Electronics Lab
Lab Session 4: The Common Emitter Amplifier

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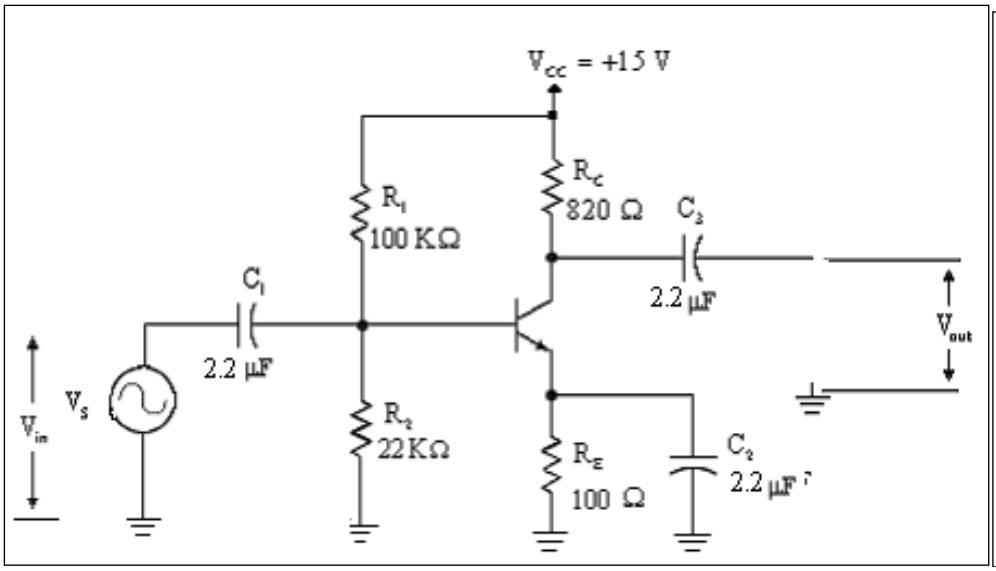
1) Construct the circuit shown below and Measure and record the DC voltages listed in Table 1.



DC Parameter	Measured Value
V_B	1.693v
V_E	0.967v
V_C	7.118v
V_{CE}	6.151v
V_{BE}	0.725v
Ic	9.597mA
I_B	0.056mA
I_E	9.652mA
β	171.375
α	0.99419

Table.1: DC Parameters of CE Amplifie

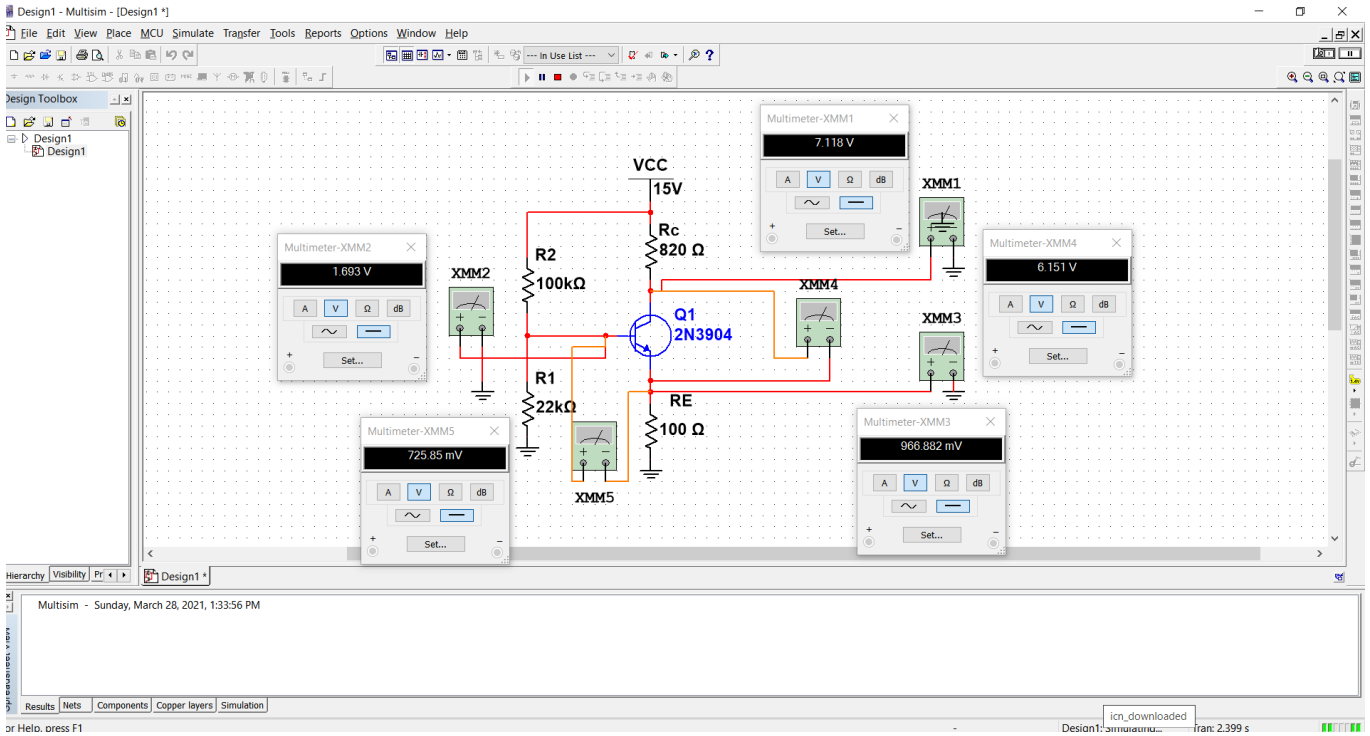
Calculations

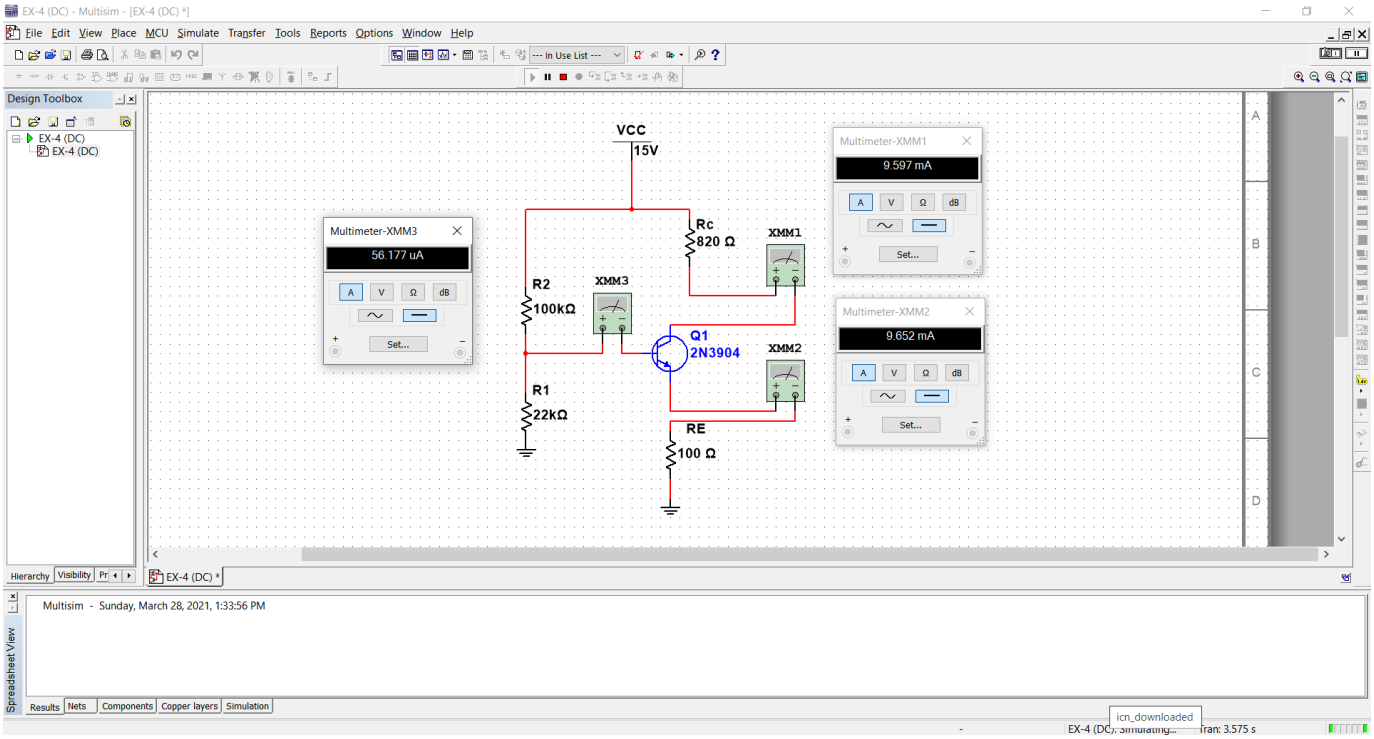
$$IC = \frac{Vcc - Vc}{Rc} = \frac{15 - 7.118}{820} = 9.61mA \qquad IE = \frac{VE}{RE} = \frac{0.967}{100} = 9.67\ mA$$

$$Vth = \frac{Rth * VCC}{R2} = 2.7049\ V \qquad Rth = \frac{R2 * R1}{R1 + R2} = 18.03\ K$$

$$IB = \frac{Vth - VB}{Rth} = \frac{2.7049 - 1.693}{18.03} = 0.056\ mA$$

DC -values


Design1 - Multisim - [Design1 *]
File Edit View Place MCU Simulate Transfer Tools Reports Options Window Help
Design Toolbox
Design1
Design1
VCC
15V
Rc
820 Ω
R2
100kΩ
R1
22kΩ
RE
100 Ω
Q1
2N3904
XMM1
XMM2
XMM3
XMM4
XMM5
Multimeter-XMM1
7.118 V
Multimeter-XMM2
1.693 V
Multimeter-XMM3
966.882 mV
Multimeter-XMM4
6.151 V
Multimeter-XMM5
725.85 mV
Set...
Hierarchy
Visibility
Design1 *
Multisim - Sunday, March 28, 2021, 1:33:56 PM
Results
Nets
Components
Copper layers
Simulation
icn_downloaded


EX-4 (DC) - Multisim - [EX-4 (DC) *]
File Edit View Place MCU Simulate Transfer Tools Reports Options Window Help
Design Toolbox
EX-4 (DC)
EX-4 (DC)
VCC
15V
Rc
820 Ω
R2
100kΩ
R1
22kΩ
RE
100 Ω
Q1
2N3904
XMM1
XMM2
XMM3
Multimeter-XMM1
9.597 mA
Multimeter-XMM2
9.652 mA
Multimeter-XMM3
56.177 uA
Set...
Hierarchy
Visibility
EX-4 (DC) *
Multisim - Sunday, March 28, 2021, 1:33:56 PM
Spreadsheet View
Results
Nets
Components
Copper layers
Simulation
icn_downloaded

2) Connect the AC circuit with **Vs= 500 mVp-p** sine wave at 1.0 kHz. Fill Table2.

AC Parameter	R_E **bypass**
$\nu_b = V_{in}$	499.33mVP-P
$r_e = 26mv/I_E$	2.6887Ω
$\nu_C = V_{out}$	6.660 Vp-p
$A_V = V_{out}/V_{in}$	13.3226

Table.2: AC Parameters of CE Amplifier

5) Remove C_2 from the circuit and fill Table3.

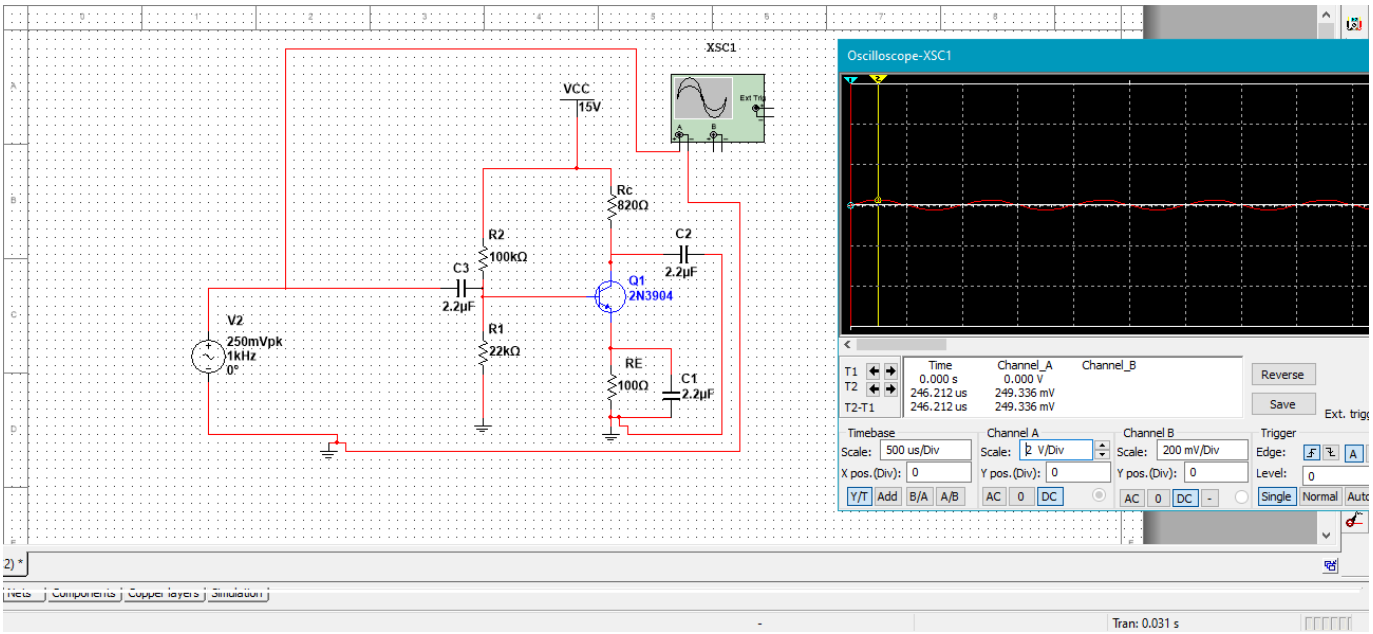
AC Parameter	R_E **unbypass**
$\nu_b = V_{in}$	499.41 mVp-p
$r_e = 26mv/I_E$	2.6887Ω
$\nu_C = V_{out}$	3.935 Vp-p
$A_V = V_{out}/V_{in}$	7.88577

Table3: AC Parameters of CE Amplifier

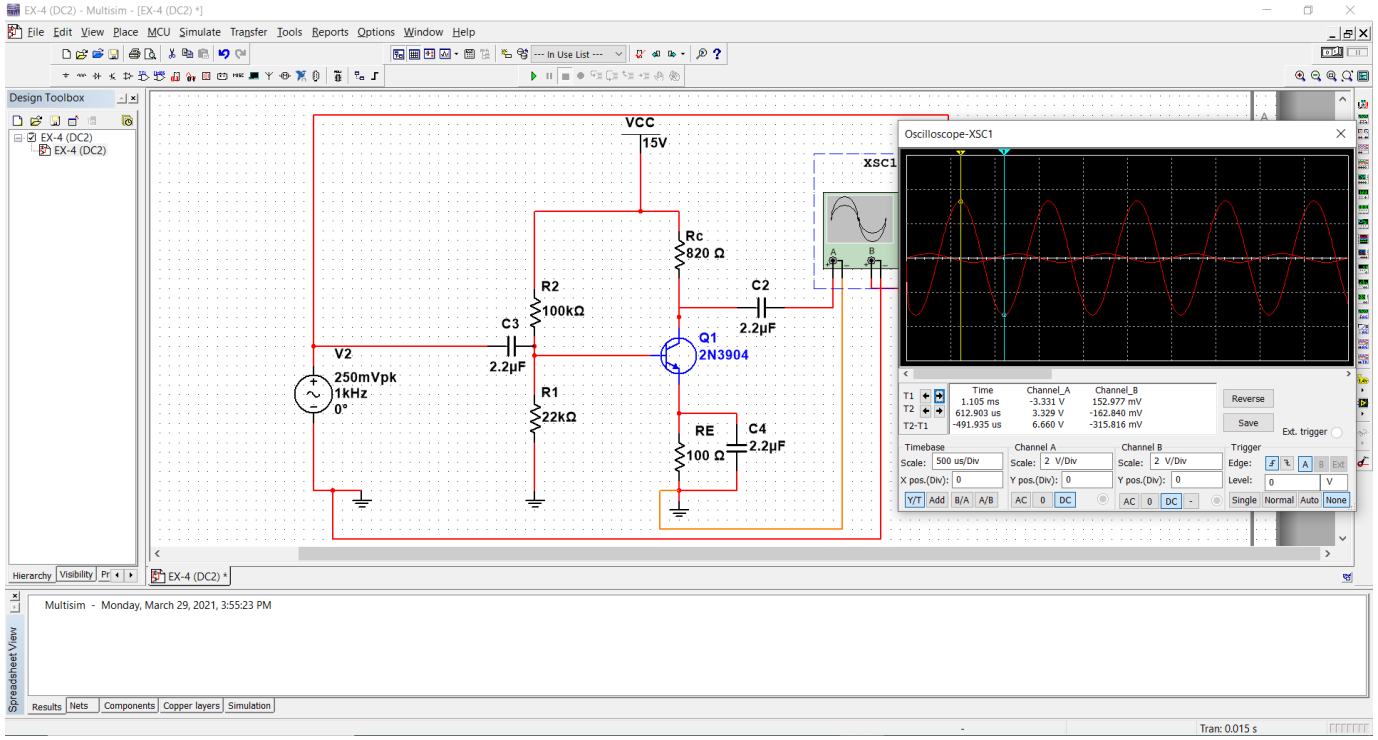
3) Use ***47kΩ*** pot. to measurer the R_{in} . R_{in} =……7.52 k Ω ……

4) Use ***47kΩ*** pot. to measurer the R_{out} . R_{out} =……799 Ω ……..……

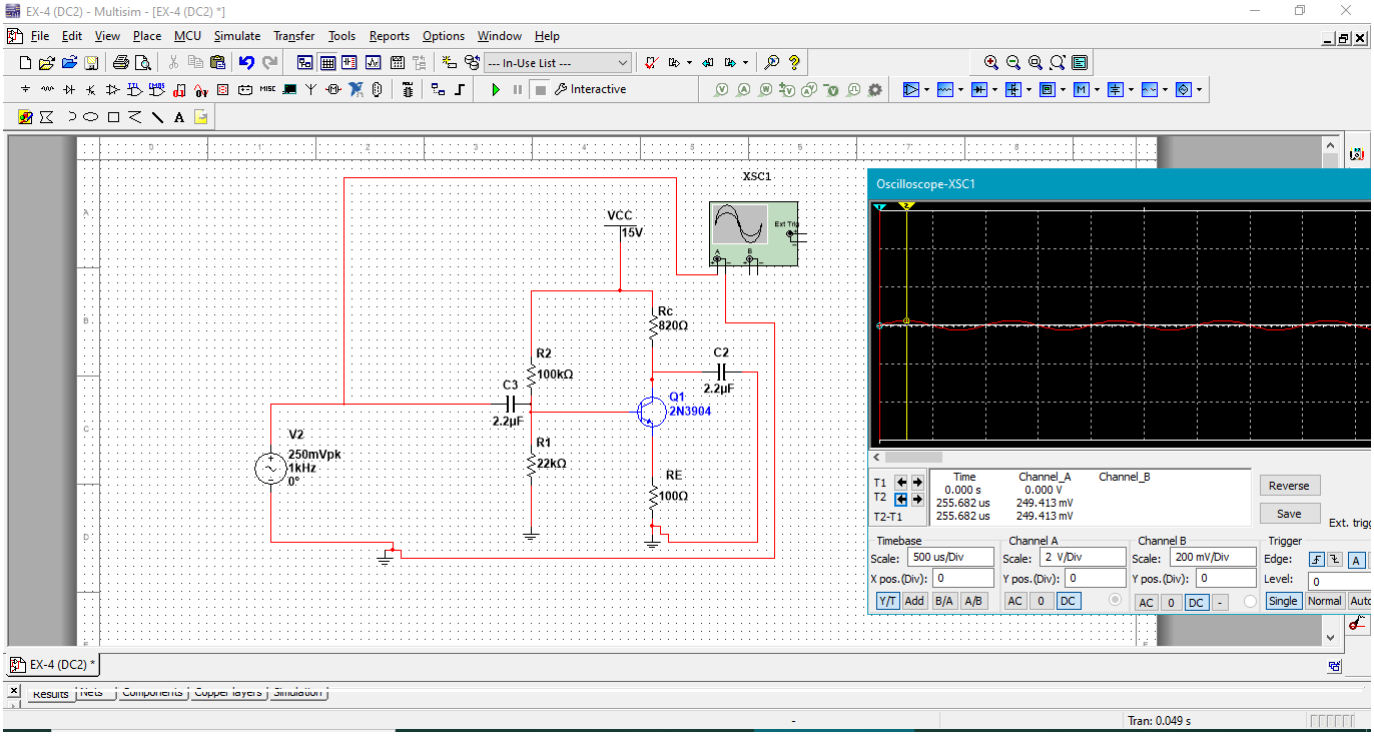
Plotting of Vi with bypass



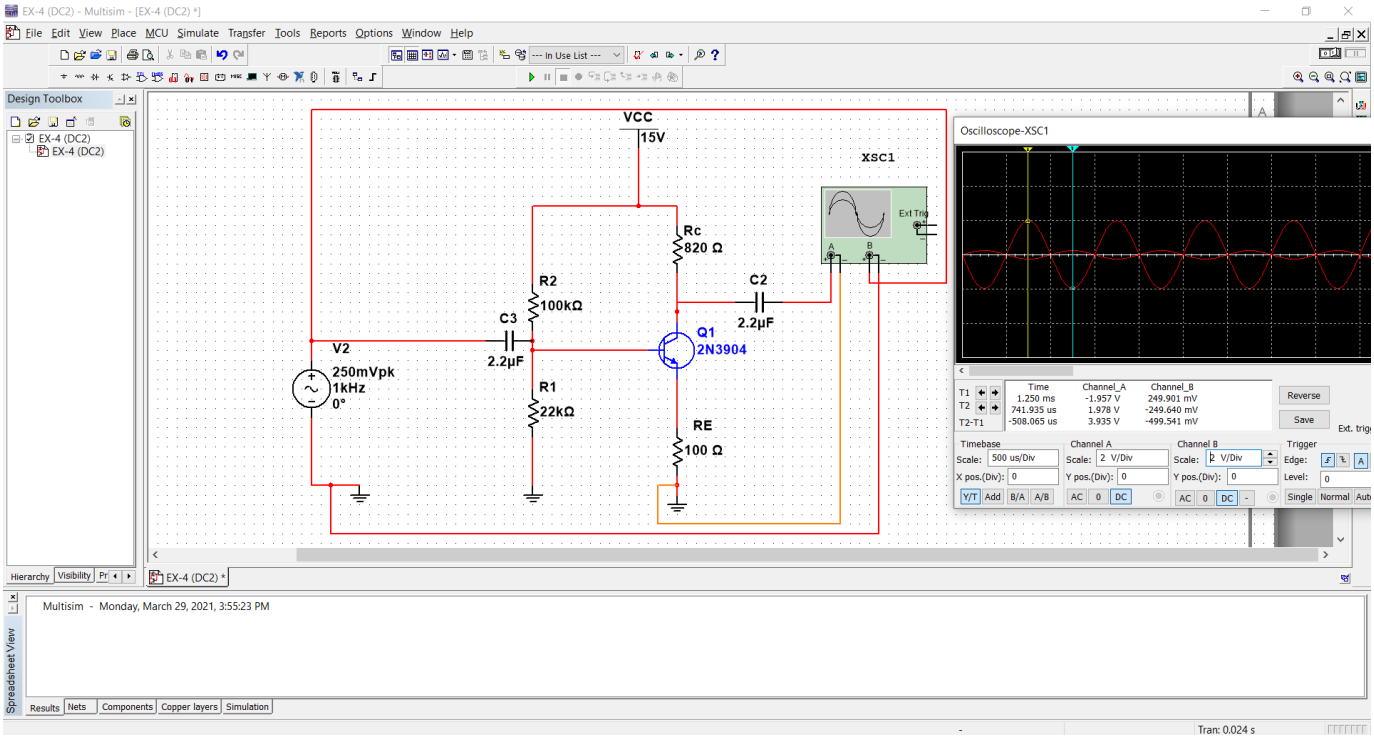
Plotting of Vi & Vo with bypass



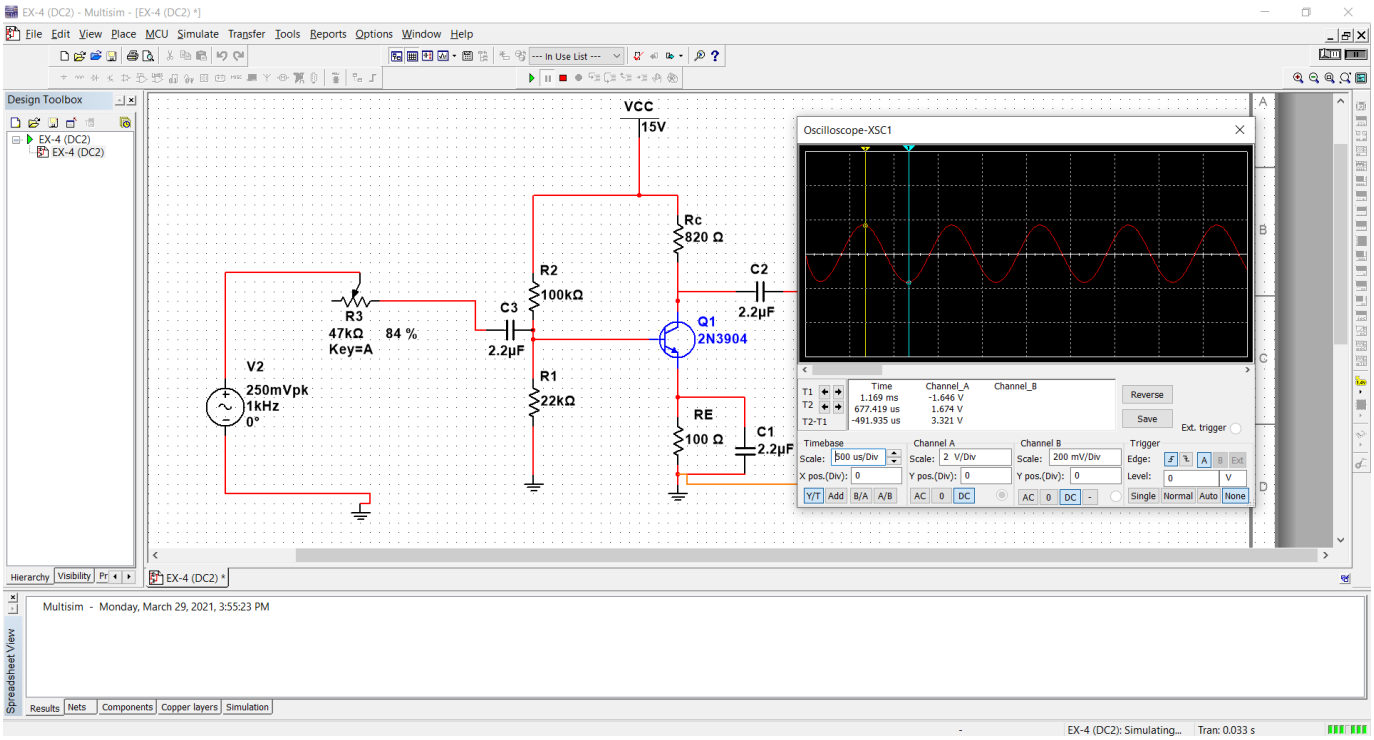
Plotting of Vi without bypass



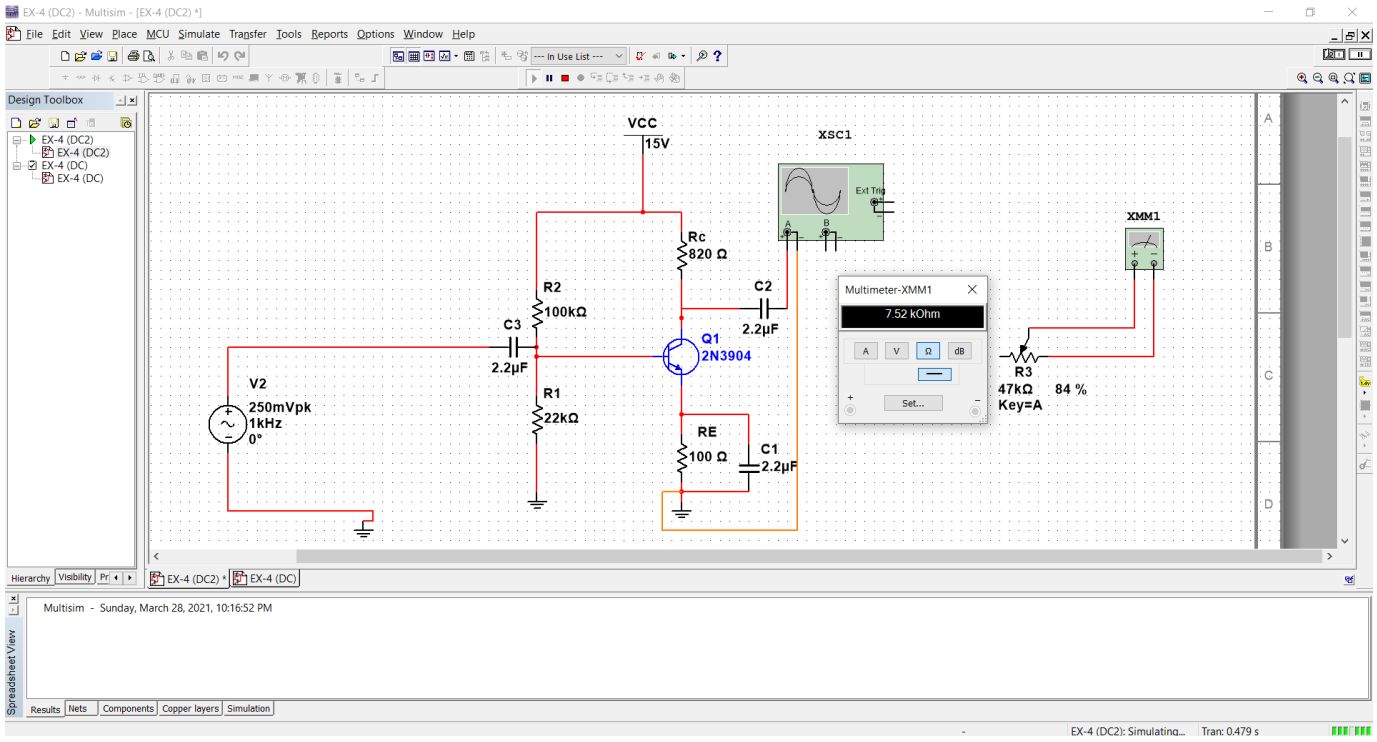
Plotting of Vi & Vo without bypass



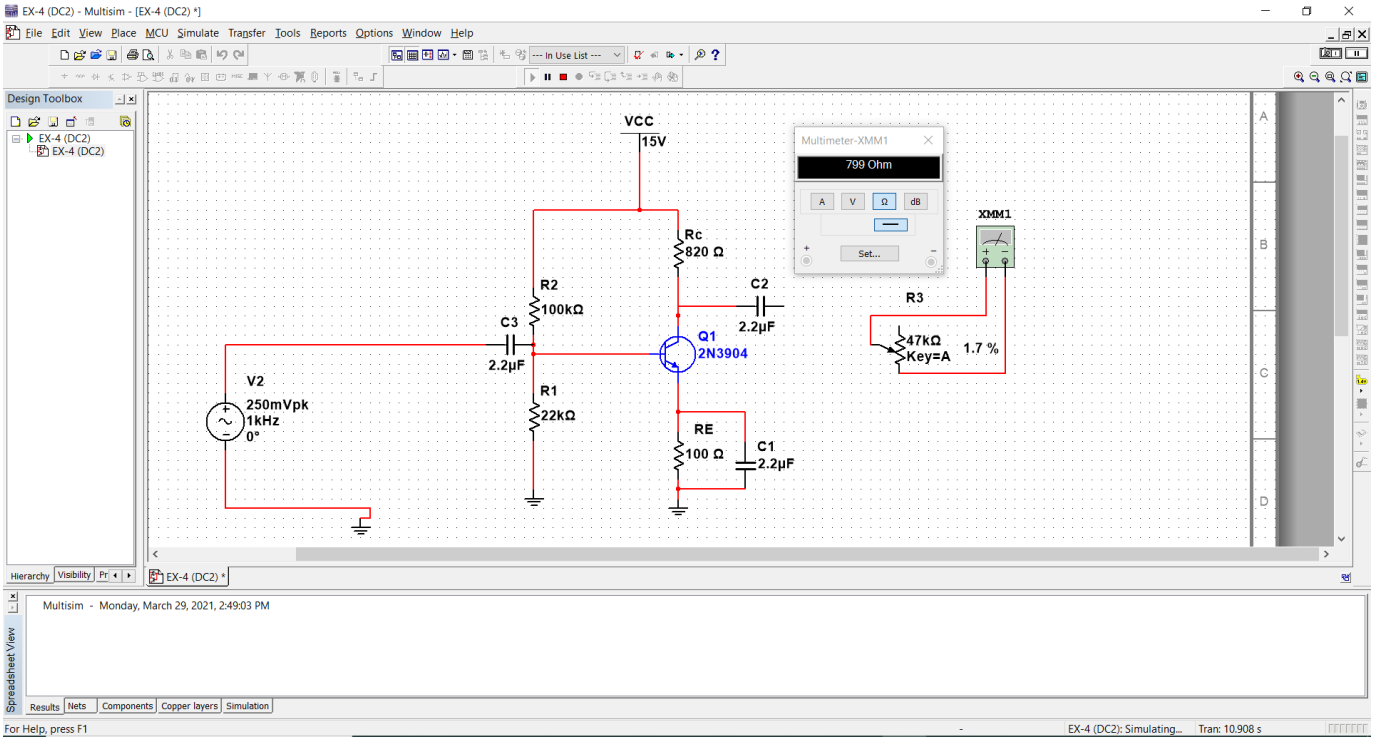
Plotting of Vo with potentiometer (input)



R INPUT VALEU



Plotting of Vo with potentiometer (output)



R OUTPUT VALUE