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Honor Code: *I have adhered to the Duke Community Standard in completing this assignment.*

Activity

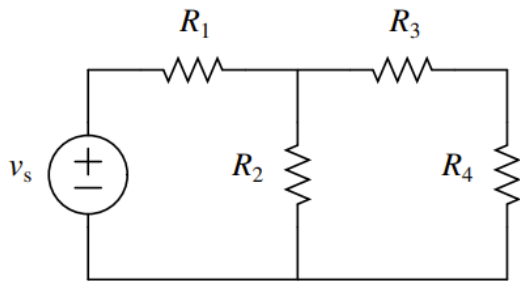
The load was too high therefore the power supply changed from constant voltage to constant current for brown out protection.

	Measured Resistance (Ω)	Nominal Resistance (Ω)
R1	43.23	43
R2	98.36	100
R3	219.52	220
R4	474.75	470

	Theoretical Voltage with Measured Resistance (V)	Theoretical Voltage with Nominal Resistance (V)	Measured Voltage (V)	Nominal Voltage (V)
V1	0.658	0.660	0.66133	0.660
V2	1.342	1.340	1.3245	1.34
V3	0.424	0.429	0.41878	0.427
V4	0.918	0.911	0.90617	0.913

	Theoretical Current with Measured Resistance (mA)	Theoretical Current with Nominal Resistance (mA)	Measured Current (mA)	Nominal Current (mA)
I1	15.578	15.35	15.077	15.3
I2	13.645	13.40	13.222	13.4
I3	1.933	1.950	1.9005	1.94
I4	1.933	1.950	1.9005	1.94

KVL Verification



Loop 1: $-v_s + i_1 R_1 + i_2 R_2 = 0$

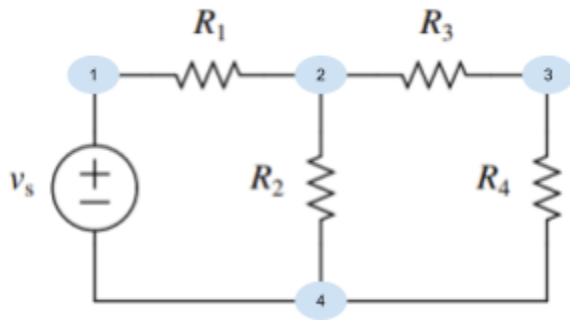
Loop 2: $-v_s + i_1 R_1 + i_3 (R_3 + R_4) = 0$

Loop 3: $-i_2 R_2 + i_3 (R_3 + R_4) = 0$

	Sum of Theoretical Voltages from Measured Resistance in Loop (V)	Sum of Theoretical Voltages from Nominal Resistance in Loop (V)	Sum of Measured Voltage in Loop (V)	Sum of Nominal Voltage in Loop (V)
Loop 1	0	0	-0.01417	0
Loop 2	0	0	-0.01372	0
Loop 3	0	0	0.00045	0

The measured voltages seem to create measuring error.

KCL Verification



Node 1: $i_s - i_1 = 0$

Node 2: $i_1 - i_2 - i_3 = 0$

Node 3: $i_3 - i_4 = 0$

Node 4: $i_2 + i_3 - i_s = 0$

	Sum of Theoretical Currents from Measured Resistance at Node (V)	Sum of Theoretical Currents from Nominal Resistance at Node (V)	Sum of Measured Currents at Node (mA)	Sum of Nominal Currents at Node (mA)
Node 1	0	0	0	0
Node 2	0	0	-0.0455	-0.04
Node 3	0	0	0	0
Node 4	0	0	0.0455	0.04

The measured currents seem to create measuring error.

Arduino Code

```
//
/*
  This program turns on an LED at pin 2 of the Arduino when
  a potentiometer reaches a certain voltage.
*/

void setup()
{
  Serial.begin(9600);

  pinMode(4, INPUT);
  pinMode(2, OUTPUT);
  digitalWrite(2, LOW);
}

void loop()
{
  // read the input on analog pin 0:
  int sensorValue = analogRead(A4);
  // Convert the analog reading (which goes from 0 - 1023) to a voltage (0
  - 5V):
  float voltage = sensorValue * (5.0 / 1023.0);
  // print out the value you read:
  Serial.println(voltage);

  // if the analog pin is on high, turn the LED to high
  if (digitalRead(4) == HIGH) {
    digitalWrite(2, HIGH);
  }
  else {
    digitalWrite(2, LOW);
  }
}
```

The threshold between LOW and HIGH is between 2.35 V and 2.48 V.