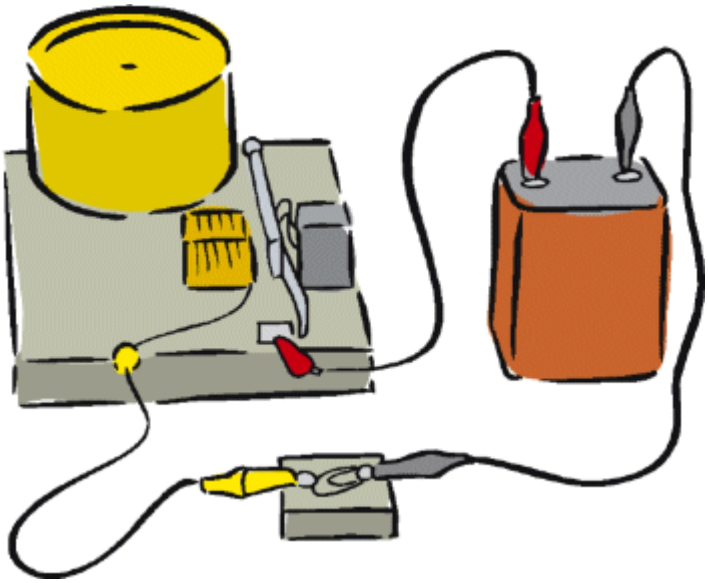
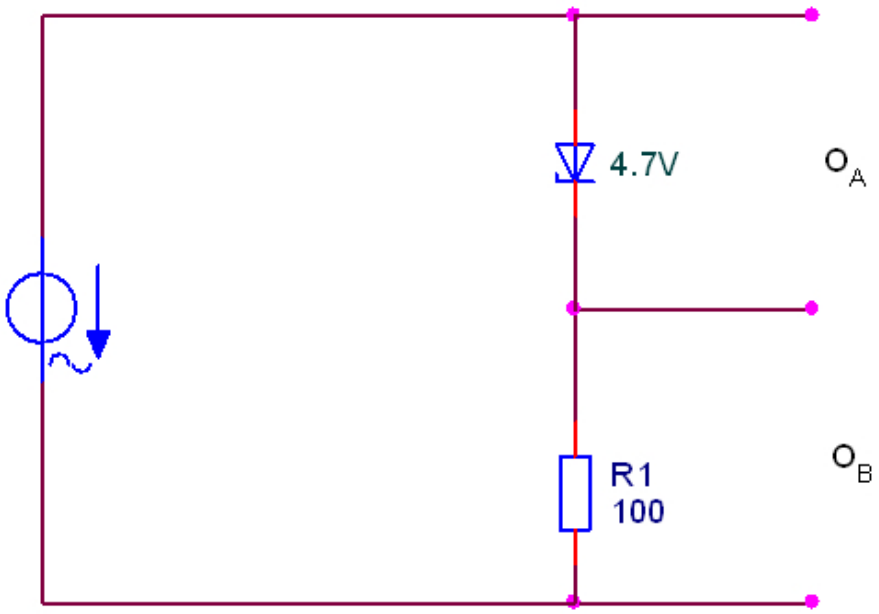
EXP (1) **Zener diode**



Experiment procedure

Circuit diagram

The following circuit diagram is used for this experiment:



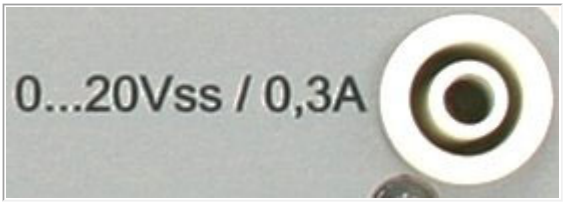
Components

The following components are used in this experiment:

Parts	Id no.	Designation
2	SO5126-5M	Cables
14	SO5124-6F	Bridges, small
1	PS4121-2N	R 100
1	PS4122-8A	Z-diode 4.7 V

Cable connections

The following cable connections are used in this experiment:

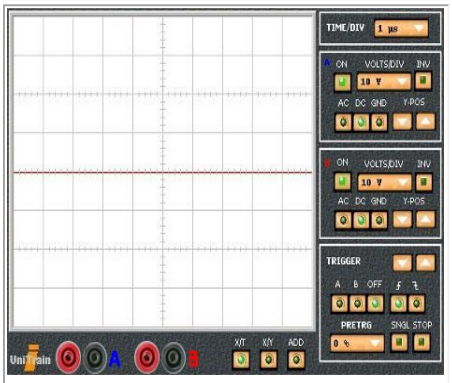
Designation	Symbol	Equipment	Sockets
FG		FUNCTION GENERATOR	
GND		MULTI POWER SUPPLY 60 VA / 500 KHz	

Connect the specified sockets to the plug-in position shown in the layout diagram.

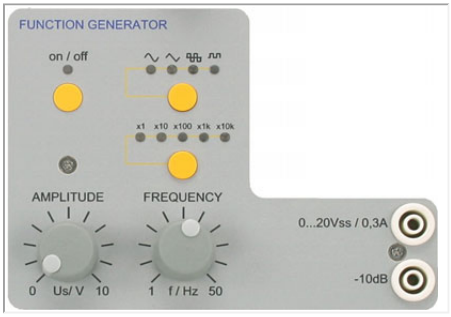
Equipment

The following equipment is required including the corresponding settings for the experiment:

Equipment	Settings



	Channel A	Channel B
Sensitivity	2 V/DIV	2 V/DIV
Coupling	DC	DC
Polarity	inv	norm
y-pos	0	0
Time base	2 msec/DIV	
Mode	X/Y	
Trigger channel	-	
Trigger edge	-	

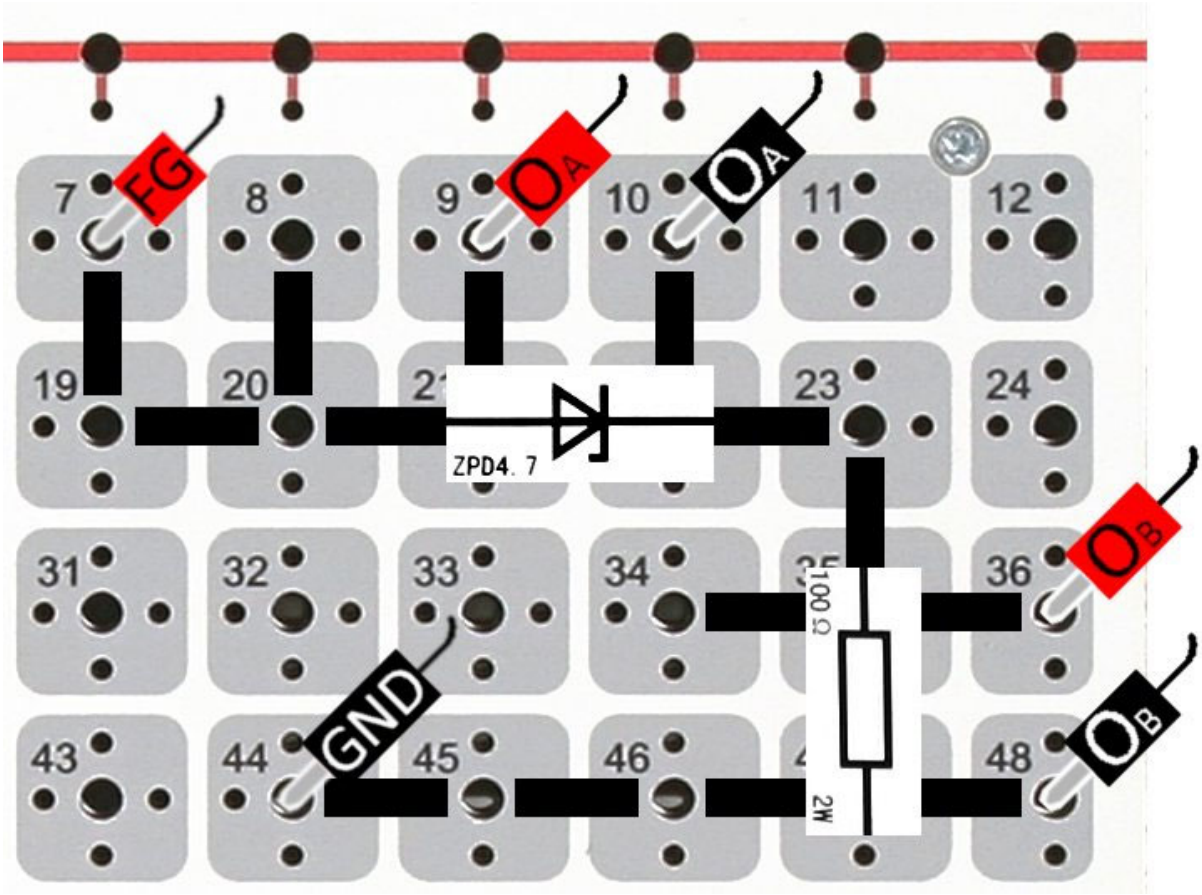


Curve shape	sinusoidal
Amplitude	8V
Frequency factor	x1
Frequency	50Hz

Experiment set-up

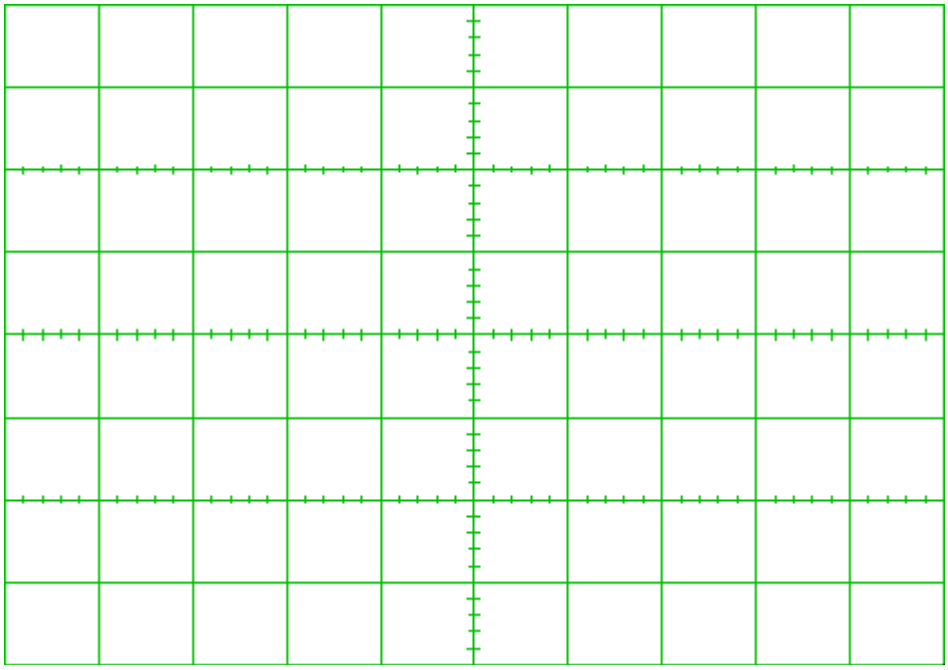
Please now set up the experiment as a testing station in the upper right hand corner of the patch panel. Begin as follows:

- Bridging plugs
- Electronic components
- Measuring instruments and cables



Experiment procedure and exercises

Set the oscilloscope and the function generator to the values specified above and enter the voltage-current characteristic of the Zener diode into the diagram below. Make sure that you obtain a good reading of the Zener diode's breakdown voltage.



The Zener diode begins conducting as of a certain voltage, the threshold voltage, and the amperage increases quite abruptly. In the normal forward (line) direction the voltage corresponds to that of a standard diode. How high is the low threshold voltage?

U_{Sw}=_____ V

How high is the higher threshold voltage in the reverse (line) direction?

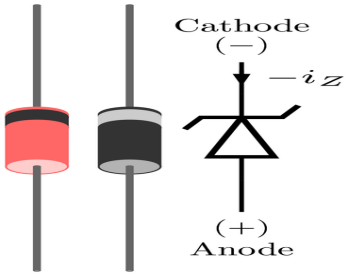
U_{Sw}=_____ V

EXperiment (2)

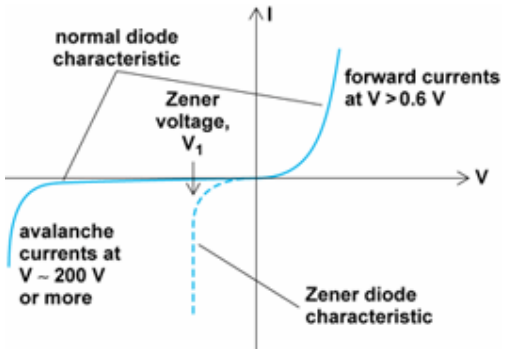
Study of Zener diode as voltage regulator

Objective of the Experiment: To study of Zener diode as a voltage regulator.

Working Principle:



A Zener diode is a type of diode that permits current not only in the forward direction like a normal diode, but also in the reverse direction if the voltage is larger than the breakdown voltage known as "Zener knee voltage" or "Zener voltage". The device was named after Clarence Zener, who discovered this electrical property. A Zener diode exhibits almost the same properties, except the device is specially designed so as to have a greatly reduced breakdown voltage, the so-called Zener voltage. By contrast with the conventional device, a reverse-biased Zener diode will exhibit a controlled breakdown and allow the current to keep the voltage across the Zener diode close to the Zener voltage. For example, a diode with a Zener breakdown voltage of 3.2 V will exhibit a voltage drop of very nearly 3.2 V across a wide range of reverse currents. The Zener diode is therefore ideal for applications such as the generation of a reference voltage (e.g. for an amplifier stage), or as a voltage stabilizer for low-current applications.



Zener diodes are widely used as voltage references and as shunt regulators to regulate the voltage across small circuits. When connected in parallel with a variable voltage source so that it is reverse biased, a Zener diode conducts when the voltage reaches the diode's reverse breakdown voltage. From that point on, the relatively low impedance of the diode keeps the voltage across the diode at that value.

Procedure for conducting the Experiment

i. Make the circuits as shown in figures.

ii. **LOAD REGULATION:** Fig 1 shows the connection diagram of Load regulation. Here an ammeter is connected in series with R_L & a volt meter is connected across the variable load résistance. Here the dc supply is fixed at 25 volts. Vary the load resistance from 0 onward.

iii. **SOURCE REGULATION:** Fig 2 shows the connection diagram of Source regulation. Here two voltmeters are connected in parallel with supply voltage and fixed load resistance (R_L) and dc supply is varied from 0 volt and onwards in the step of 1 volt.

Load regulation:

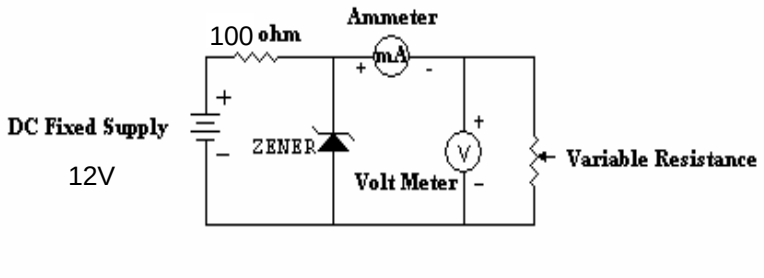


Fig 1

Source regulation:

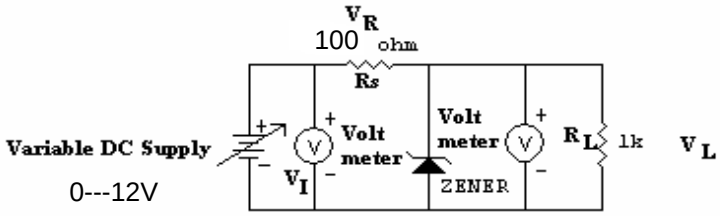


Fig 2

Load regulation:

RL	Source Voltage (volts)	Current through Load Resistance [I_L (ma)]	Voltage across Load
100	12V		
220	12V		
330	12V		
1K	12V		
4.7K	12V		
10K	12V		

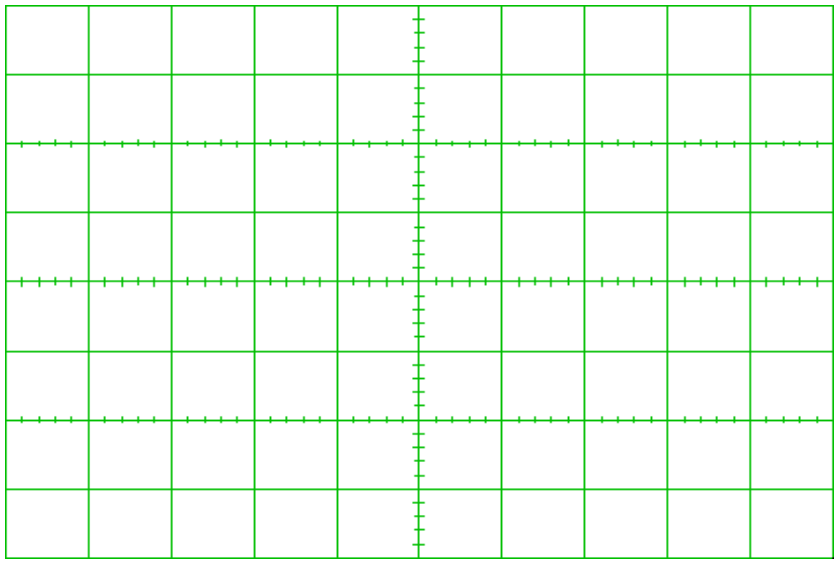
Source regulation:

RL	Input Voltage [V_i (volts)]	Voltage Across Series Resistance [V_r (volts)]	Load Voltage
1K	2		
1K	4		
1K	6		
1K	8		
1K	10		
1K	12		

Draw the relation between the load resistance and output voltage in case of Load regulation

Vout

Load Reulation

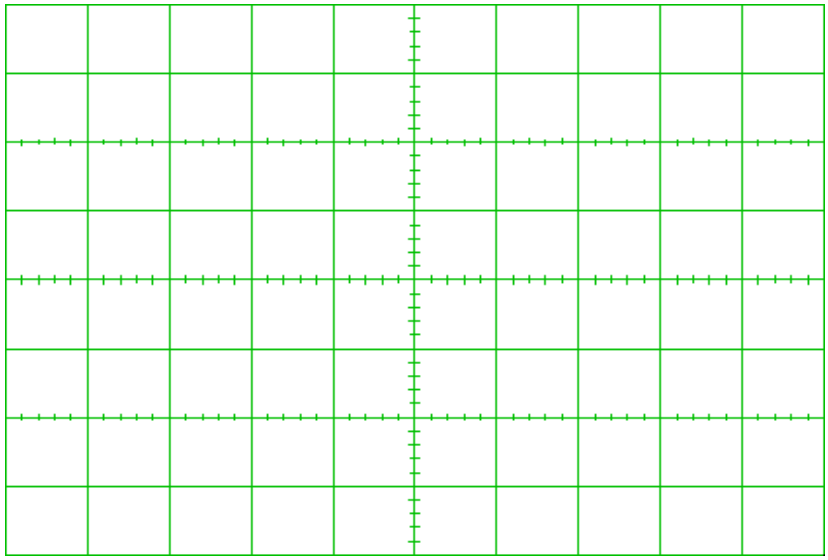


RL

draw the relation between the output voltage corresponding to the input voltage in case of source (line) regulation

Vout

Source Regulation



Vin