

### Experiment 4: Zener diode

- 1) Write any one application based on this experiment related to core branch.

Ans. 1) The main application of zener diode is as the voltage regulator.

2) Overvoltage protection is done by using zener diode because there is current flowing through the diode after the reverse bias voltage exceeds certain value.

3) Normally, current should not exceed conventional value, but if there is a fault, and current exceeds maximum allowable value, system can be damaged permanently and to avoid unstable performance, zener diodes are used where voltage reference is required like ohmmeters, ammeters, etc.

4) Zener diode works as voltage regulator if it is introduced in the circuit and is driven by current source.

5) To limit the current through zener diode, series resistance  $R$  is introduced whose value is given by equation

$$\text{Resistor } (R) = \frac{V_1 - V_2}{\text{Zener diode} + \text{load current}}$$

6) Zener diode produces a stable performances of references voltage across the load which fulfill the criteria of regulator.

7) Electronic voltage regulators are found in devices such as computer power supplies where they stabilize the DC voltages used by the processor and other elements.

8) UPS is voltage regulator for computer. It is very important to buy UPS to protect your data and sudden interruption of power.

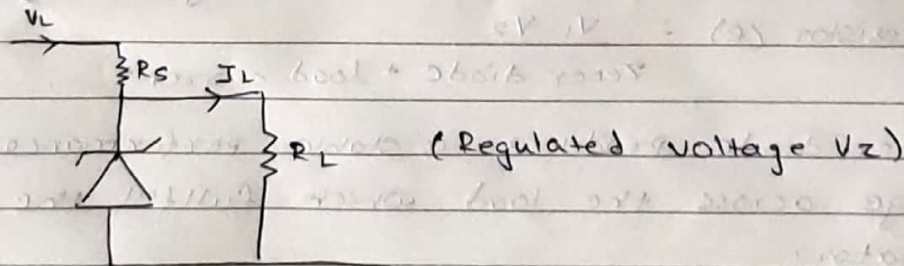
9) Apart from that, computer has SMPS or PSU which does the regulation process but if it is poorly manufactured



or low quality, your computer's motherboard is under risk. Its components may burn or wear out in such cases.

- 2) Explain any other technique or experiment other than the one performed which will achieve the result and fulfill the aim of the experiment.

Ans. There is a series resistor connected to the circuit in order to limit the current in the diode. It is connected to positive terminal of d.c. and works in such a way that reverse biased can also work in the breakdown conditions. When minimum input voltage and maximum load current is applied, zener diode current should always be minimum. Since, input voltage and required output voltage  $V_L$  is known, choose a zener diode with  $V_Z = V_L$ .



Value of series resistor  $R_S = (V_L - V_Z) / I_L$

Current through diode increases when voltage in diode decreases, hence voltage drop across resistor is very less and output voltage results normally.