ELECTRONICS LAB.

PART 4 EXPERIMENTS

Yrd. Doç. Dr. Taha İMECİ

Arş. Gör. Ezgi YAMAÇ

Arş. Gör. Ufuk ŞANVER

İSTANBUL COMMERCE UNIVERSITY

Contents

EXPERIMENT: 4.1

EXAMINATION OF ZENER DIODE

EXPERIMENTAL PROCEDURE:

Plug the Y-0016-008 module. Make the circuit connection as in figure 13.4

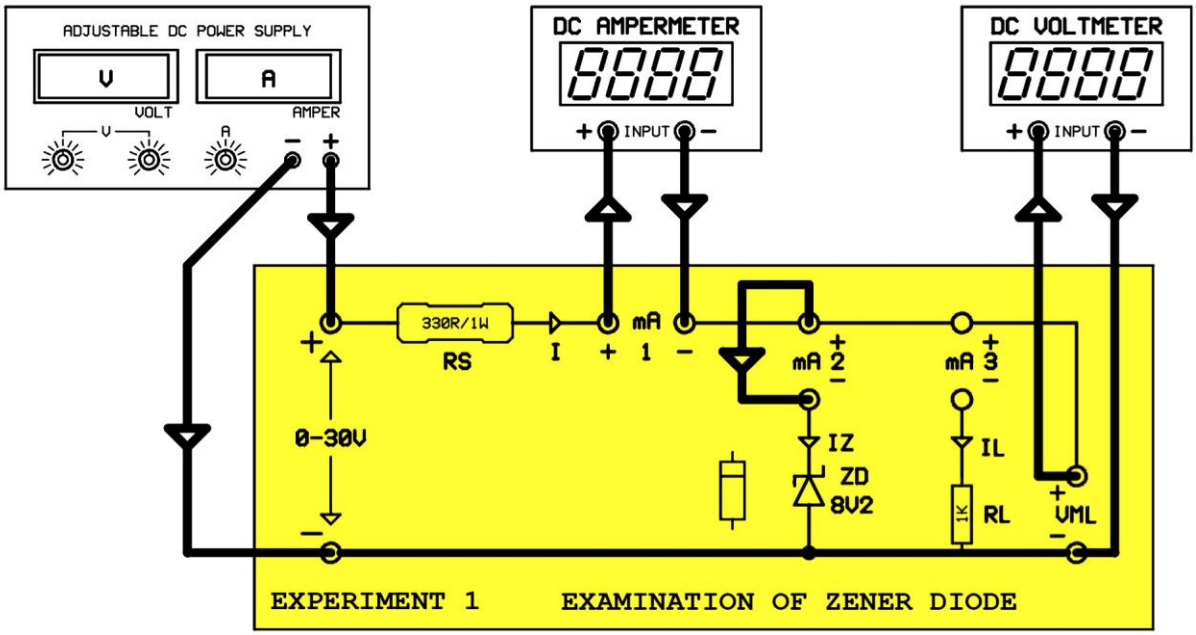

Figure 13.4

1- Adjust the voltage potentiometer of power supply to zero. (**Mid-terminals will be on the left**) apply power to circuit.

2- How is the zener diode biased? Why?

3- Adjust the voltage of power supply to the values in 13.5, respectively. Type the zener current (**Iz**) for every step.

NUMBER	APS (V)	EZ (V)	IZ(mA)
1	0,0		
2	2,0		
3	5,0		
4	8,0		
5	8,1		
6	8,2		
7	8,3		
8	8,4		
9	8,5		
10	9,0		
11	10,0		
12	12,0		

Figure 13.5

4- In which step did the zener current rapidly increase? What does it mean?

5- Draw the characteristics of zener diode in inverse bias using the values in figure 13.5

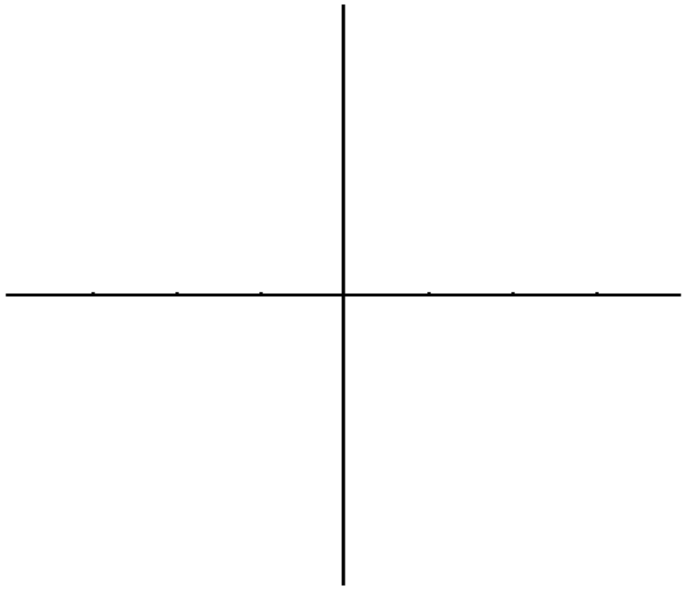

Figure 13.6

6- How would be the forward characteristics if zener diode was in forward bias? Show the forward characteristics in figure 13.6

EXPERIMENT: 4.2

EXAMINATION OF ZENER DIODE REGULATION CIRCUIT

EXPERIMENTAL PROCEDURE:

Plug the Y-0016-008 module. Make the circuit connections as in figure 13.10

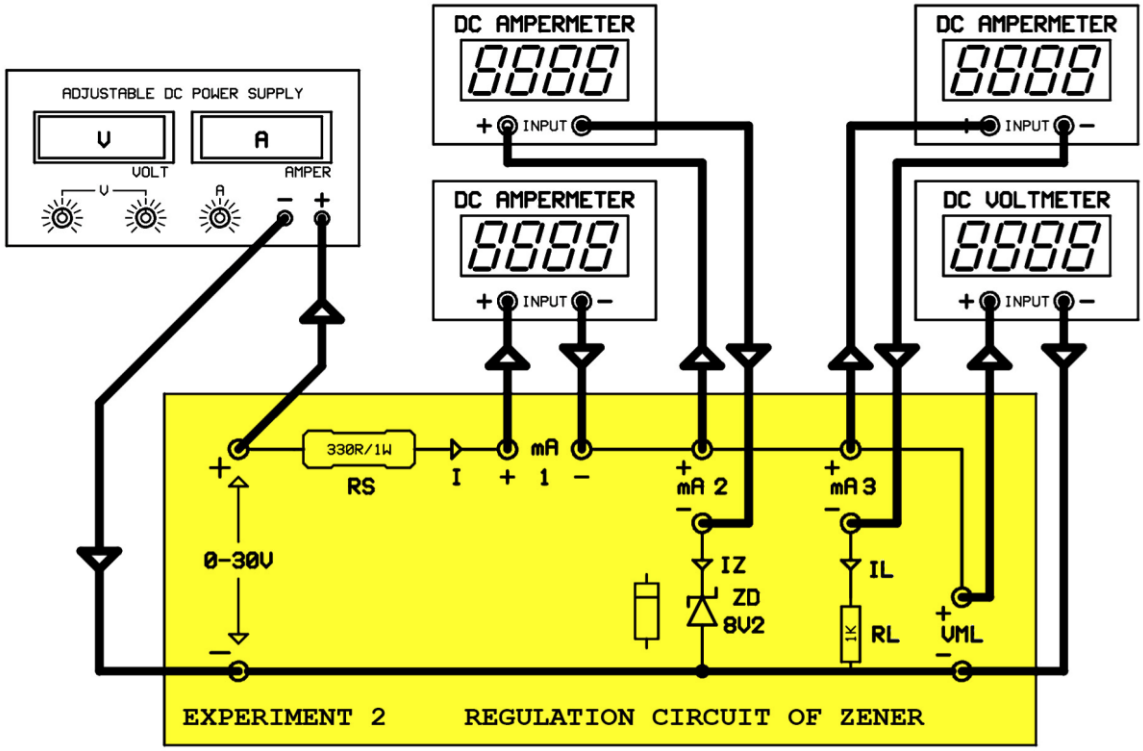

Figure 13.10

1- According to the component values given in circuit, calculate the limits of input voltage?

*Lower limit of input voltage (**EiA**);*

EiA $= (IL.RS) + EZ$

IL $= \frac{EL}{RT} = \frac{EZ}{RL} =$

EiA **=**

*Upper limit of input voltage (**EiM**);*

EiM $= (IM.RS) + EZ$

*(**Zener diode power is PZD=0,25Watt**.)*

$$IZM = \frac{PZD}{EZ} =$$

IM=*IZM+IL*
IM=

EiM=

2- Adjust the voltage potentiometer of power supply to zero. (Mid-terminals will be on the left). Apply power to the circuit. Adjust the voltage of power supply to the values between 10,9Volt and 20,8Volt. Read the values displayed by output voltmeter(**VML**) and comment on the process.

3- If the voltage of power voltage is increased and still the voltage on load terminals doesn't change, then, where is the excess voltage?

EXPERIMENT: 4.3

EXAMINATION OF RECTIFIER WITH PARALLEL REGULATOR

EXPERIMENTAL PROCEDURE:

Plug the Y-006/008 Module. Make the circuit connections as in figure 13.12.

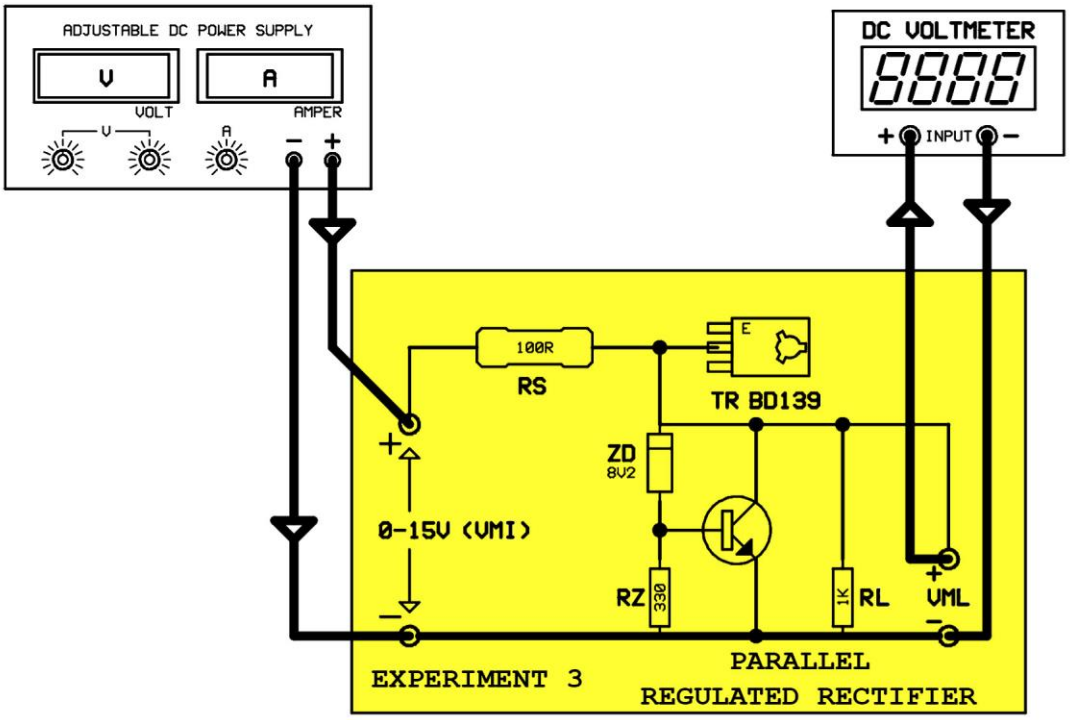

Figure 13.12

1- Adjust the output voltage of power supply to zero. (**Mid-terminals of voltage potentiometers will be on the left**)

2- Adjust the voltage of power supply to the values in figure 13.13 respectively. Type the load voltage values for every step.

NUMBER	1	2	3	4	5	6	7	8	9
APS (V)	7	8	9	10	11	12	13	14	15
VML (V)									

Figure 13.13

3- Between which limits of input voltages the output voltage is regulated?

4- Where does the difference between the input voltage and the voltage on the load terminals change?

5- Is the rectifier with parallel regulator practical and applicative? Why?

EXPERIMENT: 4.4

EXAMINATION OF RECTIFIER WITH SERIAL REGULATOR

EXPERIMENTAL PROCEDURE:

Plug the Y-0016/008 module. Make the circuit connections as in figure 13.15

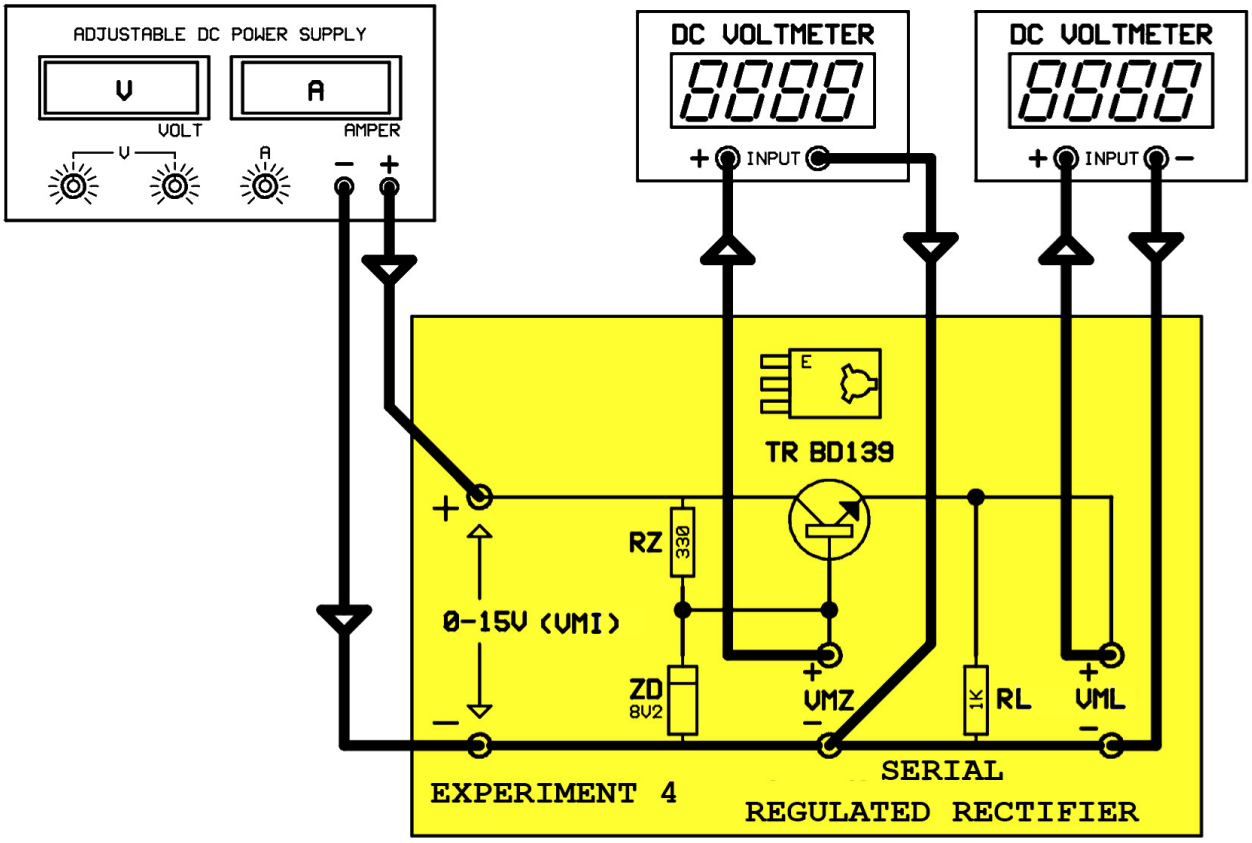

Figure 13.15

1-Adjust the output voltage of power supply to zero. (**Mid-terminals of voltage potentiometers will be on the left**). Apply power to circuit.

2- Adjust the voltage of power supply to the values in figure 13.16 respectively. Type zener diode voltage (**VMZ**) and load voltage (**VML**) for every step.

NUMBER	1	2	3	4	5	6	7	8	9
APS (V)	7	8	9	10	11	12	13	14	15
VMZ (V)									
VML (V)									

Figure 13.16

3- Between which limits of input voltages the output voltage is regulated?

4- How much is the difference between zener diode voltage and load voltage? Where is that difference voltage?

EXPERIMENT: 4.5

EXAMINATION OF RECTIFIER WITH IDEAL SERIAL REGULATOR

EXPERIMENTAL PROCEDURE:

Plug the Y-0016/008 module. Make the circuit connections as in figure 13.19

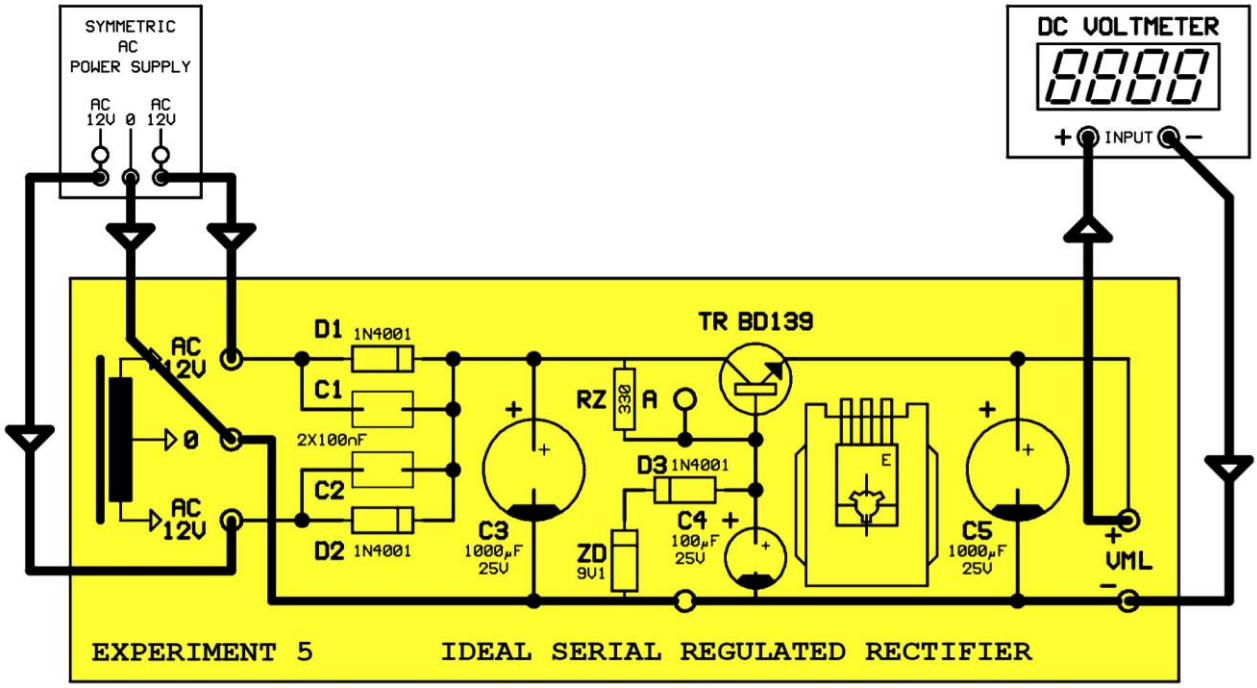

Figure 13.19

Transformator is not seen in circuit. Transformator is the alternative power supply of our experiment set. Power supply in the experiment set is actually a transformator with mid-terminal output voltage of AC12V/0/AC12V

1- Apply power to circuit. Measure the output voltage (**VML**) and base voltage(**EA**) at point (**A**).

VML=	***EA=***

2- How much is the difference between the output voltage and the transistor's base voltage? Where is this difference voltage?

EF=*EA-VML*

EF=

3- Why is D3 diode used?

4- Why is alternating input voltage chosen as **Ei=**12VAC despite the expected output voltage is 9,1Volt?

5- How much must be the threshold voltages of C3-C4-C5 capacitors?

EC3=*Ei.1,41*

EC3=

EC4=*EZD+ED3*

EC4=

EC5=VNL=

6- Calculate the RS resistor value?

EC3=*ERS+EA*
ERS=*EC3-EA*

ERS=

$$RS = \frac{ERS}{IZ} =$$