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INSTRUCTOR: PROFESSOR C.R.Wie
ASSIGNMENT: EE310 SIMULATION2
DUE DATE: 10/18/16 (Sunday)
REC SESSION: R6

Part-1

Design Calculations

Calculation for **C1,R2**

$C1 = (Vp - Vload) / (2\ VR\ fR1\ ) =$ **413.668 uF**

Vp = (Vcmax + Vcmin) / 2 = 13 V

Or Vp = Vc - Vj(diode) - VR /2 = 14 - .75 - (.5)/2 = 13 V

$Vload$= 8V (given dc V)

VR= .5 V

f= 60 Hz

R2= 201.45 Ohm (from below)

R2 = (VCmin -Vzo - rz Izmin) / (Izmin + ILmax) = 5.03625/ .025 = **201.45 Ohm**

VCmin = (Vc - Vj - Vr/2) = 14 - (.5) - (.75) =12.75 V

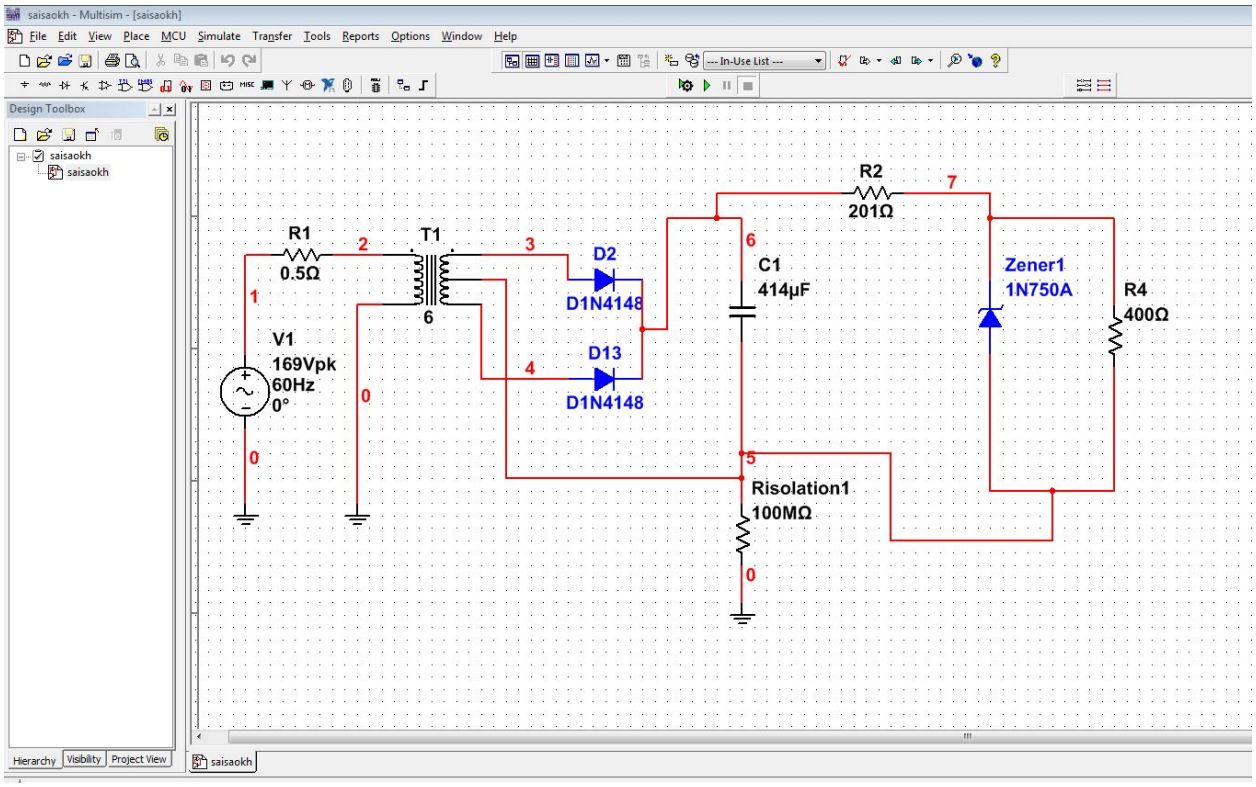
Vzo = 7.9V (given)

Rz =10 Ohm (given)

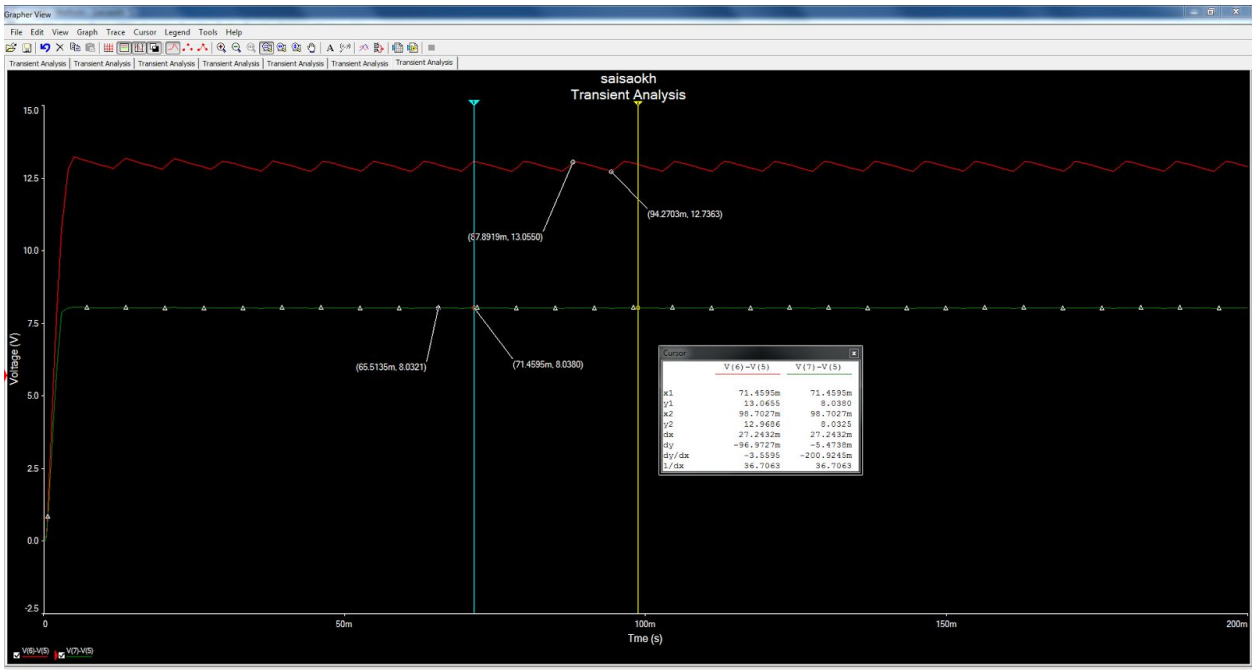
Izmin = 5mA (given)

ILmax = 20 mA

Circuit Schematic



Plot of Voltage across capacitor and the load



Average voltage, Ripple voltage across capacitor

Ripple Voltage = Vmax - Vmin = (13.0550 - 12.7363) = 0.3187 V

Average voltage = (Vmax + Vmin) /2 = 12.8957 V

Output voltage, Ripple voltage across load

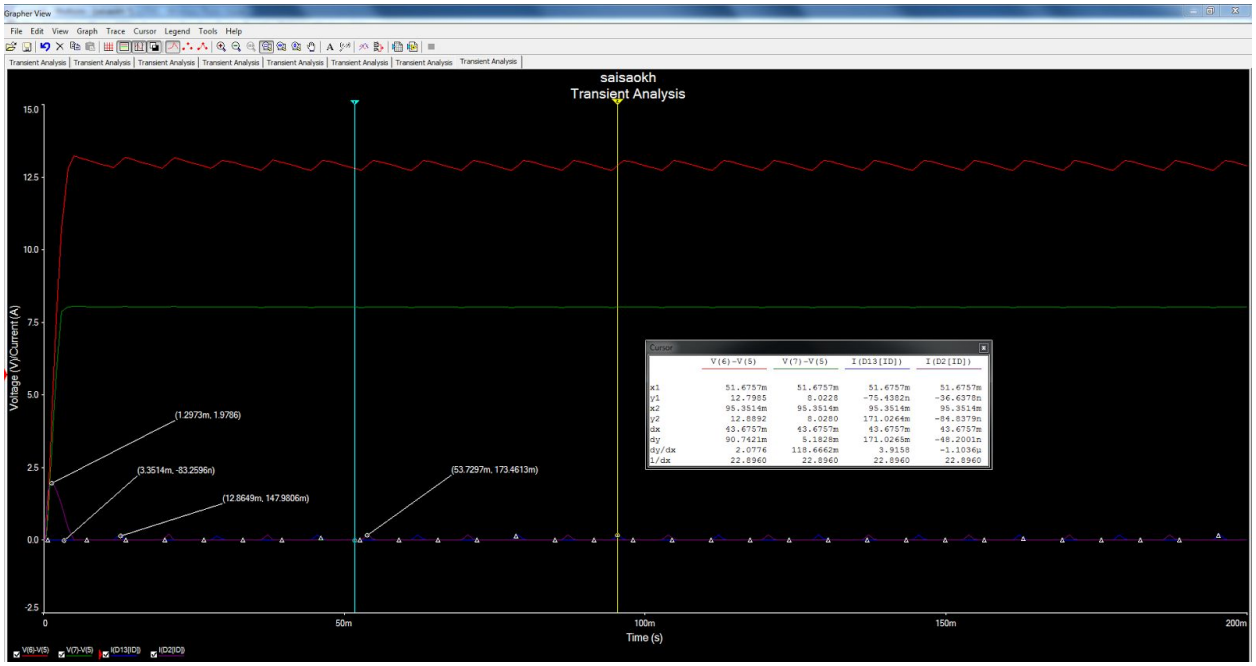
Output voltage = 8.0321 V (as V across load)

Ripple voltage across load = Vmax - Vmin = 8.0380 - 8.0321 = 0.0059 V

Measure of I_{max} across each diode

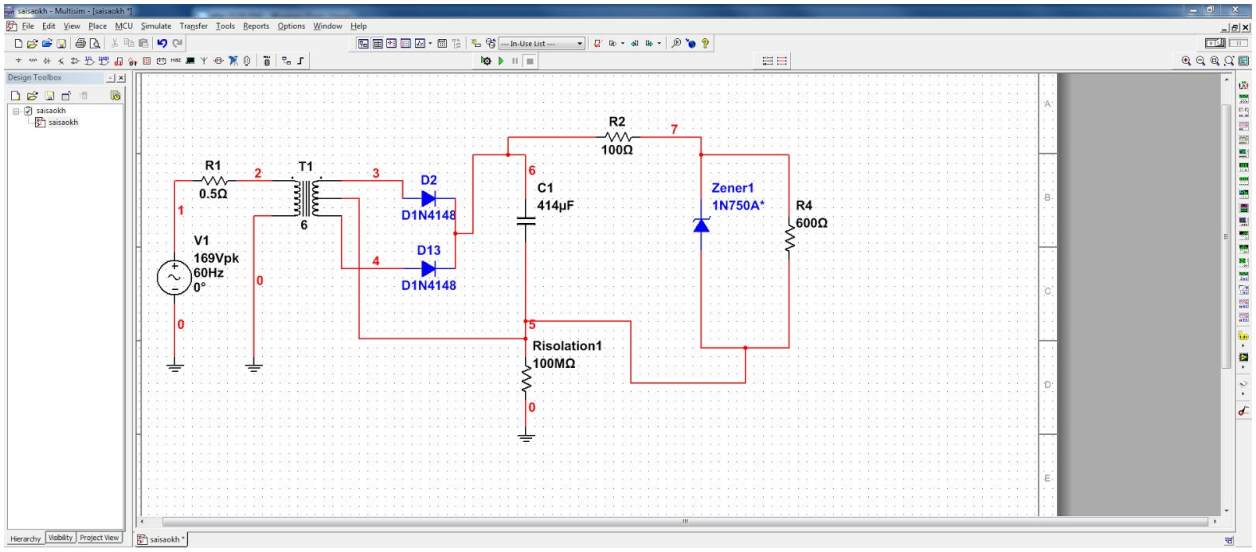
D2: Imax 173.4613 mA (as below waveform)

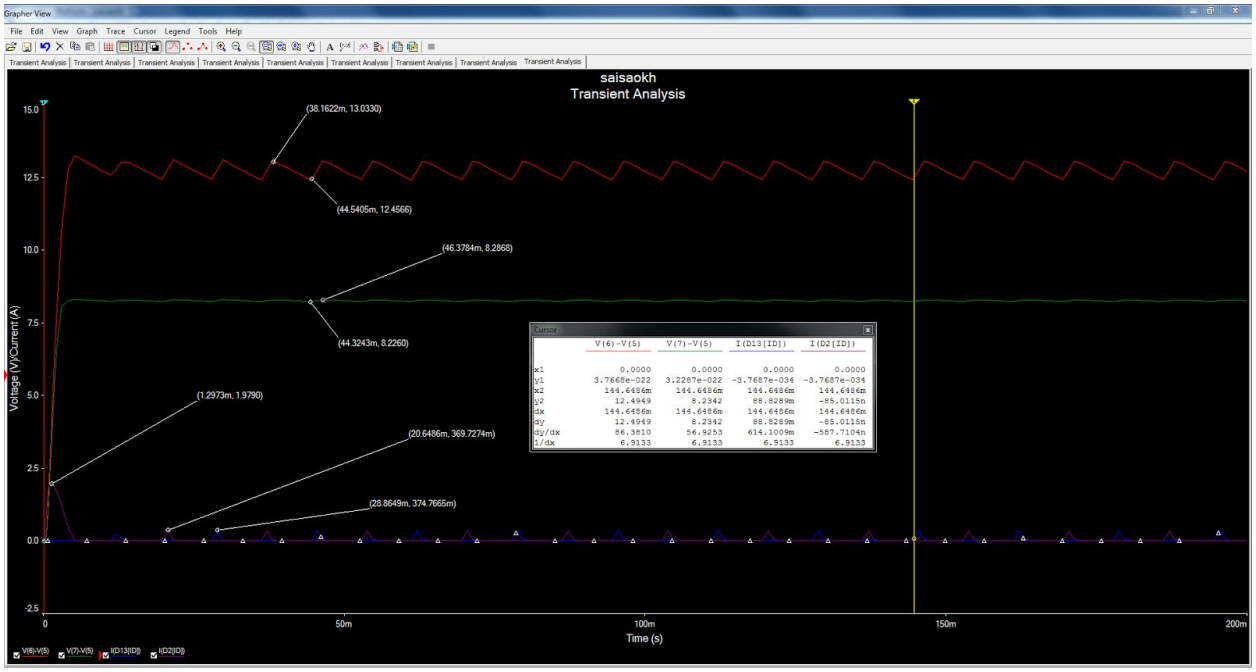
D13: Imax 147.9806 mA (as below waveform)



Fine tuning ,value of C or R chose, observation result including change in ripple voltage

Circuit schematic with R=100 Ohm and its waveform

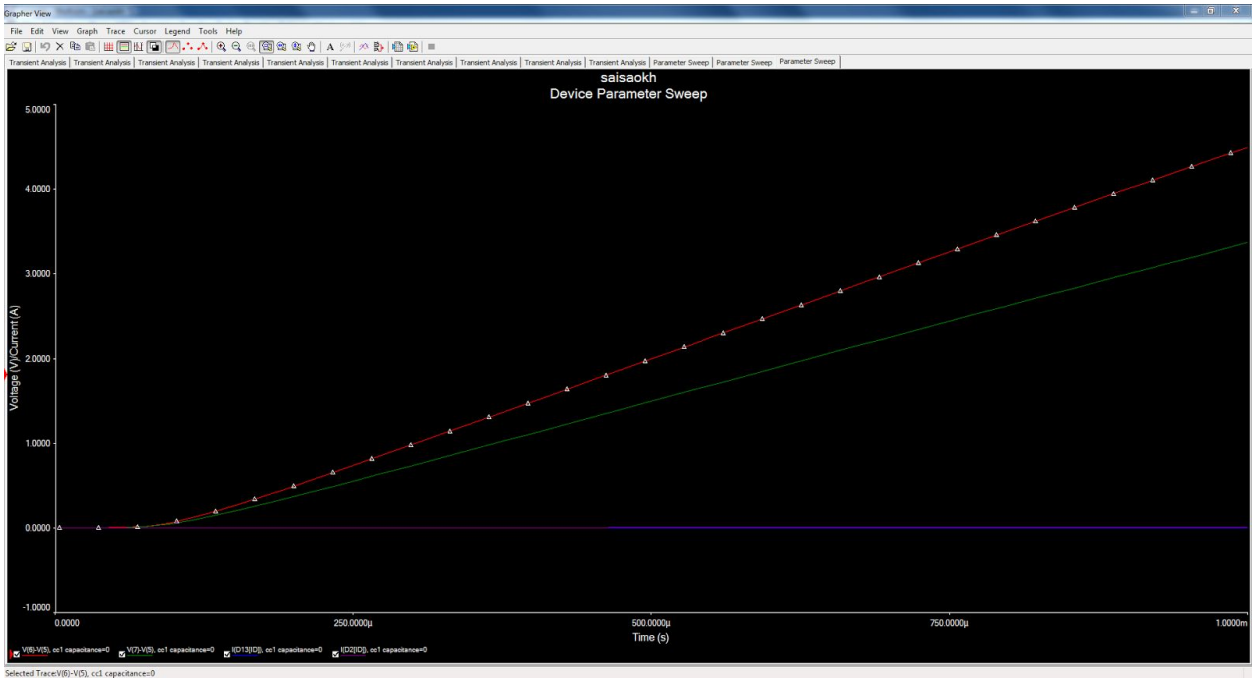


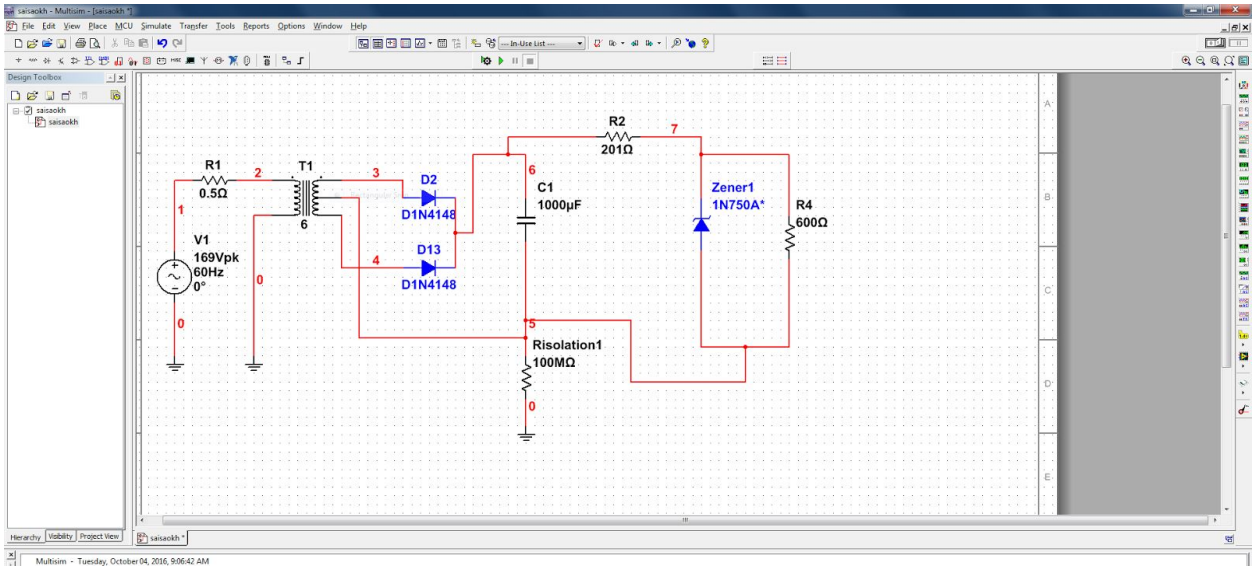


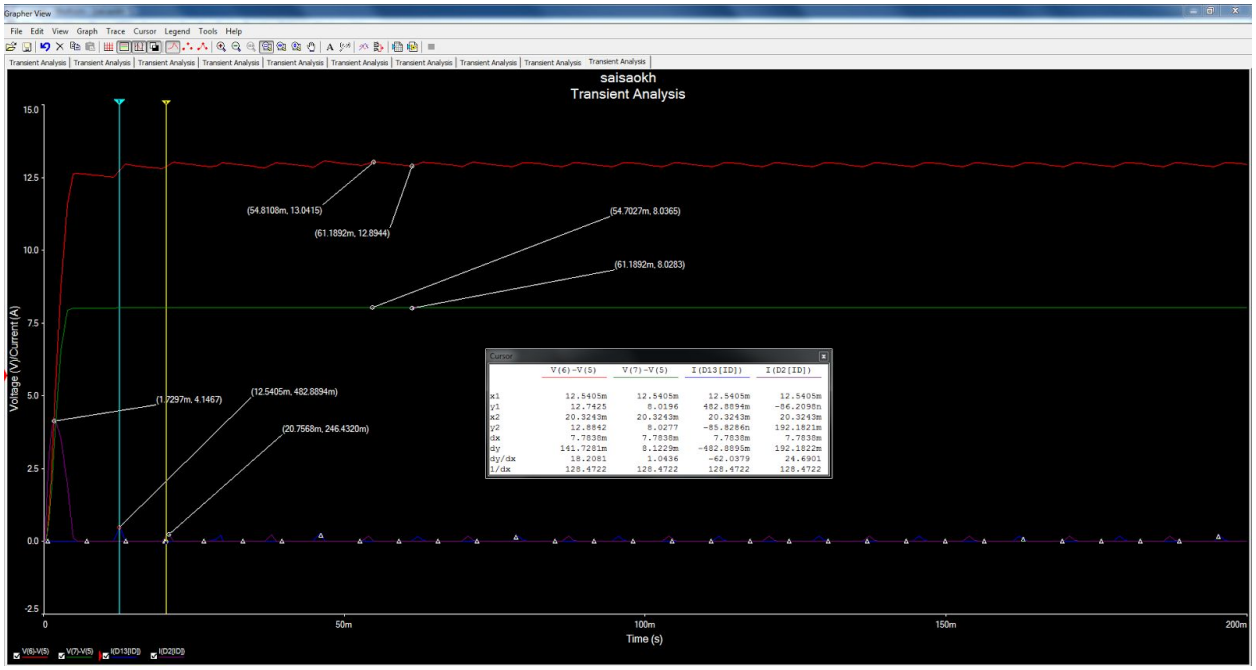
Part-2

Plot of voltage across load for each resistance value(parametric sweep)

Below: Parametric sweep, Circuit schematic, waveform,







Discussion of ripple and output voltage of changing resistance

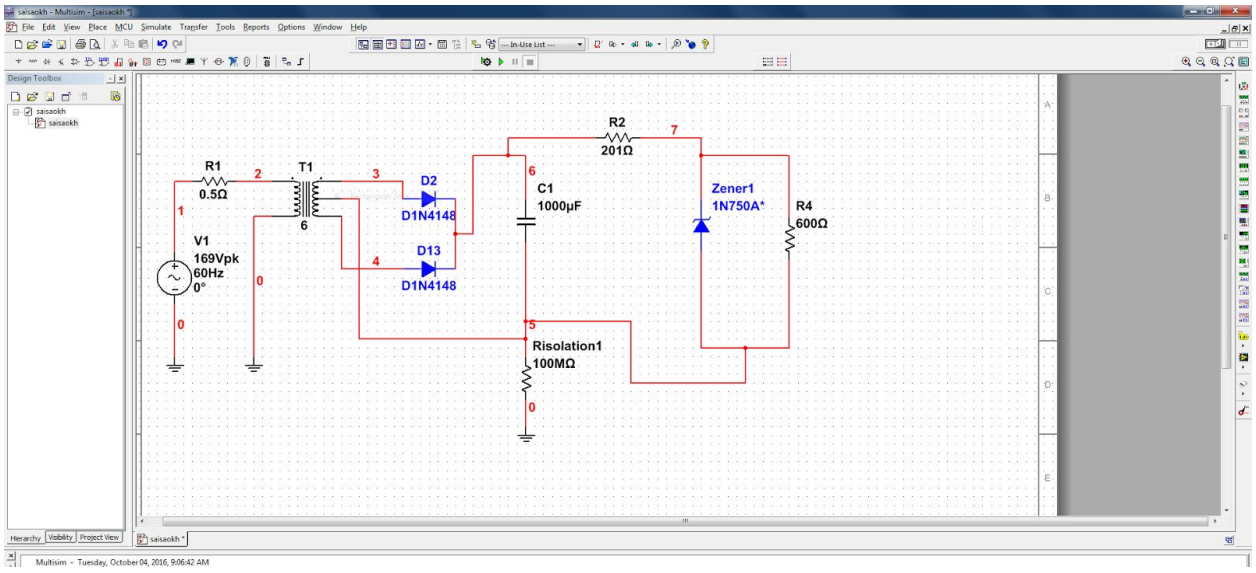
As I increases the resistance I observed that the ripple voltage has decreased. However, the DC output voltage decreases as the resistance increases. Therefore, as the resistance decreases I noticed that the ripple voltage increases and the DC output voltage increases.

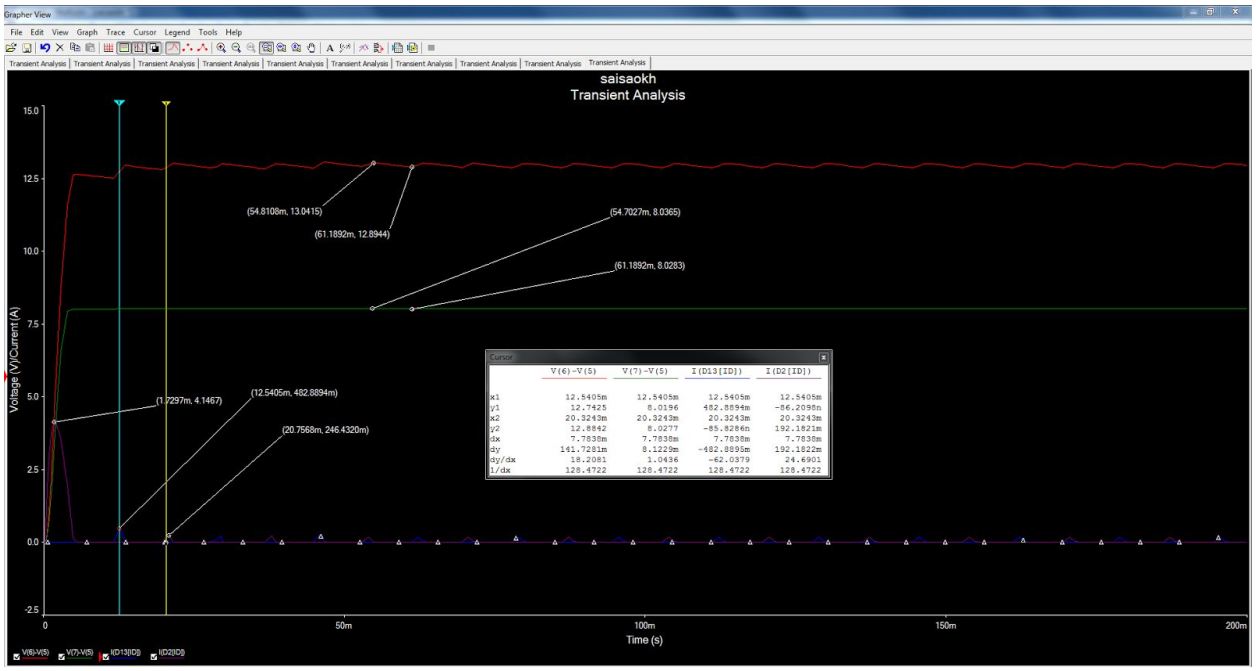
A rectifier device converts alternating current (AC) to direct current (DC). Rectifiers have many uses including as components of power supplies and as amplitude modulation detectors of radio signals. Rectifiers are most commonly made using solid state diodes but other type of components can be used when very high voltages or currents are involved.The term rectifier describes a diode that is being used to convert AC to DC. Most rectifier circuits contain

a number of diodes in a specific arrangement to more efficiently convert AC power to DC power than is possible with only a single diode.

Observation by lowering capacitor value

Circuit schematic with C value 1000uF and its waveform





Measure I_{max} across each diode of each resistance value

With Capacitance value 1000 uF,

D2: Imax = 246.432 mA

D13: I max = 482.889 mA