

## Experiment No.- 3

**Objective of the Experiment:** To Study the 1-Phase Full Wave Rectifier with R, Motor and Free Wheeling Diode.

### Equipment Needed:

1. Sciencetech 2700 Trainer Kit.
2. Resistor and Motor Load.
3. Patch Cords.
4. DSO.

### Circuit Diagram:

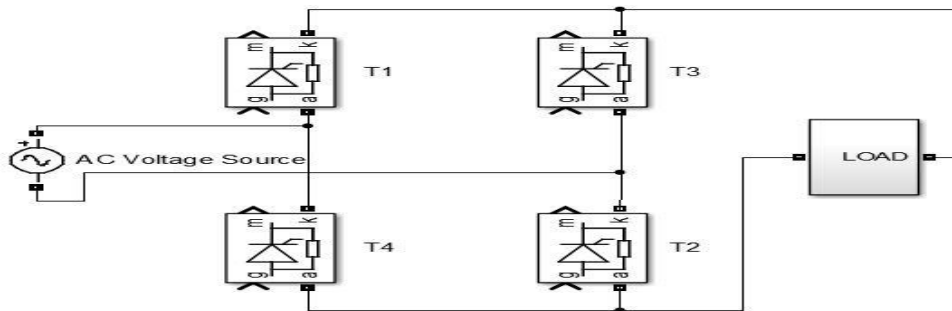


Fig. 1: 1-phase full wave rectifier with R and Motor Load.

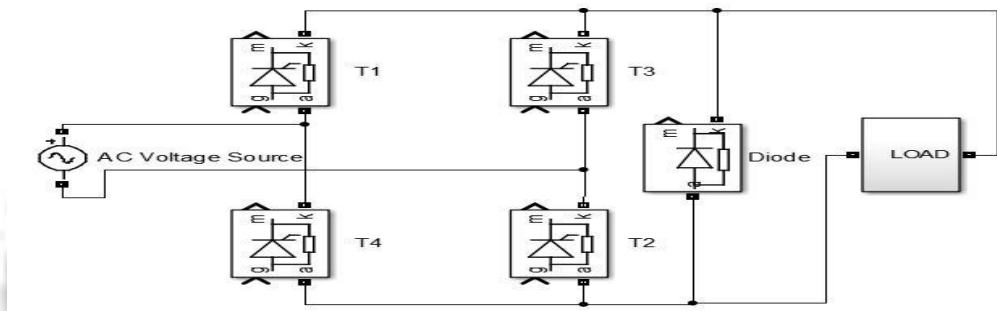


Fig. 2: 1-phase full wave rectifier with motor load and freewheeling diode.

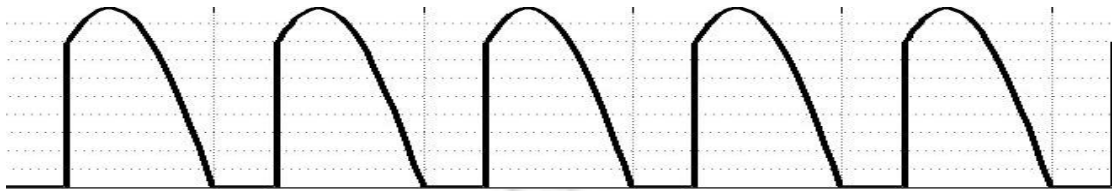
**Note:** Gate pulse will be given by firing circuit unit internally.

### Procedure:

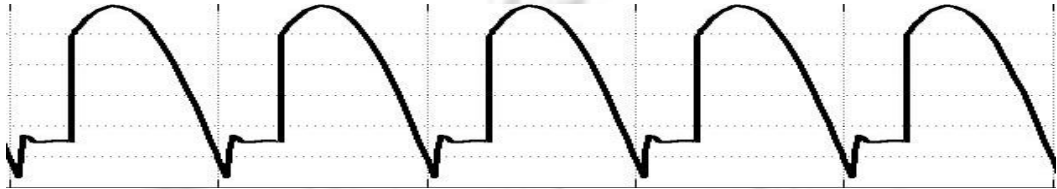
1. Make the connections as per the given circuit diagram.
2. Give the gate pulses from the firing circuit unit to the SCR assembly carefully.
3. Connect the given resistor then motor load and then motor load with freewheeling diode.
4. Connect the DSO probe and multi-meter across the load.
5. Make sure the connections are **OK** and patch cords are **not loose**.
6. Switch on the main supply.
7. Vary the firing angle and take the required readings from the DSO and multi-meter.
8. Calculate the desired result from the observed data.

**Expected Output Voltage Waveforms:**

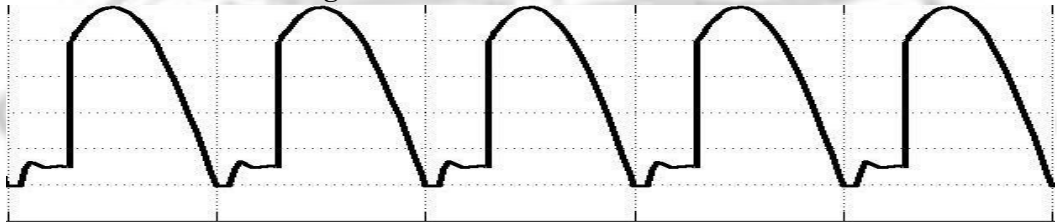
**1. Resistor Load**



**2. Motor Load:**



**3. Motor and Free Wheeling Diode**



**Observation Table:**

$V_{\text{peak}} (V_m) = \quad \quad \quad V$						
Sl No.	Firing Angle ( $\alpha^0$ )	Extinction Angle ( $\beta^0$ )	Conduction Angle ( $\gamma^0$ )	Average Output Voltage ( $V_o$ ) (Volt)		% Error
				$V_o(\text{Meas.})$	$V_o(\text{Cal.})$	
1.						
2.						
3.						
4.						
5.						

**Calculations:**

**For Resistive (Discontinuous) & Motor with FWD (Continuous Conduction Mode):**

$$V_o = \frac{V_m}{\pi} (1 + \cos\alpha)$$

**For Motor (Continuous Conduction Mode):**

$$V_o = \frac{2V_m}{\pi} \cos\alpha$$

**For Motor & Motor with FWD (Discontinuous Mode):**

$$I_o = \frac{V_m}{\pi} (\cos\alpha - \cos\beta) - \frac{E(\pi + \alpha - \beta)}{\pi}$$

$$V_o = I_o R + E$$

\*\*\*\*\*