**INDRAPRASTHA INSTITUTE *of***
**INFORMATION TECHNOLOGY**
**DELHI**

Department
of
Electronics & Communication Engineering

Circuit Theory and Devices

Dr. Shobha Sundar Ram

# Lab_4: Voltage-Regulator
Week_4

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2020220
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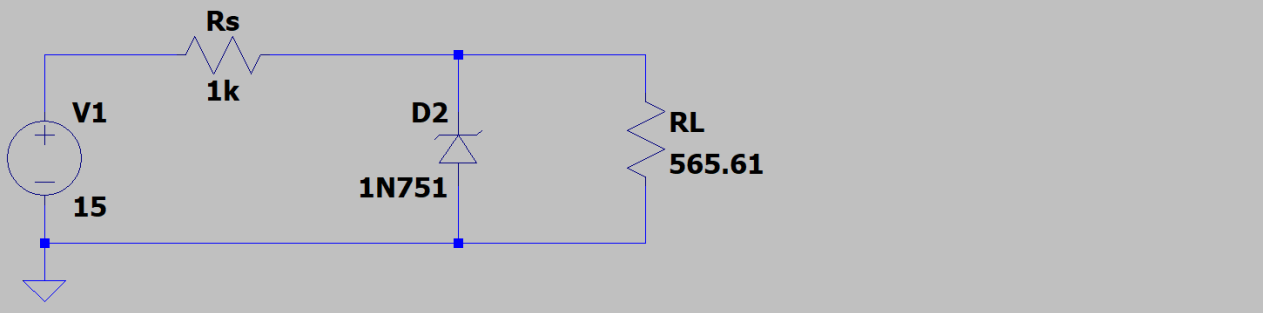
## Objective:

1. Design a simple voltage regulator circuit using a zener diode
2. Contrast the performance of this circuit with an IC voltage regulator.
3. Check the noise performance of the circuit

## Components Used:

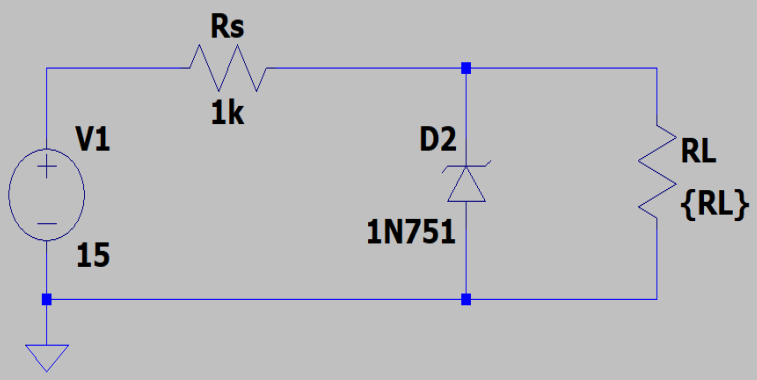
- LTSpice as Simulation Software
- Transformer
- Diode(IN751)
- Inductor
- Capacitor
- Voltage Source
- Resistors

## Diagrams:




.model 1N751 D(Is=1.004f Rs=.5875 Ikf=0 N=1 Xti=3 Eg=1.11 Cjo=160p M=.5484 Vj=.75 Fc=.5 Isr=1.8n Nr=2 Bv=5.1 Ibv=27.721m Nbv=1.1779 Ibvl=1.1646m Nbvl=21.894 Tbv1=176.47u Vpk=5.1 mfg=Motorola type=zener)

.tran 10s

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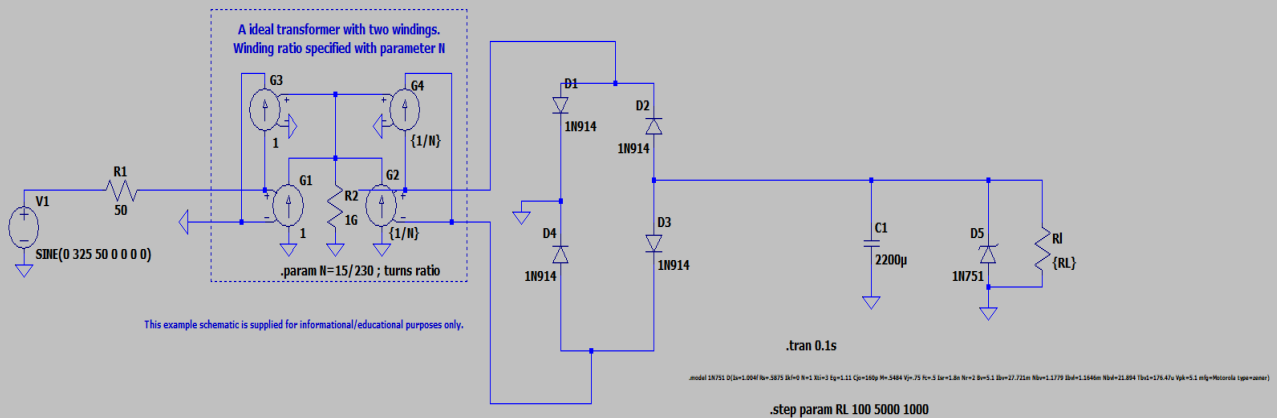
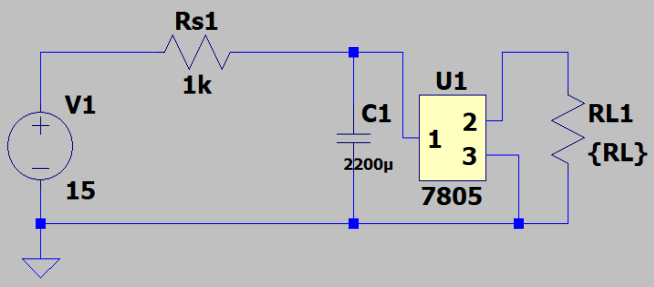
**.step param RL 100 5000 100** **;tran 10s** **.op 0.1s**



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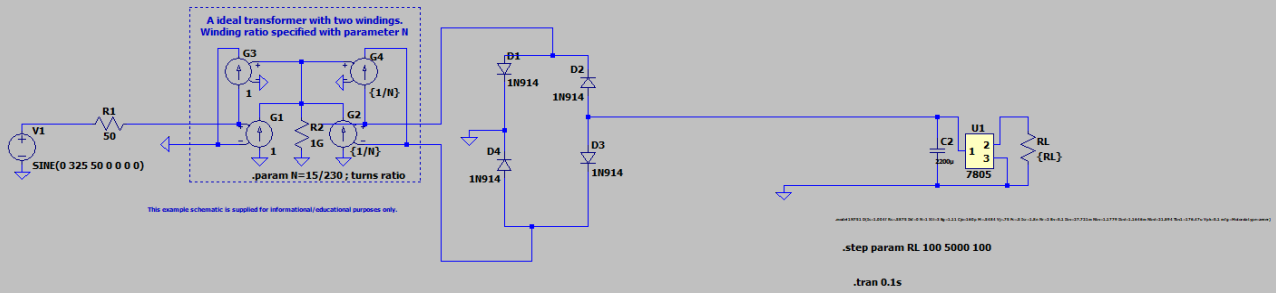
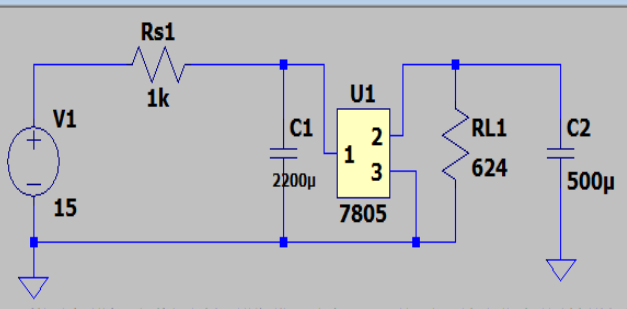



Introduce a smoothing capacitor at the output of the IC7805 in parallel to the load. Change the capacitor from 5uF to 500uF and observe the noise performance of the resulting circuit

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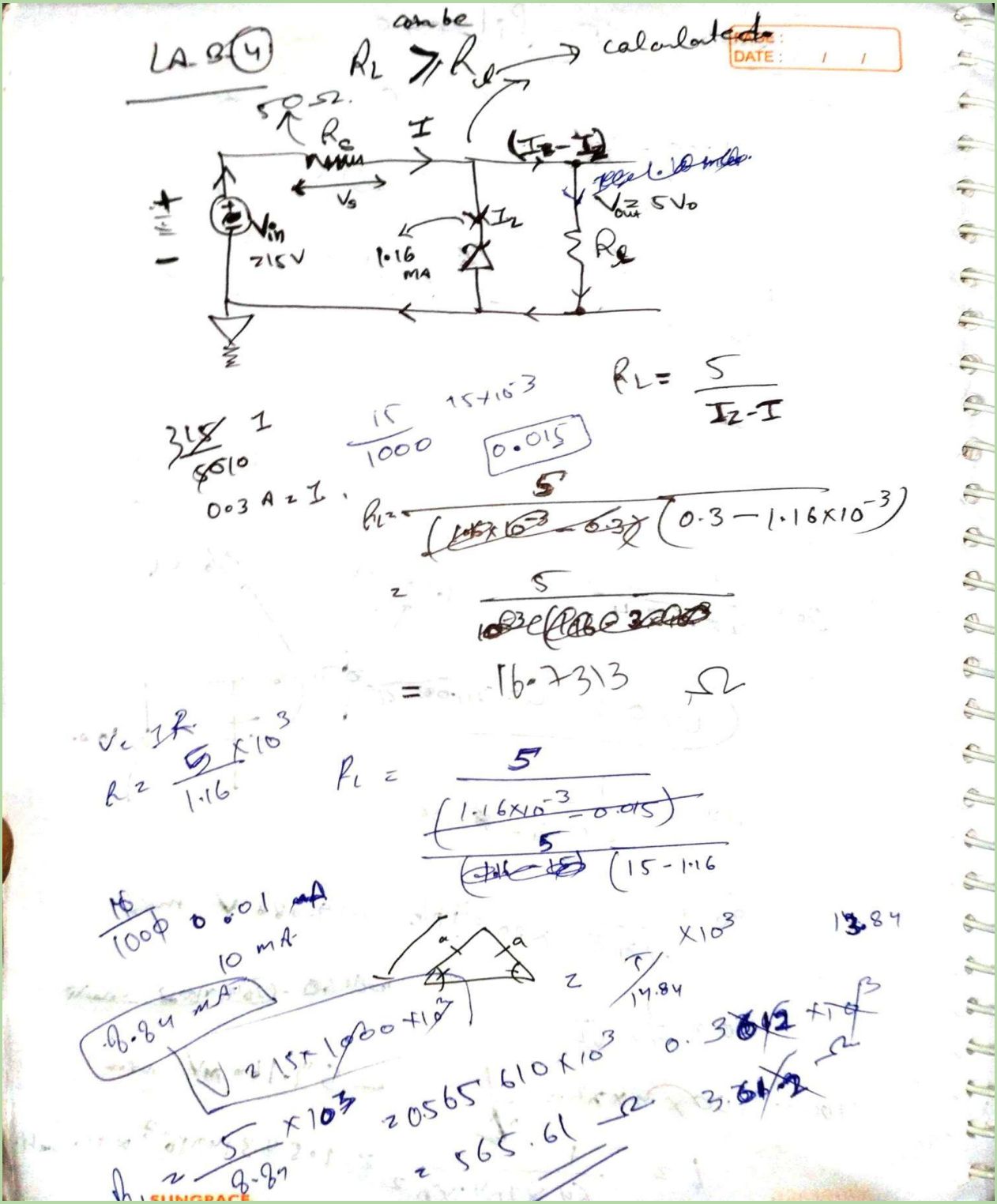
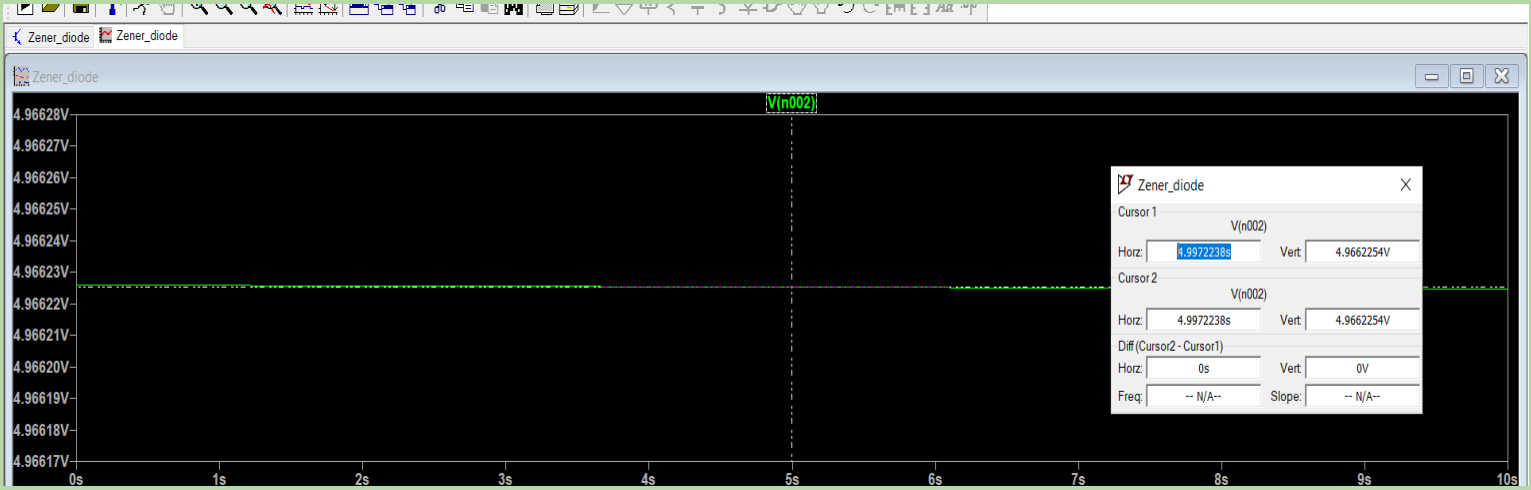
**.noise V(n003) V1 dec 100 1 10k**

**Theoretical Calculations:**

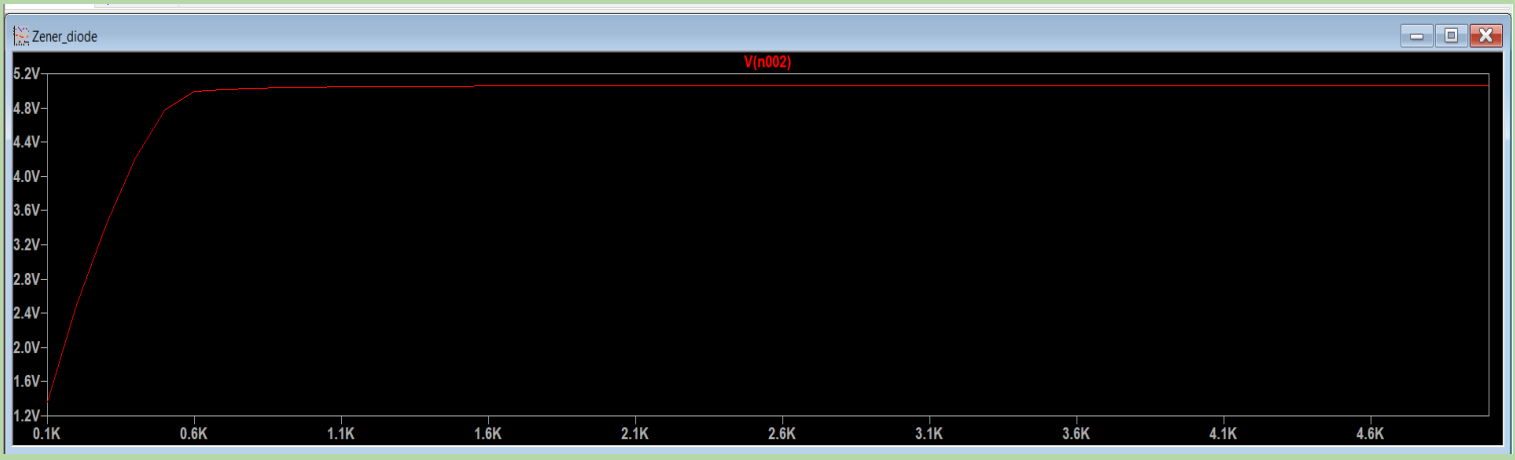


# Plots:

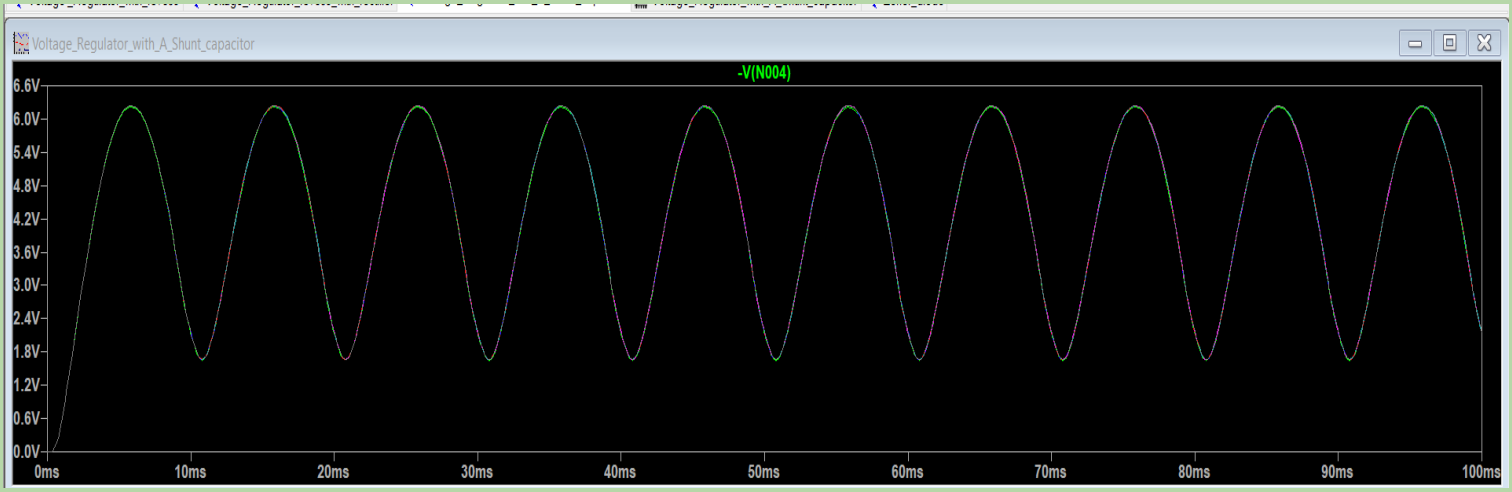
Connect a DC input of 15V, a resistor of 1kΩ and a zener diode rated at 5V . Connect a load resistor RL across the diode. Draw this circuit in LTSpice & run transient simulation.




- Insert a DC input of 15V to the regulator circuit and measure the output voltage across RL. Vary RL from 100Ω to 5K and note how the output voltage is changing (.op).

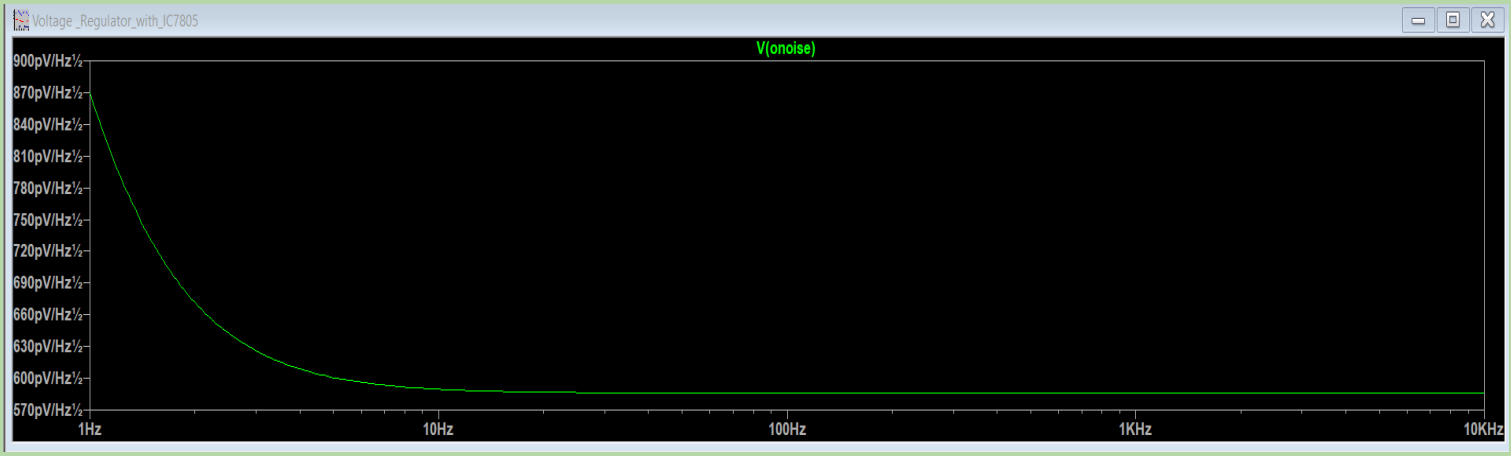



- Now connect the voltage regulator circuit at the load of rectifier circuit with smoothing filter (C=2200uF) and repeat the study of the previous step.(transient)

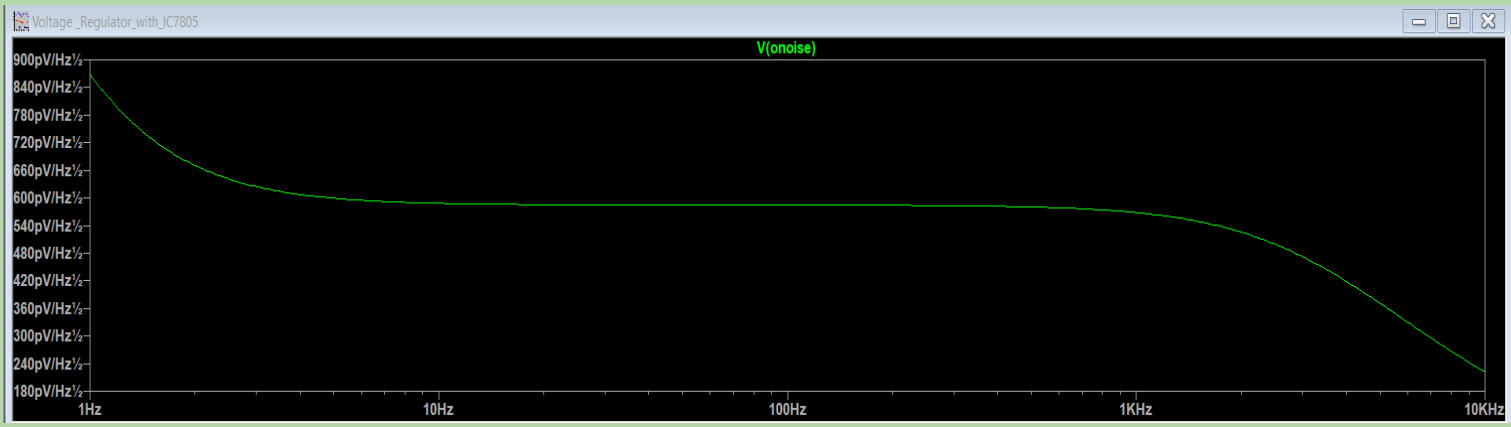


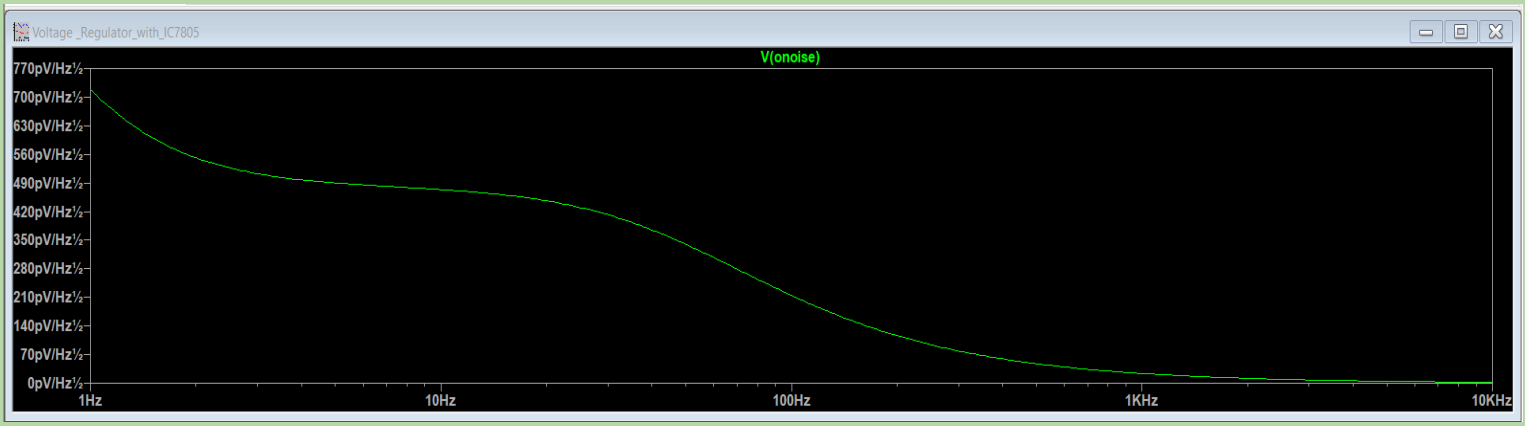

- Now instead of the zener circuit shown in Fig.1, we will consider the Spice model of an IC7805 circuit and connect it to the input DC excitation and output load RL.


noise:




The capacitor from 5uF to 500uF and observe the noise performance of the resulting circuit:






## Conclusion:

The introduced capacitor parallel to load is reducing the noise in our circuit.

THE END…..