MODELLING AND SIMULATION OF SINGLE PHASE SEMI CONTROLLED BRIDGE RECTIFIER FED SEPERATELY EXCITED DC MOTOR.

EX.NO: **DATE:**

Aim:

To model and simulate the single phase semi controlled bridge rectifier fed separately excited DC motor 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,)	Simpower Systems / Power Electronics	Thyristor (2 numbers)	Default
Diodes (D1, D2,)	Simpower Systems / Power Electronics	Diodes (2 numbers)	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 (2 numbers)	Constant Value=1 (For Control Voltage) Constant Value = 200 (For Torque)
Fourier	Simpower Systems/Extra Library/Measurements	Fourier	Fundamental Freq : 50 Harmonic: 0
DC Motor	Simpower Systems / Machines	DC Machine	Default
Discrete Mean Value	Simpower Systems / Extra Library / Discrete Measurements	Discrete Mean Value	Fundamental Frequency = 50 (Remaining Parameters Default)

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 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.

5. 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**.

6. 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**.

7. Make the connections as per the **schematic diagram 1.**

8. Set the control voltage V_c (Constant block in simulink diagram) (Range with in $0 – 5$)

9. Vary the torque of the DC machine (Constant block in simulink diagram) and run the simulation for 5 secs.

10. After 5 secs note the speed of the DC machine and record it in the table 1.

11. Repeat steps 9 and 10 for some 8 values of load torque.

12. Repeat the above steps for various values of V_c.

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.

TABLE 1: For Average Load Voltage of V_{dc}=_____.

Slno	Control Voltage	Firing Angle (α)	Speed in RPM	Torque in Nm
1				
2				
3				
4				
5				
6				
7				
8				

TABLE 2: For Average Load Voltage of V_{dc}=_____.

Slno	Control Voltage	Firing Angle (α)	Speed in RPM	Torque in Nm
1				
2				
3				
4				
5				
6				
7				
8				

TABLE 3: For Average Load Voltage of V_{dc}=_____.

Slno	Control Voltage	Firing Angle (α)	Speed in RPM	Torque in Nm
1				
2				
3				
4				
5				
6				
7				
8				

TABLE 4:   For Load Torque of 45 Nm.

Slno	Control Voltage	Firing Angle (α)	Speed in RPM	Average Load Voltage
1				
2				
3				
4				
5				
6				
7				
8				

TABLE 5:   For Load Torque of 50 Nm.

Slno	Control Voltage	Firing Angle (α)	Speed in RPM	Average Load Voltage
1				
2				
3				
4				
5				
6				
7				
8				

TABLE 6:   For Load Torque of 55 Nm.

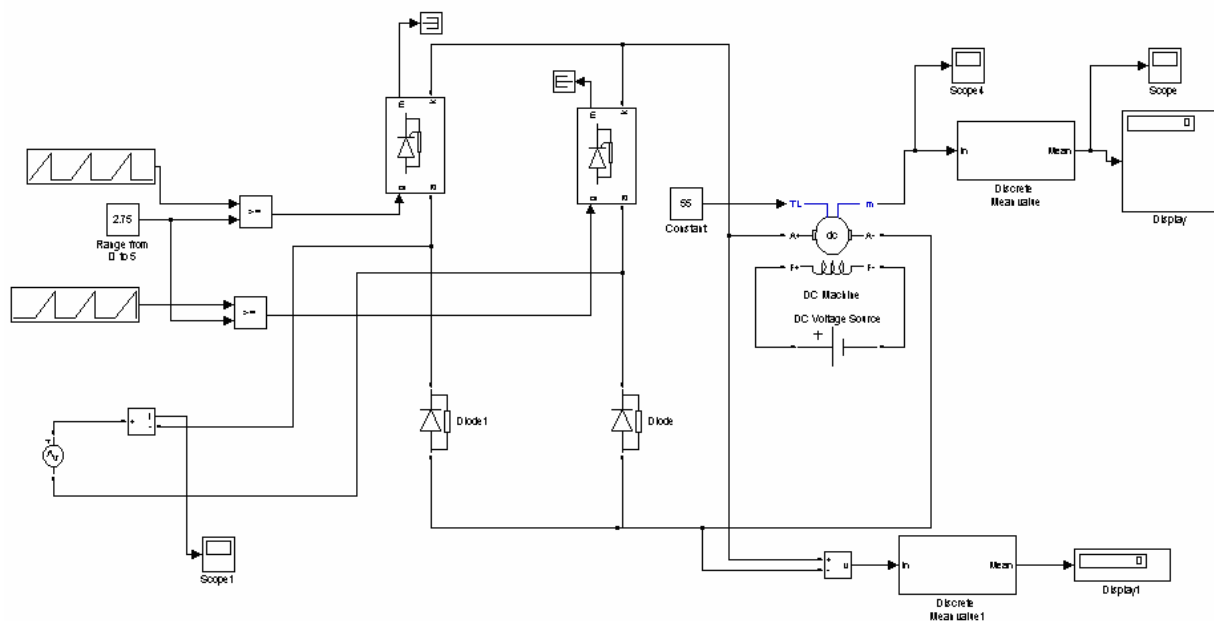| Slno	Control Voltage	Firing Angle (α)	Speed in RPM	Average Load Voltage
1				
2				
3				
4				
5				
6				
7				
8				

Result:

The model of single phase semi controlled bridge rectifier fed with separately excited DC motor is created and simulated by using MATLAB/SIMULINK and the corresponding waveforms are observed.

Model Graph
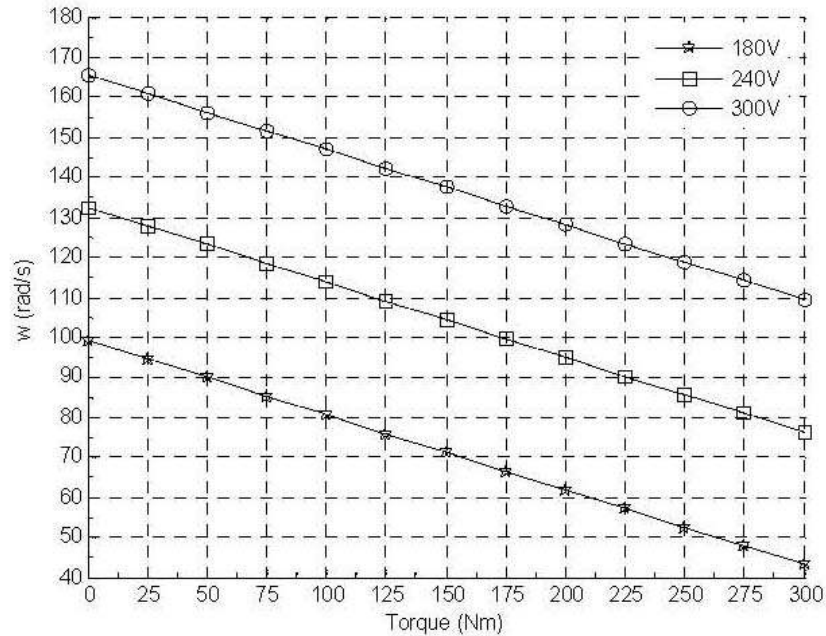
SCHEMATIC DIAGRAM: 1

SINGLE PHASE FULL CONTROLLED BRIDGE RECTIFIER FED WITH DC SEPERATELY EXCITED MOTOR

WAVEFORMS FOR MOTOR-LAOD:(Va = 205 Volts)