MODELLING AND SIMULATION OF SINGLE PHASE FULL CONTROLLED BRIDGE RECTIFIER WITH R AND RL LOADS.

EX.NO: **DATE:**

Aim:

To model and simulate the single phase full wave controlled bridge rectifier with R and RL loads by using MATLAB/SIMULINK.

Requirements:
Procedure:

Steps to create modeling by using MATLAB/SIMULINK:

Components	Tool Box / Library browser	Block	parameters
AC Voltage Source	Simpower Systems / Electrical sources	AC voltage source	Peak Amplitude(v) =230*sqrt(2) Phase(deg) =0 Frequency(Hz) =50
Thyristors (T1, T2, T3 &T4)	Simpower Systems / Power Electronics	Thyristor	Default
Repeating Sequence(R1)	Simulink / Sources	Repeating Sequence	Time Values = [0 0.01 0.01 0.02] Output Values = [0 5 0 0]
Repeating Sequence(R2)	Simulink / Sources	Repeating Sequence	Time Values = [0 0.01 0.02 0.02] Output Values = [0 0 5 0]
Relational Operator	Simulink /Math Operations	Relational Operator (2 numbers)	Greater than or equal to (>=)
Constant	Simulink / Sources	Constant	Constant Value=1
Fourier	Simpower Systems/Extra Library/Measurements	Fourier	Fundamental Freq : 50 Harmonic: 0
Load	Simpower Systems / Elements	Series RLC Branch	Resistance(Ohm) =10 Inductance(H) =8e-03 Capacitance(F) =inf

1. Click on **File→ New→Model.**
2. On resulting window click on **library Browser**, a Simulink library browser will appear.
3. Make/Model the circuit by placing all its Blocks from its corresponding Library/toolbox, which is clearly shown in the table 1. Right click on the block to rotate mirror etc. to organize the circuit elements.
4. To get any one of the element in series RLC branch, such as R, L, or C, click on **series RLC branch** block in the **Simpower System/Element** library, and enter the parameters

value in such a way that other two elements are invisible. That is to eliminate resistance, inductance, or capacitance of the branch, the R, L and C values must be set respectively to 0, 0 and inf.

5. To change the circuit parameters applicable to the block by double clicking on the block/element and type the values. Keep the values default for some blocks like thyristor, diodes, mosfet etc.

6. To measure/observe the voltage across or current passes through the electrical block/device, connect **voltage measurement** or **current measurement** blocks respectively with the electrical block, it is available on the library **Simpower System/measurement**.

7. To observe the waveform in figure window, **scope** block is connected with voltage measurement and current measurement blocks. This scope block is available by click on **Library browser→simulink/source→scope**.

8. For **single phase full controlled Bridge rectifier with RL load**, components required and its parameter values are similar to that of RLE load, except E parameter. That is **DC voltage source** block must remove from schematic. The schematic arrangement is shown in **schematic diagram 2**.

9. For **single phase full controlled Bridge rectifier with R load**, components required and its parameter values are similar to that of RLE load, except L and E parameters. That is L must set to 0, and DC voltage source is removed from the schematic. The schematic arrangement is shown in **schematic diagram 1**.

10. Before simulating the circuit, ensure that all the blocks are connected properly. The most common error encountered is 'floating node'. This usually means that there is some problem in interconnects.

Steps to simulating the circuit by using MATLAB/SIMULINK:

1. After correcting all floating node errors start by creating a simulation.

2. Click on **simulation→configuration parameters** and make sure that **solver option** is '**ode23tb**', it is essential when circuit contains **power system** or **power electronics** tools. And the **stop time** value should be 5/50 for 50Hz supply frequency for five cycles. For 'n' number of cycles, stop time would be n*(1/50) for 50Hz supply, where n=1, 2, 3…. and also set **Max Step Size to 1e-5 and Min Step Size to 1e-6**

3. To run the simulation, select **simulation→ start**.

4. If any errors are reported here. Correct schematic or the simulation settings and re-run simulation.

5. To view **simulation plots** on simulation window, double click the scope in the schematic. The scope block corresponding to voltage measurement and current measurement blocks gives voltage and current waveforms respectively with respect to time.

Formulas Used:

Firing Angle $\alpha = \dfrac{V_c}{V_T} * 180$

Where V_c = Value of Constant Block in the Simulation

$V_T = 5$

TABLE 1:   For R Load

Slno	Control Voltage	Firing Angle (α)	Simulated Edc	Calculated Edc
1				
2				
3				
4				
5				

TABLE 2:   For RL Load

| Slno	Control Voltage	Firing Angle (α)	Simulated Edc	Calculated Edc
1				
2				
3				
4				
5				

Result:

The model of single phase full wave controlled bridge rectifier with R, and RL load is created and simulated by using MATLAB/SIMULINK and the corresponding waveforms are observed.

SCHEMATIC DIAGRAM: 1

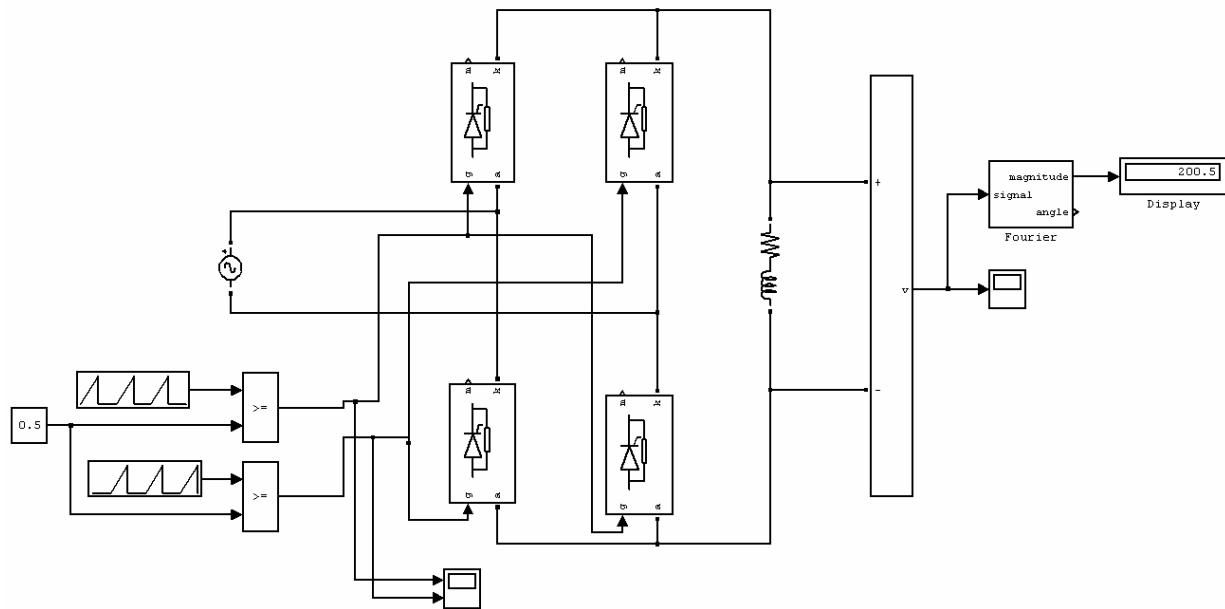### SINGLE PHASE HALF CONTROLLED BRIDGE RECTIFIER WITH R LOAD
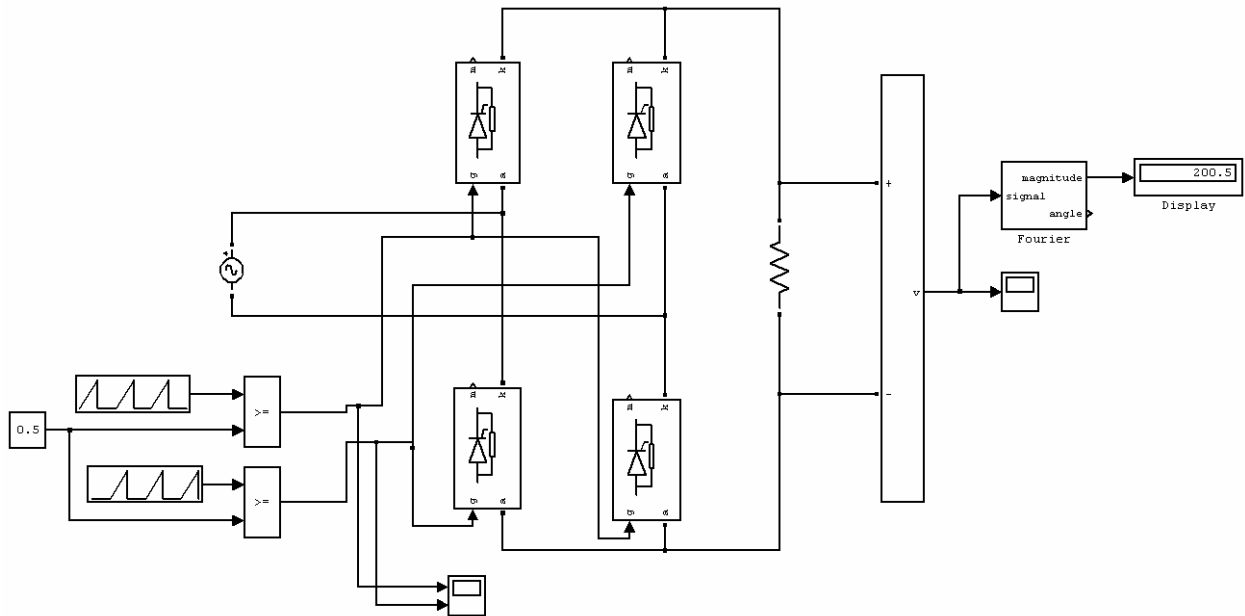
WAVEFORMS FOR R-LAOD: (R =10)
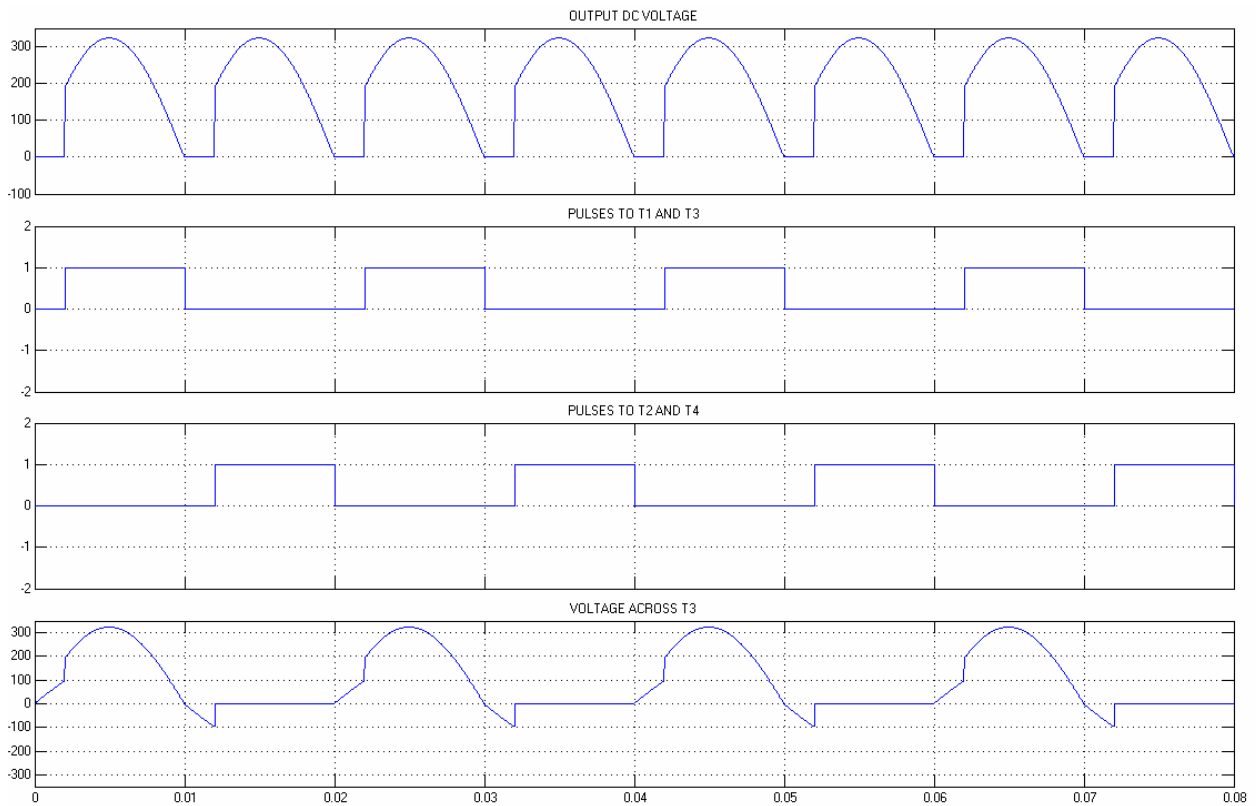
SCHEMATIC DIAGRAM: 2

SINGLE PHASE HALF CONTROLLED BRIDGE RECTIFIER WITH RL LOAD

WAVEFORMS FOR CONTINUOUS MODE FOR RL LOAD: (L=8mh, R=10)