VR Vpg Tp Input Voltage 3.98 V R VR Vpg Tp Input Voltage 3.98 V R VR Vpg Tp Input Voltage 3.98 V R Vpg Input Voltage 3.98 V R Vpg Input V V V V V V V V V V V V V V V V V V V				xuinn roley				
A Black Box 45t1 Input Voltage 3.98 V R VR		LNG17 710						
A Black Box 45t1 Input Voltage 3.98 V R VR								
A Black Box 45t) Input Voltage 3.98 V R VR Vag Fp Lap 22 kn 0.433V 3.55V 0.200 pm/ 10 kn 680 kn 0.158V 2.83V 0.226 nf 2.2 kn 1 kn 0.217V 3.76V 0.220 pm/ 0.70 n Selected 2.2 kn to vary V V Nep Ipp 2 0.36 (nA 4 0.202 mA 6 0.357 nA 8 0.522 nA 10 0.6 90 nA 0 -0.122 m/ 2. We can conclude the block box contains a source Open great with block box: 0.149 m/4 also no voltage and switch feeds: -140 p block box 6610. Resistance 48.77 kn Not entert or voltage space bd: No coveret 4 No vettere Heavend 14 sens with a 100 kn: V1 = 5.01 4 V2 = 4.44 with 10 V supply 100 kn = 91.9 kn								
A Black Box 45t) Input Voltage 3.98 V R VR Vag Fp Lap 22 kn 0.433V 3.55V 0.200 pm/ 10 kn 680 kn 0.158V 2.83V 0.226 nf 2.2 kn 1 kn 0.217V 3.76V 0.220 pm/ 0.70 n Selected 2.2 kn to vary V V Nep Ipp 2 0.36 (nA 4 0.202 mA 6 0.357 nA 8 0.522 nA 10 0.6 90 nA 0 -0.122 m/ 2. We can conclude the block box contains a source Open great with block box: 0.149 m/4 also no voltage and switch feeds: -140 p block box 6610. Resistance 48.77 kn Not entert or voltage space bd: No coveret 4 No vettere Heavend 14 sens with a 100 kn: V1 = 5.01 4 V2 = 4.44 with 10 V supply 100 kn = 91.9 kn				lah #	7			
R VR		A Black r	1. 4ttl t.					
10 k D 680 k D 0.158 V 2.2 k D 1 k D 0.217 V 3.76 V 0.226 pt 2.2 k D V V V V V V V V V V V V V						÷		
10 k D 680 k D 0.158 V 2.2 k D 1 k D 0.217 V 3.76 V 0.226 A A 2.2 k D 1 k D 2.2 k D 3.76 V V V V V V V V V V V V V		22 kn				100		
2.2 kg 1 kg 2.2 kg 1 kg 0.217V 3.76V 6.220Mf 0.70 g 2 0.035MA 4 0.702MA 6 0.702MA 6 0.757MA 8 0.522MA 10 0.690MA 0 -0.122MA 10 0.690MA 0 -0.122MA 1. We can conclude the block boy content a source Open crust with block box: 0.149 MA also no voltage and switched leads: -149 B block box 6610. Resultance 98.77 kg Not content or voltage source be: No content 4 No Vettage Measured it some with a 100 kg: V ₁ = 5 01 q V ₂ = 4.00 with 10 V supply 100ka = 91.9 kg			0.133*	3,55V	Un ALU MIA			
1 kA 0.217V 3.76V 6.220M/ O.J. A Selected 2.24 A to vary V V NOB I DO 2 0.03(MA 4 0.202 MA 6 0.522 MA 8 0.522 MA 10 0.690 MA O -0.122 MA The can conclude the black box contains a source Open circut with black box: 0.149 MA also no voltese and switded leads: -149 B black box 6610. Resultance 48.77 KA Not current o voltese source bet: No carrent 1 No voltese Measured its sems with a 100 KA: V = 501 9 V2=4.000 with 10 V supply 100 K = 91.9 KA	4		0.1587	3.83V	A 226 4A			-
1 KA 0.217 3.76 0.220Mt 6.9 A Selected 22 La to Vary V V Non Inn 2 0.036 MA 4 0.707 MA 6 0.572 MA 8 0.572 MA 10 0.690 MA -0.122 MA : We can conclude the bleck box content a source Open circle with bleck box: 0.149 MA also no voltere and switched leads:149 B bleck box 6610. Resolation 92.77 km Not current or voltage source bt: No convent 1 No vottere Measured it some with a 100 km: V = 501 9 V2=4.44 with 10 V supply 100 km = 91.9 km					U. 220 NA			100
Selected 2.2 km to vary V V V V V V V V V V V V V			0.2171	3.76V	6.2.20mt			
V NoB I FOB 2 0.036MA 4 0.702MA 6 0.357MA 8 0.522MA 10 0.690MA O -0.122MA : We can conclude the block box content a source Open creat with block box: 0.149 MA also no voltese and switched locals:149 B block box 6610. Restricted 48.77 KM Not consent o voltese source bd: No consent 1 No vottese Measured it some with a 100 km: N=5.01 9 N=4.00 with 10 V supply 100Ka = 91.8 KM	7 1888	-			0,2,7,7			
V NoB IDB 2 0.036MA 4 0.702MA 6 0.357MA 8 0.522MA 10 0.690MA O -0.122MA : We can conclude the block box content a source Open creat with block box: 0.149 MA also no voltese and switded locals:149 B block box 6610. Resultance 48.77 KM Not carrent o. voltese source bd: No carrent 1 No vottsou Measured it som with a 100 KM: V1 = 5.01 9 V2 = 4.44 with 10 V supply 100Km = 91.8 KM		Selected	2.2 km + va	, V				
2 0.03(AA 4 0.707 MA 6 0.357 MA 8 0.522 MA 10 0.690 MA . We can conclude the black box contains a source Open circle with black box: 0.149 M/A also no voltese and switched leads:149 Resultance 48.77 km Not current o. voltase source bd: No carrent 1 No vottese Measured it som with a 100 km: V, = 5.01 9 V2=4.44 with 10 V supply 100 km = 91.8 km								
8 0.522mA 10 0.690mA 0 -0.122mA : We can conclude the black box content a source Open creat with black box: 0.149mA also no voltage and switched leads:149 B black box 6610. Restrance 98.77 km Not current or voltage source bd: No current & No vettere Measured it sens with a 100 km: V, = 501 & V2=4.44 with 10 V supply 100ka = 91.8 km		2						
8 0.522AA 10 0.690MA C. We can conclude the black box contains a source Open circut with black box: 0.149 MA also no voltage and switched leads:149 B black box 6610. Resolative 98.77 KA Not current or voltage source bet: No carrent A No vottage Measured its sense with a 100 kA: V, = 5.01 Q V2=4.44 with 10 V supply 100 ka = 91.8 kg		4	0	. 202 mA	6-54 3 T			
O -0.122 m/t : We can conclude the black box contains a source Open circut with black box: 0.149 m/t also no voltage and switded leads: 149 B black box 6610. Resortance 98.77 km Not convent o voltage source of: No convent of No vottage Measured it seems with a 100 km: V, = 5.01 of V2=4.44 with 10 V supply 100 km = 91.8 km		6	0	.357AA				
O -0.122 m/4 : We can conclude the black box contains a source Open circut with black box: 0.149 m/t also no voltese and switched leads:149 B black box 6610. Restrance 98.77 km Not current or voltage source bet: No carrent & No vottage Measured its sense with a 100 km: V, = 5.01 & V2=4.44 with 10 V supply 100 km = 91.8 km		8						
:. We can conclude the black box contains a source Open circut with black box: 0.149 m/t also no voltage and switded leads: 149 B black box 6610. Resortance 98.77 km Not convent or voltage source bd: No convent of No vottage Measured it seems with a 100 km: V, = 5.01 of V2=4.44 with 10 V supply 100 km = 91.8 km		10						
Open circut with blade box: 0.149 m/t also no voltage and switched leads:149 B black box 6610. Resultance 98.77 K.M. Not current or voltage source bd: No carrent & No vottage Measured it sens with a 100 kM: V, = 5.01 & V2=4.44 with 10 V supply 100 km = 91.8 km		The second secon						Barre
Resultance 98.77 K.A. Not convent or voltage source be: No convent of No votage Measured it seems with a 100 kA: V, = 5.01 of V2=4.44 with 10 V supply 100 kA = 91.8 kA		:. We c	can conclude th	ne bleck boy	contain a s	ouice.		
Resultance 98.77 KM Not current or voltage source be: No carrent & No vottere Measured it sens with a 100 km: V, = 5.01 & V2=4.44 with 10 V supply 100km = 91.8 km V		Open cir	cut with blade b	84. 0.199	m/ also no	voltese a	hel switched feeds	: 149 1
Measured in sense with a 100 km: V = 5.01 q V2=4.00 with 10 V supply 100km = 91.8 km V		The second secon						
100kn = 91.8 ks. V I V V V V V V V V V V V V V V V V V		Wat extent as voltage cause by: No could be as						
Mary E A E		Measured it sens with a 100 km: V= 5 ml a 11 - 11						
		100km	= 91.8 ks		-01 4 12=	-4.44 h	11th 10 V supp	ply
		Variable	I	V	E			
4 A 0010, H		0	0	1		Д		
2 ,0200 mA 3 .0300mA		2	,0200 BA	3				
1 1000 pt 2 0202Vt		4		2				
6 0.0606mA 7 0.709AA		-				The same of the sa		
8 ,0.809127 9 ,0907n4	0			9				-
1.9 10 0.101 n.k	1.9	10	0.101 A					
							ARRIVATE LAND	



Black Box 4551: We concluded that this black box contains a current source. We began by measuring IV that is shown above and we concluded that it was some sort of a source based on the fact that current was being emitted with an input of 0 volts and the resistance was unmeasurable. From there we measured open and short circuits for this box. In a short circuit we found a current, but didn't find a voltage. When we measured the open circuit it has a current of 0.149 mA Ergo we concluded it was a current source.

Black Box 6610: Firstly, we began by measuring the resistance of the box. We found a value of 98.77 KOhms. We thought this was earily close to a 100 KOhms resistor with an uncertainty of +/- 5%. We then measured the IV data over the box and found the plot of the data to be

consistent with that of a resistor. Due to its linear fit and its initial current of 0 amps with an input of 0 volts we were able to eliminate the possibility of other similar components.

- 4) No, when a diode is placed in opposing directions (their leads are not directed the same way), current is restricted, effectively opening the circuit along this branch. Thus, with respect to the open circuit, no voltage or current measurements could be taken to conclude the cause is this setup. If either of the diodes were flipped from the picture, then we would be able to take measurements to conclude there is at least one diode in the circuit. However, we would not be able to tell the extent of how many diodes were present. If both diodes were flipped, then current would be restricted again, opening the circuit and preventing any useful measurements.
- 5) Measuring the voltage directly across the black box gives a more accurate measurement as the voltmeter would be measuring the voltage drop specifically across that component of the circuit. This method is used to eliminate some of the discrepancy/uncertainty in any other part of the circuit which will not be factored in when measuring the voltage.
- 6) You can tell the difference by shorting the terminals in the black box and measuring the voltage across the terminals concurrently. A voltage source will produce very low current and high voltage, while a current source will produce very low voltage and high current.