AVIT
AARUPADAI VEEDU INSTITUTE OF TECHNOLOGY

VINAYAKA MISSION'S RESEARCH FOUNDATION
(Deemed to be University under section 3 of the UGC Act 1956)

DEPARTMENT OF
ELECTRICAL AND ELECTRONICS ENGINEERING

M .E – POWER SYSTEM ENGINEERING

POWER ELECTRONICS FOR POWER SYSTEMS
LABORATORY MANUAL

SEMESTER - I

REGULATION – 2021

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PREFACE

This Laboratory manual for Power Electronics for Power Systems Lab has been revised and updated in order to meet the Curriculum changes, laboratory equipment upgrading and the latest circuit simulation.

Every effort has been made to correct all the known errors, but nobody is perfect, if you find any additional errors or anything else you think is an error, Please feel free to inform the HOD / EEE at eeedept@avit.ac.in

The Authors thanked all the staff members from the department for their valuable Suggestions and contributions.

The Authors
Department of EEE

LIST OF EXPERIMENTS:

1. Single Phase Semi-converter with R-L and R-L-E loads for continuous and discontinuous conduction modes
2. Single Phase Full- Converter With R-L And R-L-E Loads for Continuous and Discontinuous Conduction Modes
3. Three phase full-converter with R-L-E load
4. MOSFET, IGBT based Choppers
5. IGBT based Single phase inverters
6. Single phase AC voltage controller
7. Modeling of PV system
8. Modeling of Wind Energy conversion System
9. Modeling of HVDC
10. Modeling of reactive power control

INDEX

Expt No: 1 Date:	SINGLE PHASE HALF CONTROLLED CONVERTER WITH R AND RL LOAD

AIM:

To simulate the single phase half controlled converter by using MATLAB Simulink

SOFTWARE REQUIRED:

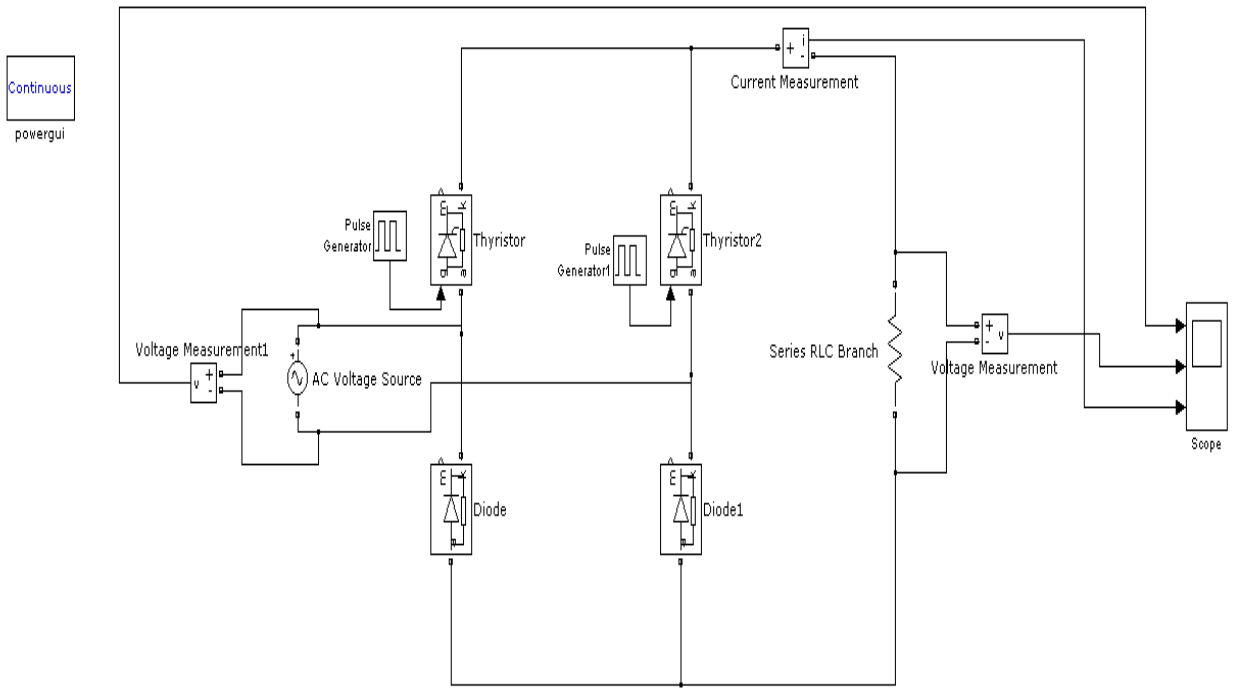
1. Sim power system
2. MATALAB version 7.0

THEORY:

The single phase semi converters or single phase half controlled converters employing two SCRs and two diodes. Both of these semi converters have two legs. The single phase semi converter offers one-quadrant operation. At ωt=0 to ωt=α load current Io free wheel T2 D1.After ωt=0,T1 gets forward bias through T2.At a firing angle α,T1 turned on. Load current shift to T2 to T1.Thyristor T2 turned off. At ωt=α T2 is subjected to reverse voltage Vm Sin α. At ωt=(Π + α),forward bias T2 is turned on.T1 is therefore turned off.

SIMULINK MODEL:

SINGLE PHASE HALF CONTROLLED CONVERTER – RL LOAD:



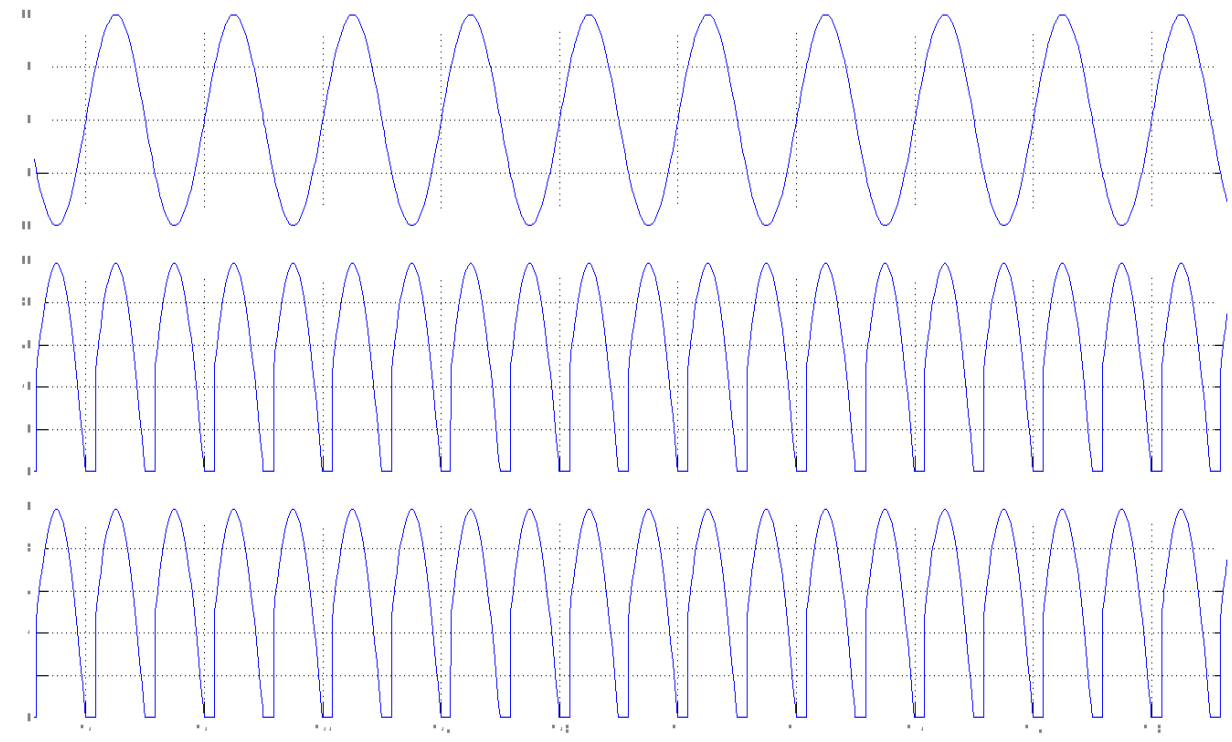
PROCEDURE:

R-Load:

1. A model is created by using the component available in the simulink browser
2. Go to the voltage measurements block & set the magnitude as 100 V and frequency as 50 Hz
3. Next go to the thyristor gate of pulse generator block and set the firing angle as 30°, 90°, 130°.
4. Then go to the resistive load block and enter the value as R=5Ω (or)10 Ω
5. Verify all the model parameters values & re enter for the various firing angle for the required rating of the parameter block.
6. Then run the program by clicking the arrow in the top box (Or) Go to the simulink parameter and click the start.
7. Double click the scope to see the out put waveform.
8. Then output is printed for result analysis.

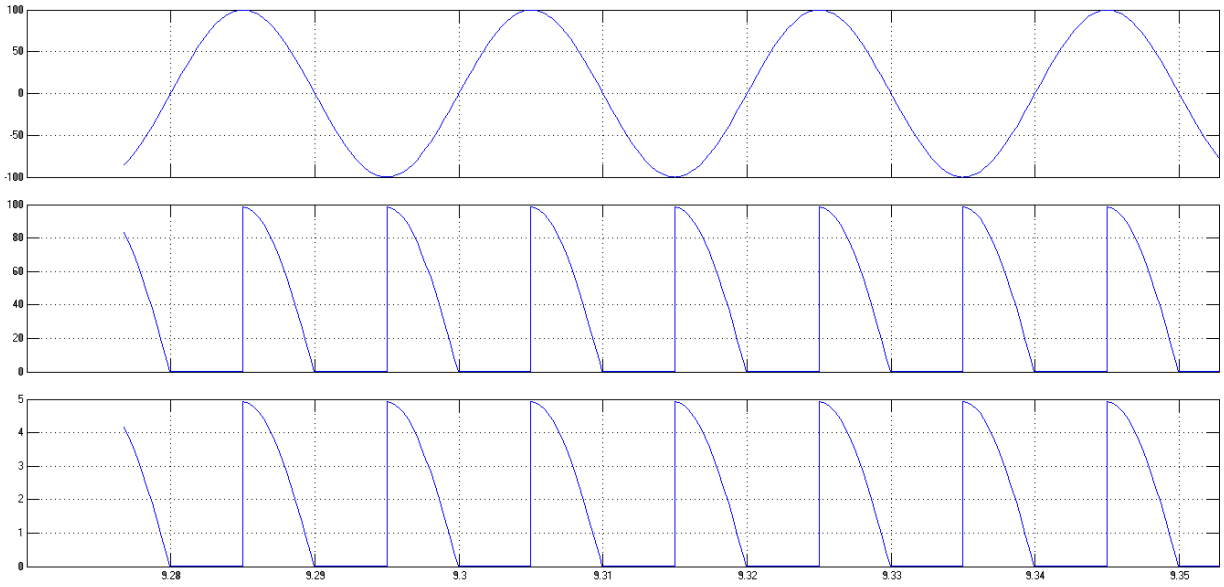
R-LOAD: R = 10Ω

OUT PUT WAVE FORM FOR 0°



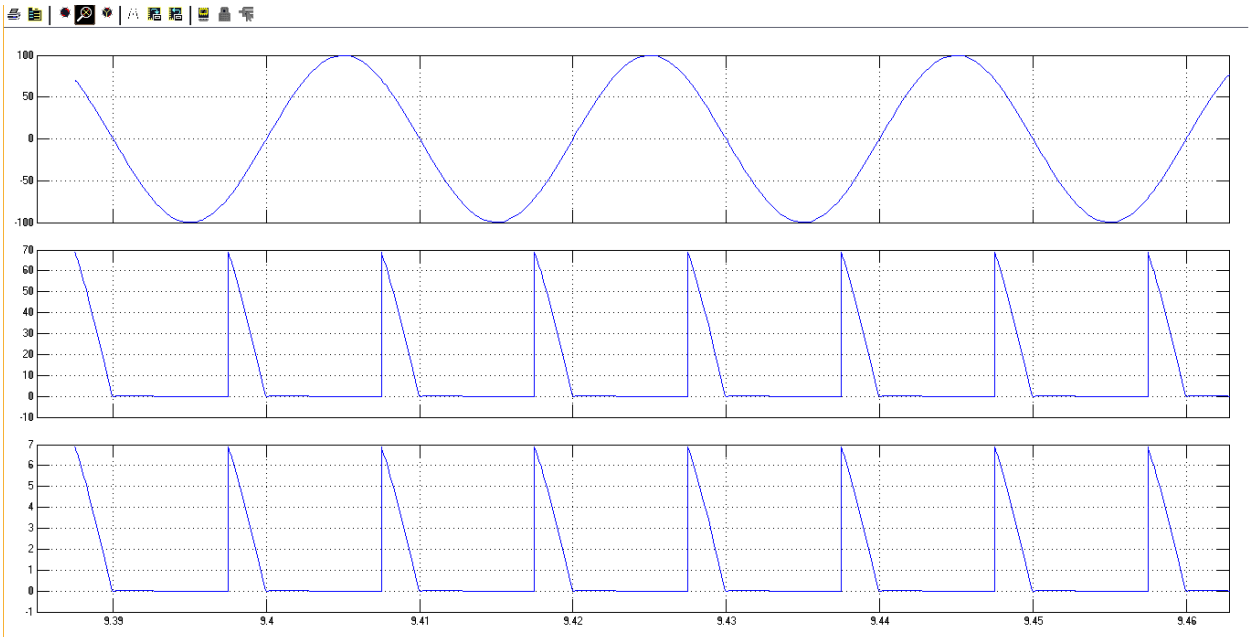
R-LOAD: R = 10Ω

OUTPUT WAVEFOR FOR 90°



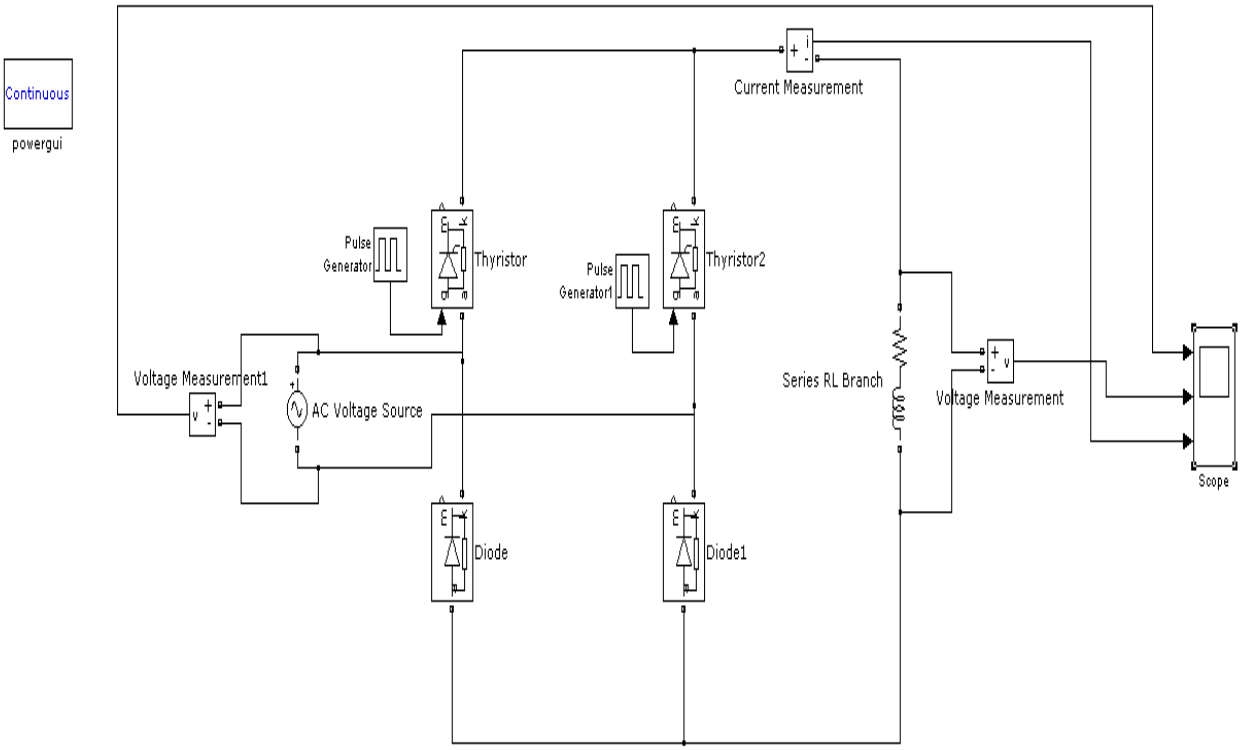
R-LOAD: R = 10Ω

OUT PUT WAVE FORM FOR 135°



SIMULINK MODEL:

SINGLE PHASE HALF CONTROLLED CONVERTER – RL LOAD:



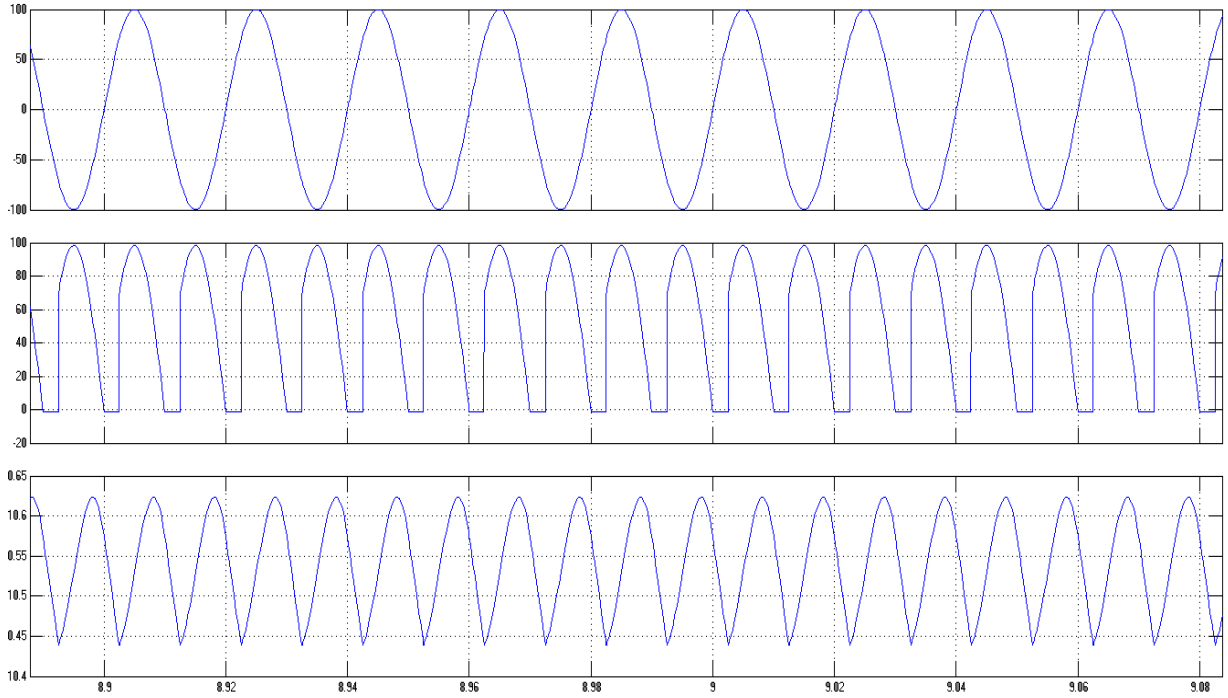
PROCEDURE:

RL-Load:

1. A model is created by using the component available in the simulink browser
2. Go to the voltage measurements block & set the magnitude as 100 V and frequency as 50 Hz
3. Next go to the thyristor gate of pulse generator block and set the firing angle as 30°, 90°, 130°.
4. Then go to the resistive load block and enter the value as R=5Ω (or)10 Ω,1mH,1H
5. Verify all the model parameters values & re enter for the various firing angle for the required rating of the parameter block.
6. Then run the program by clicking the arrow in the top box (Or) Go to the simulink parameter and click the start.
7. Double click the scope to see the out put waveform.
8. Then output is printed for result analysis

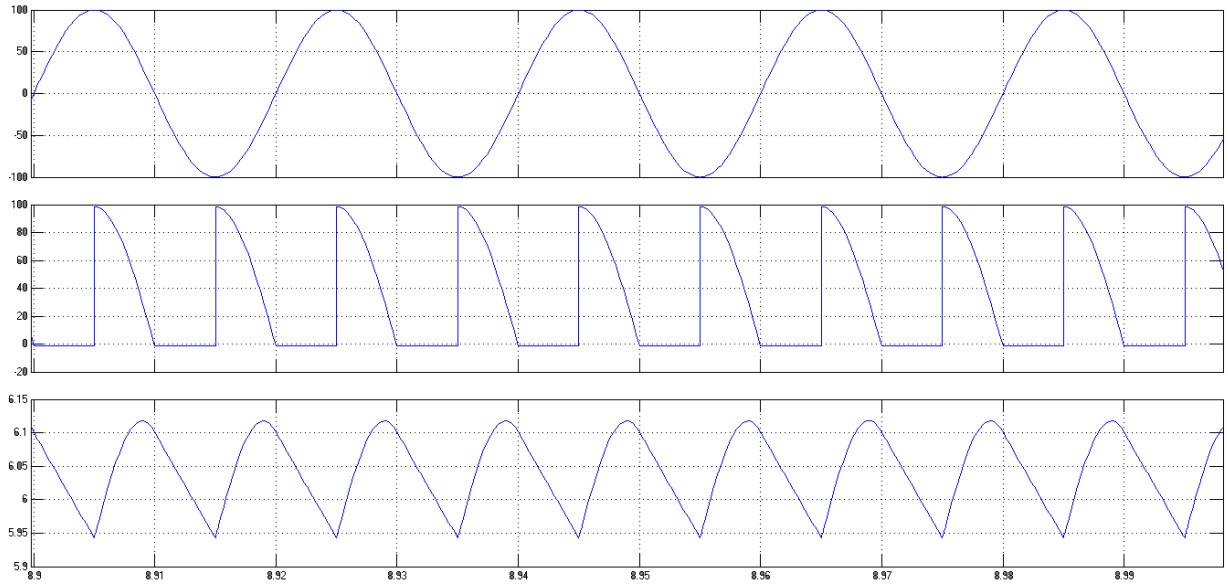
RL LOAD: R = 5Ω ; L = 1H

OUT PUT WAVE FOR FOR 0 °



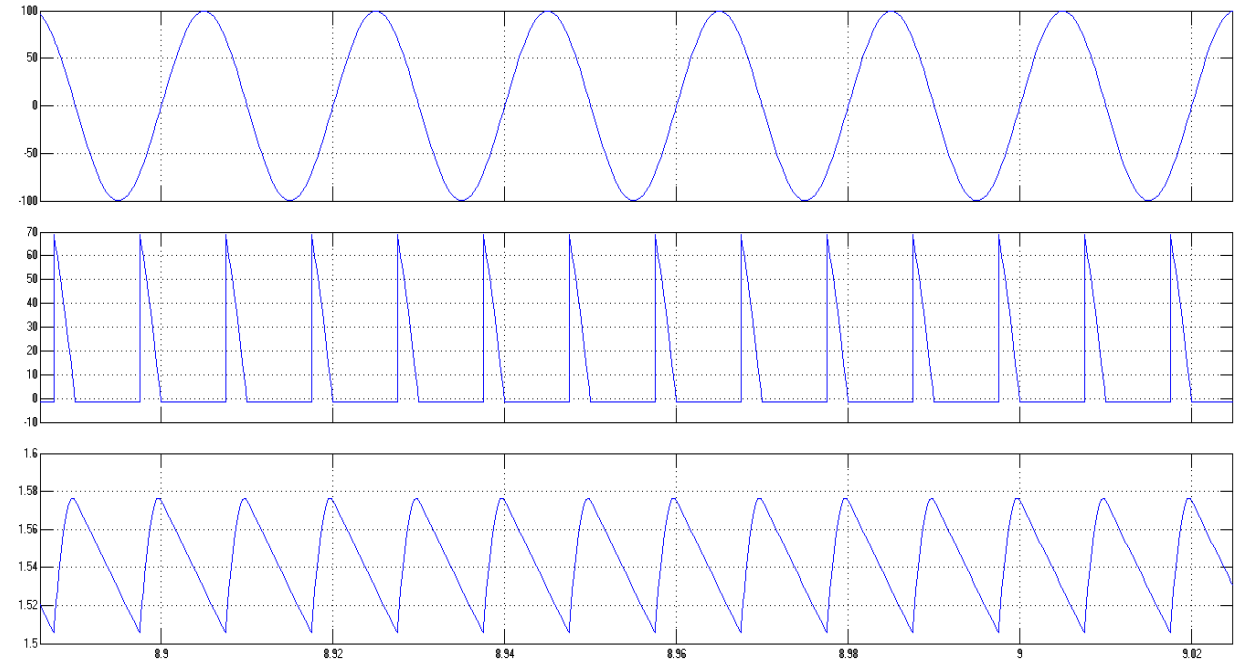
RL LOAD: R = 5Ω ; L = 1H

RL LOAD:
OUTPUT WAVE FORM FOR 90°



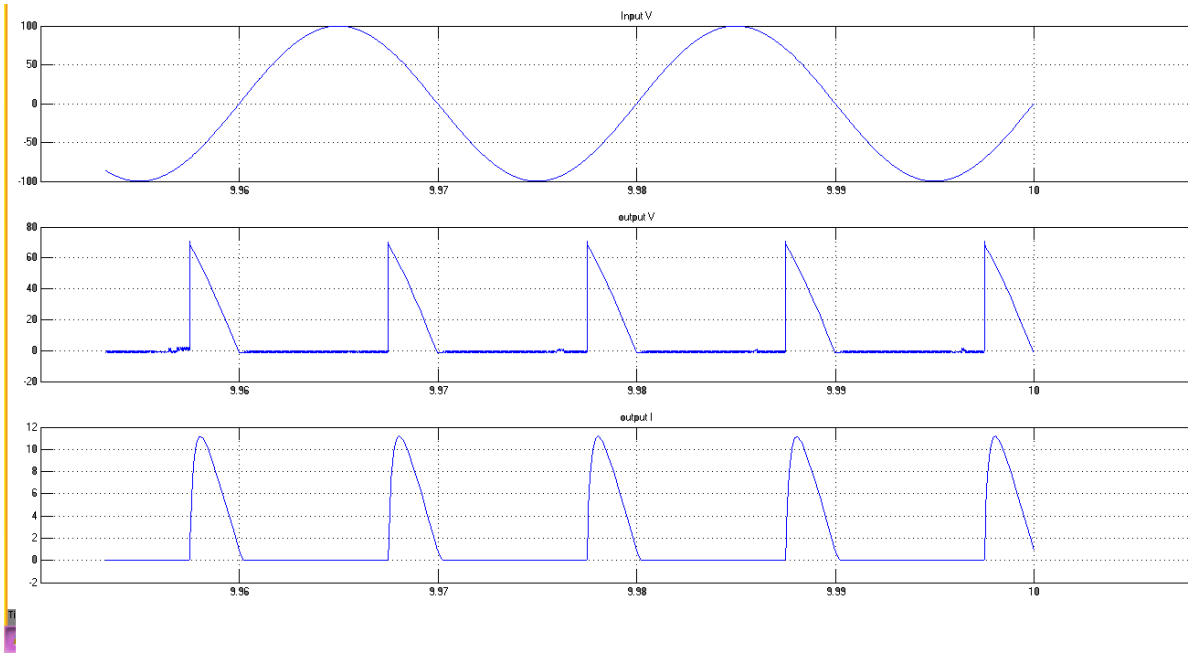
RL LOAD: R = 5Ω ; L = 1H

RL LOAD:
OUTPUT WAVEFORM FOR 135°



RL LOAD: R = 5Ω ; L = 1mH

RL LOAD:
OUTPUT WAVEFORM FOR 135°



RESULT:

Thus the single phase half controlled converter model is created and simulated by using MATLAB simulink and the following

1. output voltage Vo (vs.)time ,
2. output current Io (vs.) time

was obtained.

Expt No: 2 Date:	SINGLE PHASE FULLY CONTROLLED CONVERTER WITH R AND RL LOAD

AIM:

To simulate the single phase Fully controlled converter by using MATLAB Simulink

SOFTWARE REQUIRED:

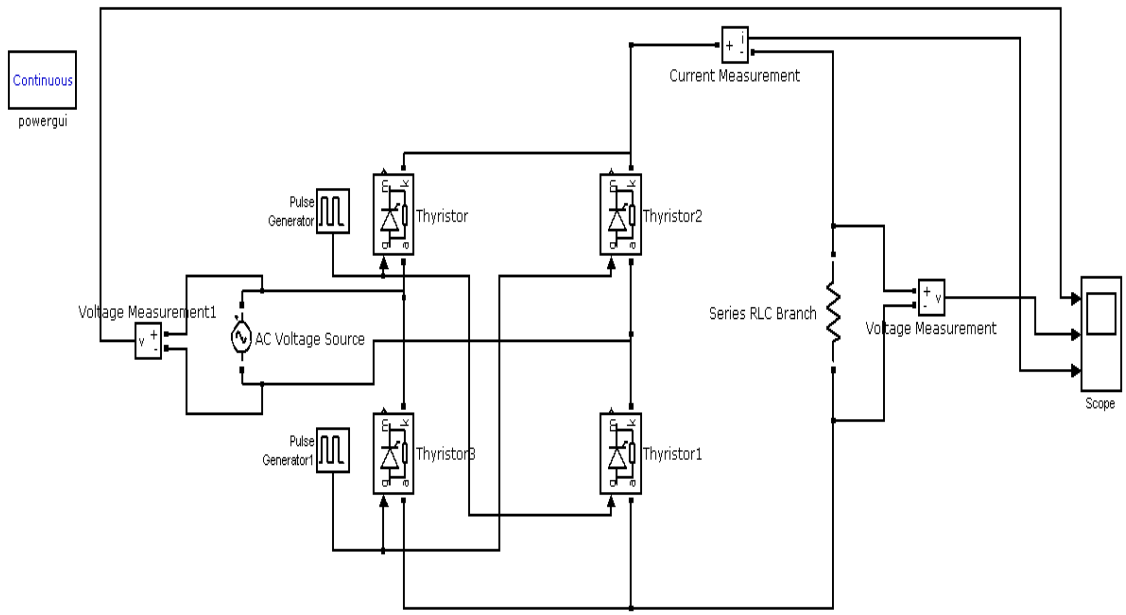
1. Sim power system
2. MATALAB version 7.0

THEORY:

A single phase full converter bridge using four SCRs .The load is assumed to be R or RL load. The thyristor pair. T1, T2 is simultaneously triggered and Π radians later, T3, T4 are gated together. When a is positive with respect to b, supply voltage waveform is Vab. When b is positive with respect to a, supply voltage waveform is Vba=-Vab. . At ωt=0 to ωt=α load current Io free wheels. After ωt= α, T1T2 gets forward bias. Load current io flowing flowing through T3, T4 is transferred to T1, T2 at ωt= α, .Thyristor T3 T4 turned off. As a result supply voltage Vm Sin α immediately appears across a thyristor T3 T4 as a reverse bias therefore turned off by natural or line commutation

SIMULINK MODEL:

SINGLE PHASE FULLY CONTROLLED CONVERTER – R LOAD:



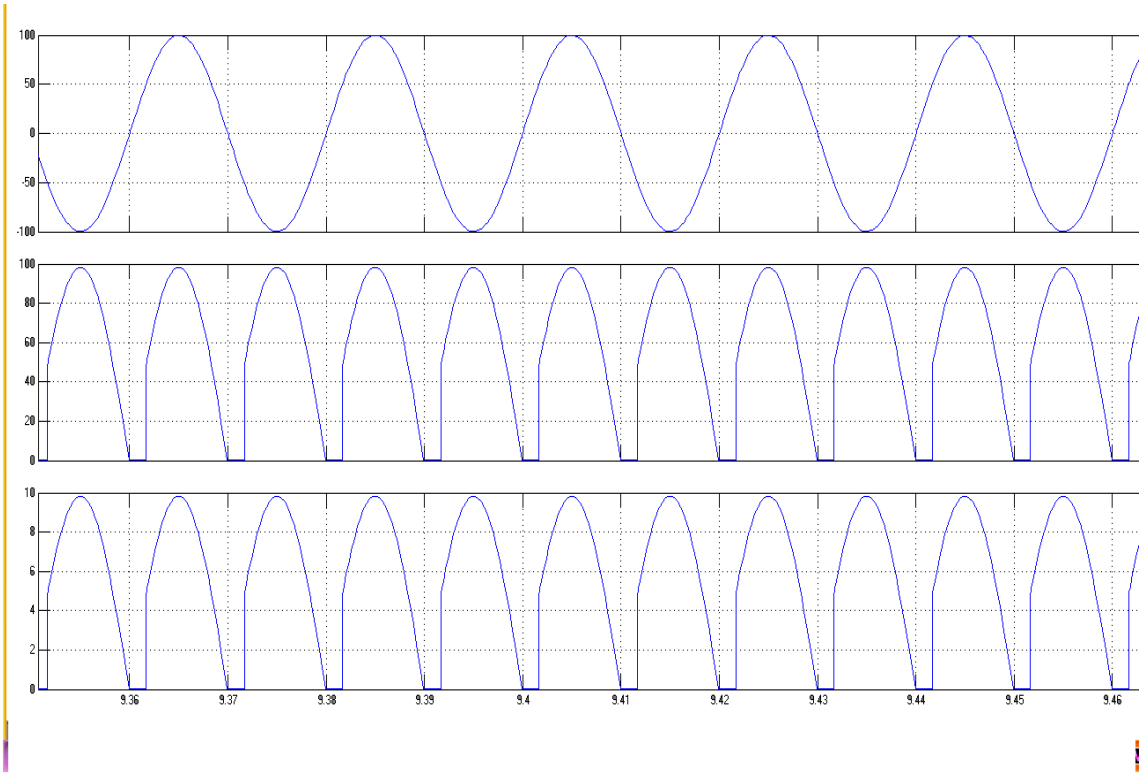
PROCEDURE:

R-Load:

1. A model is created by using the component available in the simulink browser
2. Go to the voltage measurements block & set the magnitude as 100 V and frequency as 50 Hz
3. Next go to the thyristor gate of pulse generator block and set the firing angle as 30°, 90°, 130°.
4. Then go to the resistive load block and enter the value as R=5Ω (or)10 Ω
5. Verify all the model parameters values & re enter for the various firing angle for the required rating of the parameter block.
6. Then run the program by clicking the arrow in the top box (Or) Go to the simulink parameter and click the start.
7. Double click the scope to see the out put waveform.
8. Then output is printed for result analysis.

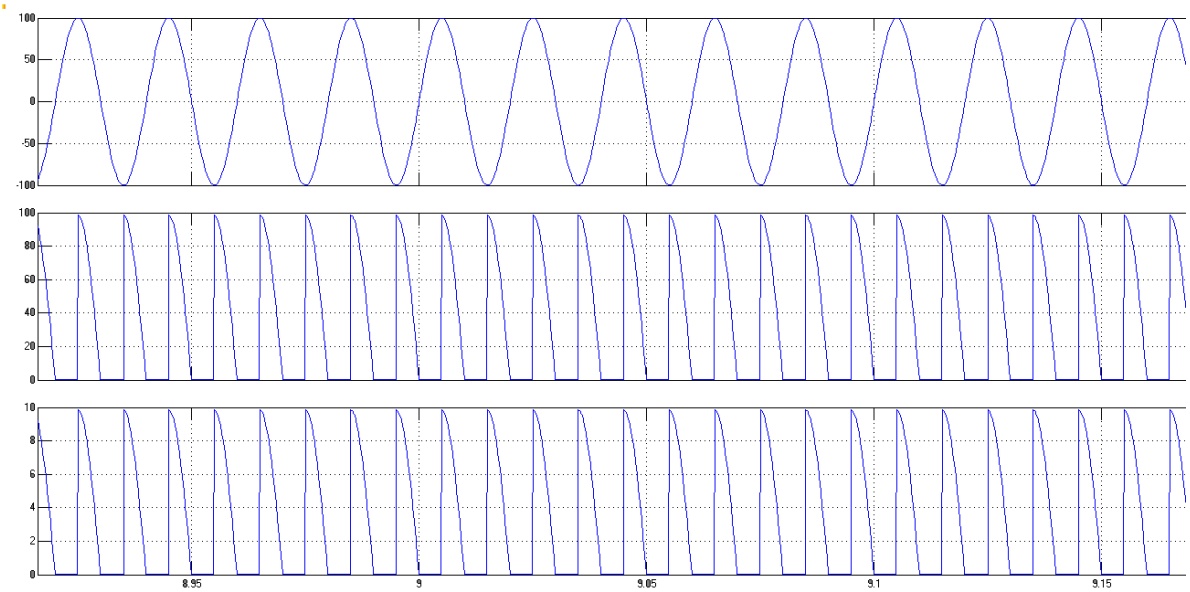
R-LOAD: R = 10Ω

OUT PUT WAVE FORM FOR 0°



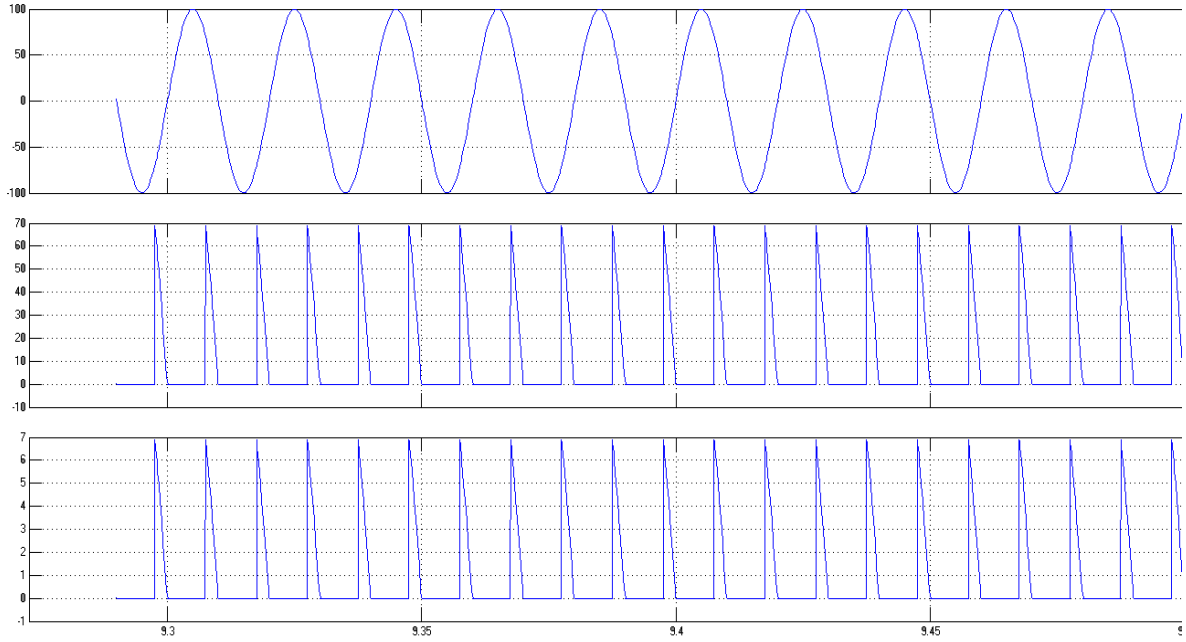
R-LOAD: R = 10Ω

OUTPUT WAVEFOR FOR 90°



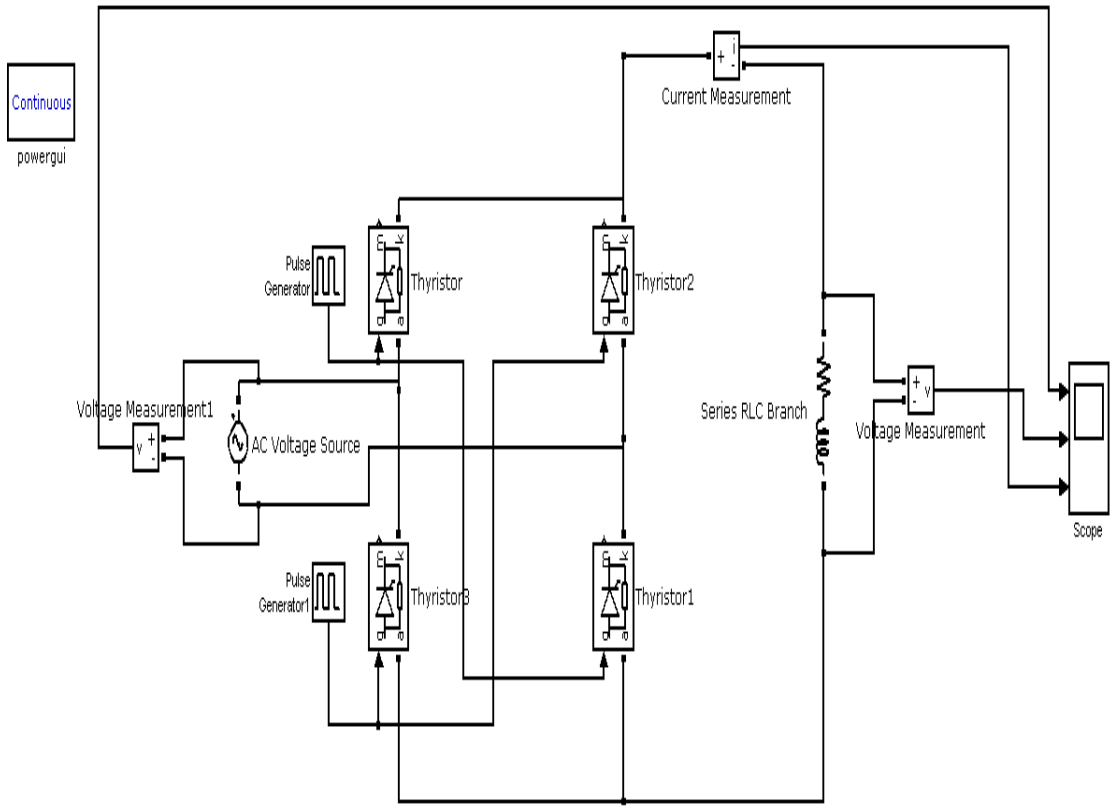
R-LOAD: R = 10Ω

OUT PUT WAVE FORM FOR 135°



SIMULINK MODEL:

SINGLE PHASE FULLY CONTROLLED CONVERTER – RL LOAD:

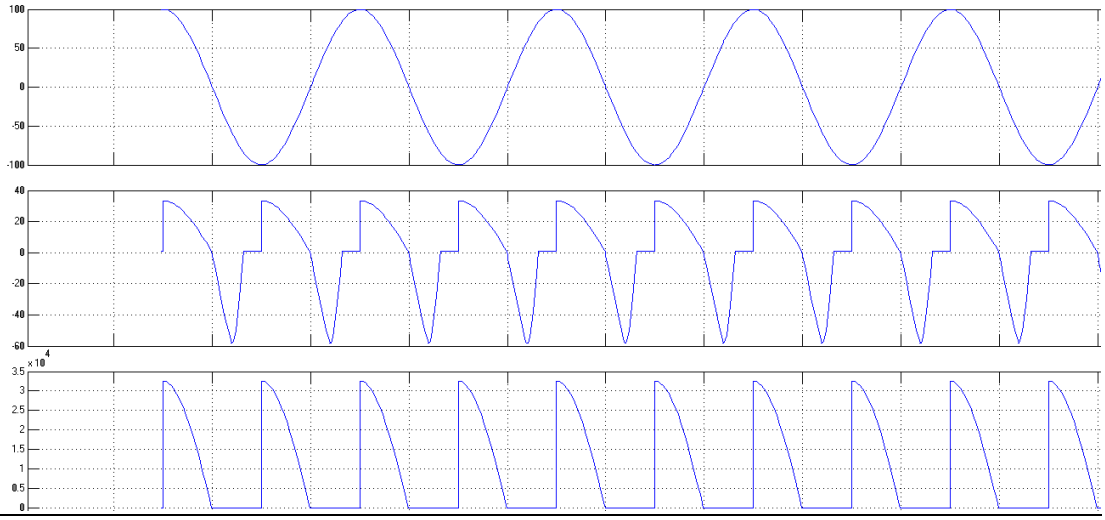


PROCEDURE:
RL-Load:

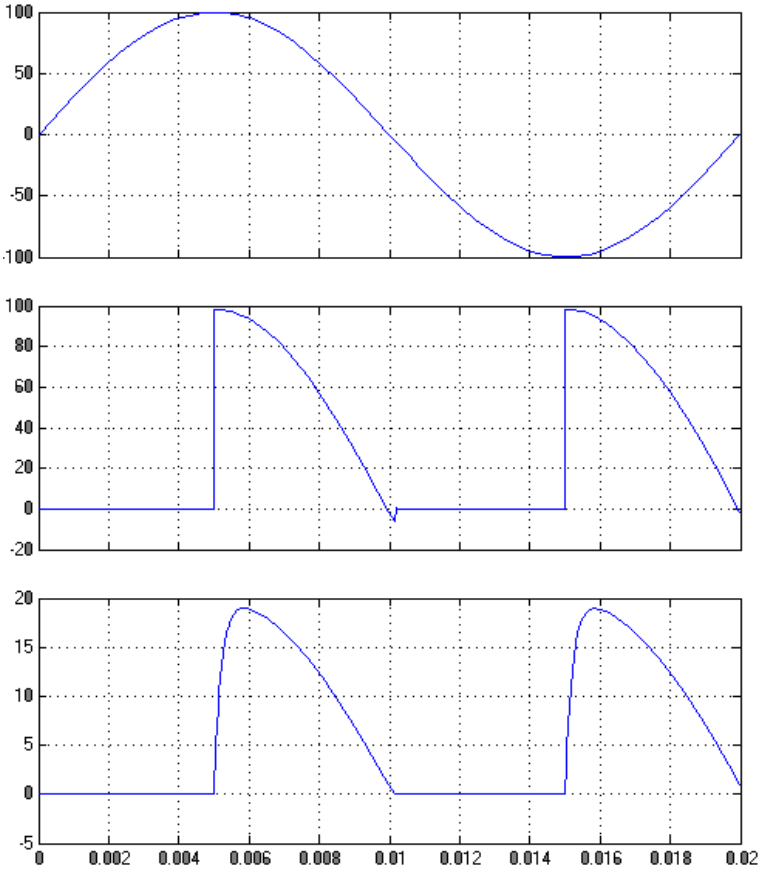
1. A model is created by using the component available in the simulink browser
2. Go to the voltage measurements block & set the magnitude as 100 V and frequency as 50 Hz
3. Next go to the thyristor gate of pulse generator block and set the firing angle as 30°, 90°, 130°.
4. Then go to the resistive load block and enter the value as R=5Ω (or)10 Ω,1mH,1H
5. Verify all the model parameters values & re enter for the various firing angle for the required rating of the parameter block.
6. Then run the program by clicking the arrow in the top box (Or) Go to the simulink parameter and click the start.
7. Double click the scope to see the out put waveform.
8. Then output is printed for result analysis

RL LOAD: R = 5Ω ; L = 1mH

OUT PUT WAVE FOR FOR 45 °

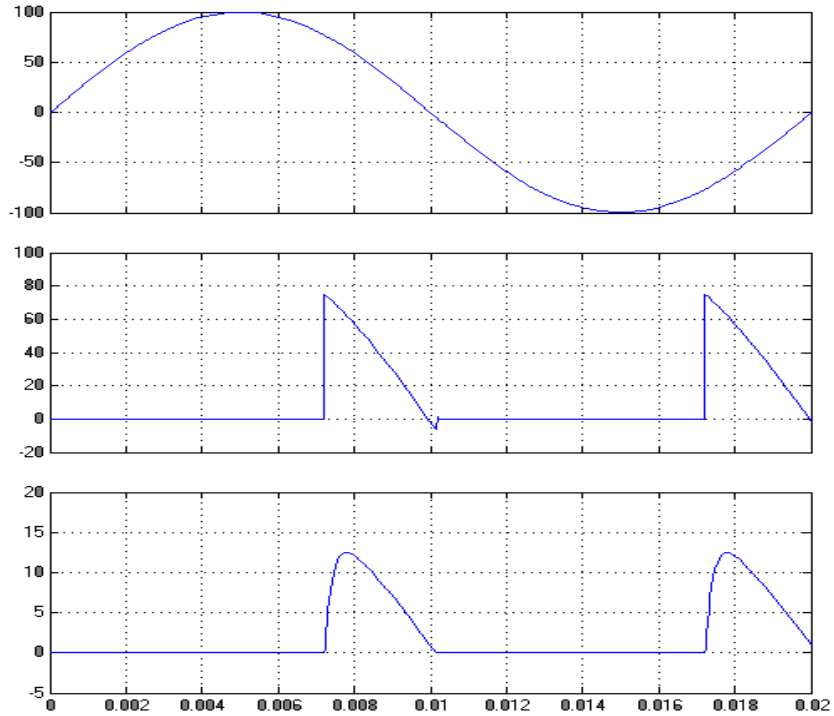


RL LOAD: R = 5Ω ; L = 1mH
RL LOAD:
OUTPUT WAVE FORM FOR 90°



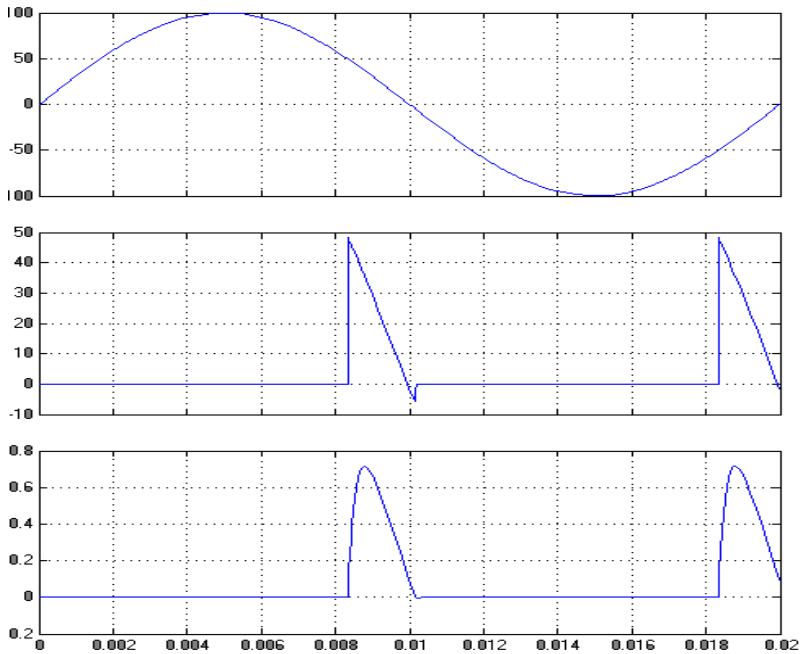
RL LOAD: R = 5Ω ; L = 1mH

RL LOAD:
OUTPUT WAVEFORM FOR 135°



RL LOAD: R = 50Ω; L = 0.01 H

RL LOAD:
OUTPUT WAVEFORM FOR 150°



RESULT:

Thus the single phase fully controlled converter model is created and simulated by using MATLAB simulink and the following

1. output voltage Vo (vs.)time ,
2. output current Io (vs.) time

was obtained.

Expt No: 3 Date:	THREE PHASE HALF CONTROLLED CONVERTER WITH R AND RL LOAD

AIM:

To simulate the three phase half controlled converter by using MATLAB Simulink

SOFTWARE REQUIRED:

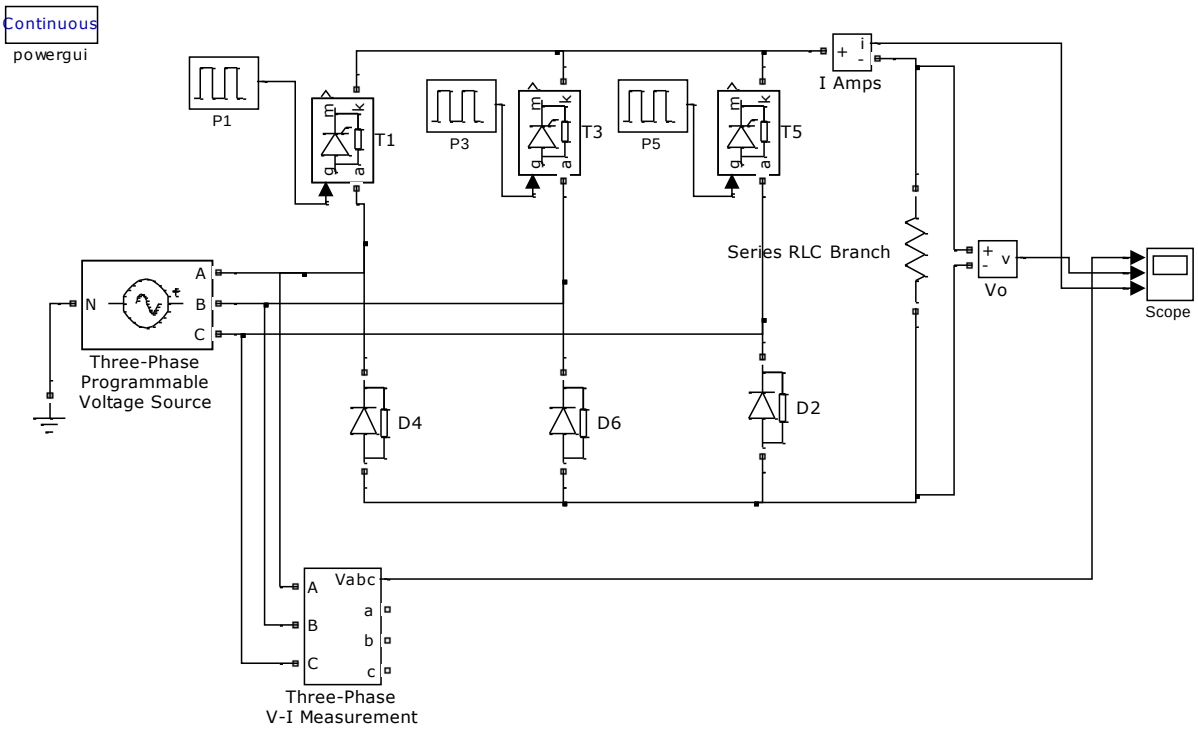
1. Sim power system
2. MATALAB version 7.0

THEORY:

The Three phase converter is also called as 3 phases 3 pulse converters or 3 phase M-3 converter. The load is assumed to be R or RL load. The Three phase converter employing three SCRs and three diodes. At α =0 SCRs T1 triggered at ωt=30° to ωt=150°. T2 from ωt=150° to ωt=270°, and T3 from ωt=270° to ωt=390° so on. For zero degree firing angle ,thyristor behave as a diode and the voltage output waveform Vo is shown in diagram.

SIMULINK MODEL:

THREEPHASE HALF CONTROLLED CONVERTER – R LOAD:



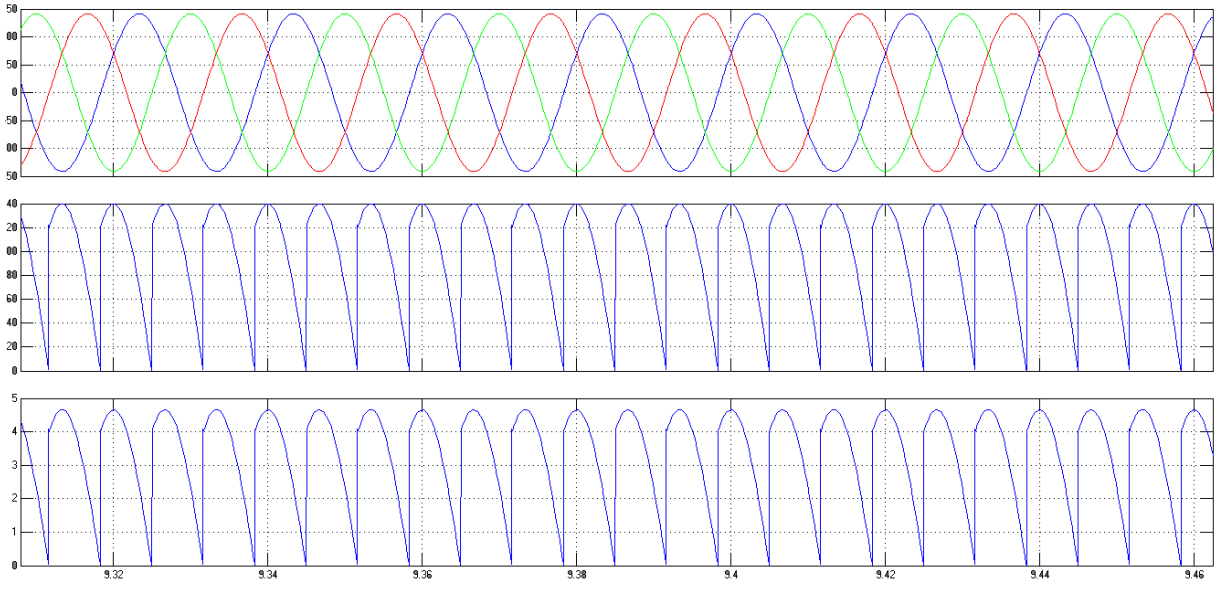
PROCEDURE:

R-Load:

1. A model is created by using the component available in the simulink browser
2. Go to the voltage measurements block & set the magnitude as 100 V and frequency as 50 Hz
3. Next go to the thyristor gate of pulse generator block and set the firing angle as 30°, 90°, 130°.
4. Then go to the resistive load block and enter the value as R=5Ω (or)10 Ω
5. Verify all the model parameters values & re enter for the various firing angle for the required rating of the parameter block.
6. Then run the program by clicking the arrow in the top box (Or) Go to the simulink parameter and click the start.
7. Double click the scope to see the out put waveform.
8. Then output is printed for result analysis.

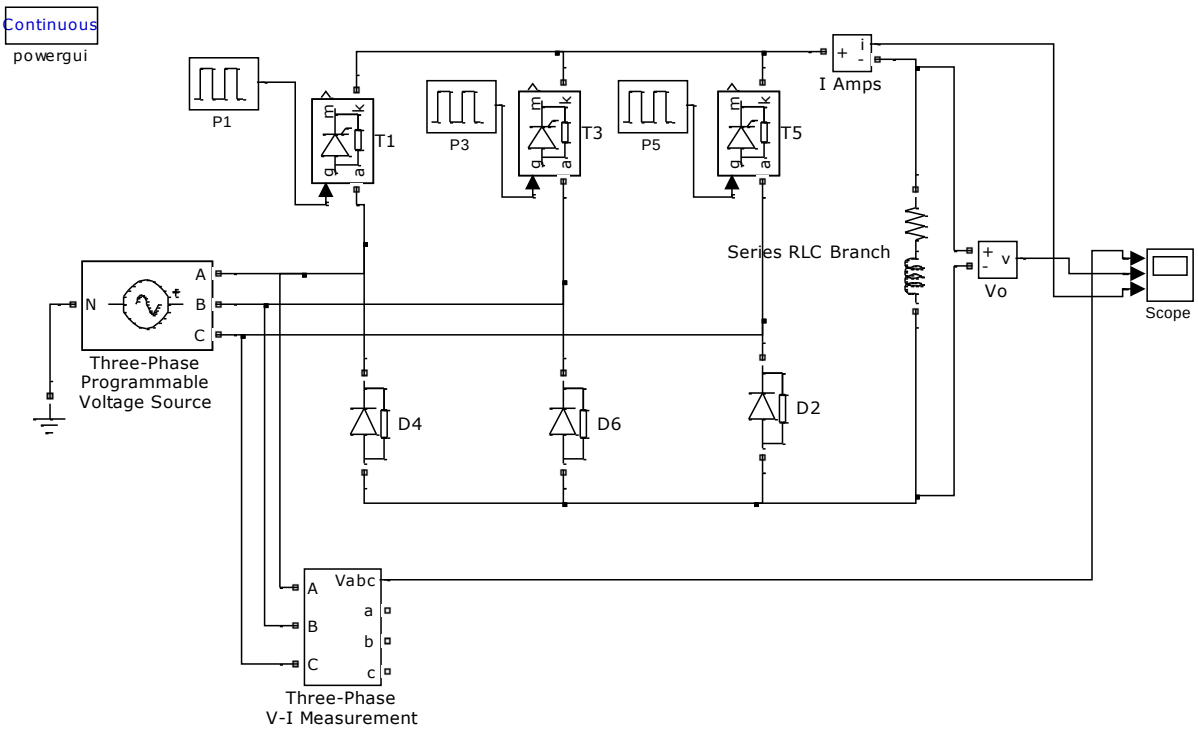
R-LOAD: R = 10Ω

OUT PUT WAVE FORM FOR 0°



SIMULINK MODEL:

THREE PHASE HALF CONTROLLED CONVERTER – RL LOAD:



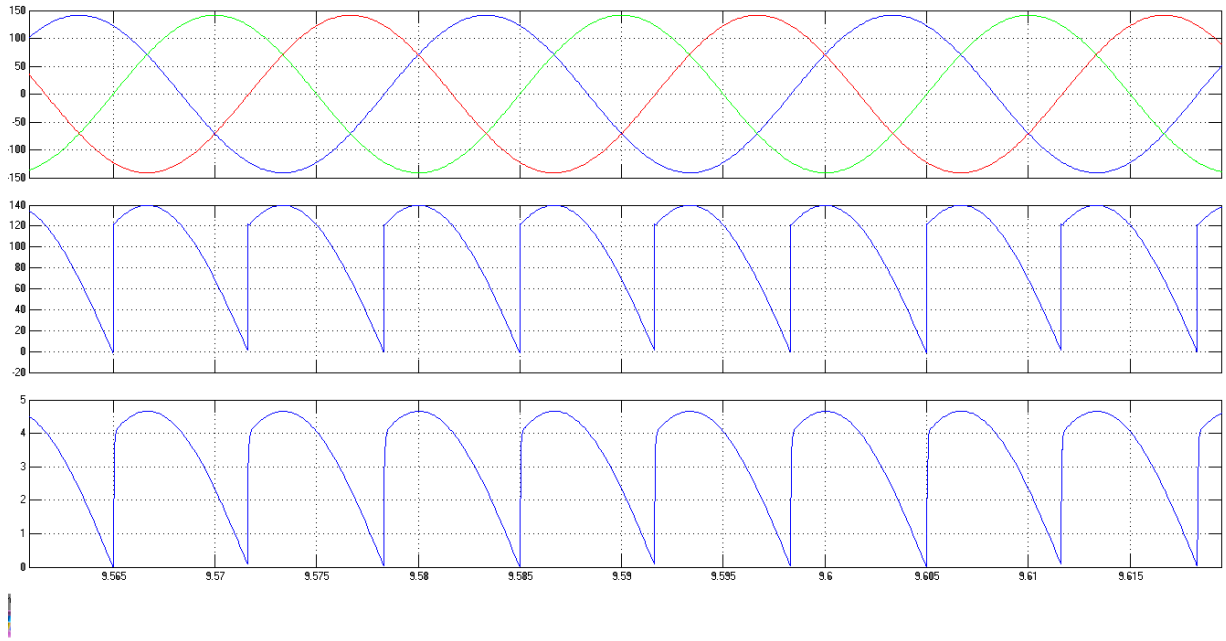
PROCEDURE:

RL-Load:

1. A model is created by using the component available in the simulink browser
2. Go to the voltage measurements block & set the magnitude as 100 V and frequency as 50 Hz
3. Next go to the thyristor gate of pulse generator block and set the firing angle as 30°, 90°, 130°.
4. Then go to the resistive load block and enter the value as R=5Ω (or)10 Ω,1mH,1H
5. Verify all the model parameters values & re enter for the various firing angle for the required rating of the parameter block.
6. Then run the program by clicking the arrow in the top box (Or) Go to the simulink parameter and click the start.
7. Double click the scope to see the out put waveform.
8. Then output is printed for result analysis

RL LOAD: R = 5Ω ; L = 1H

OUT PUT WAVE FOR FOR 60 °



RESULT:

Thus the single phase half controlled converter model is created and simulated by using MATLAB simulink and the following

1. output voltage Vo (vs.)time ,
2. output current Io (vs.) time

was obtained.

Expt No: 4 Date:	THREE PHASE FULLY CONTROLLED CONVERTER WITH R AND RL LOAD

AIM:

To simulate the three phase fully controlled converter by using MATLAB Simulink

SOFTWARE REQUIRED:

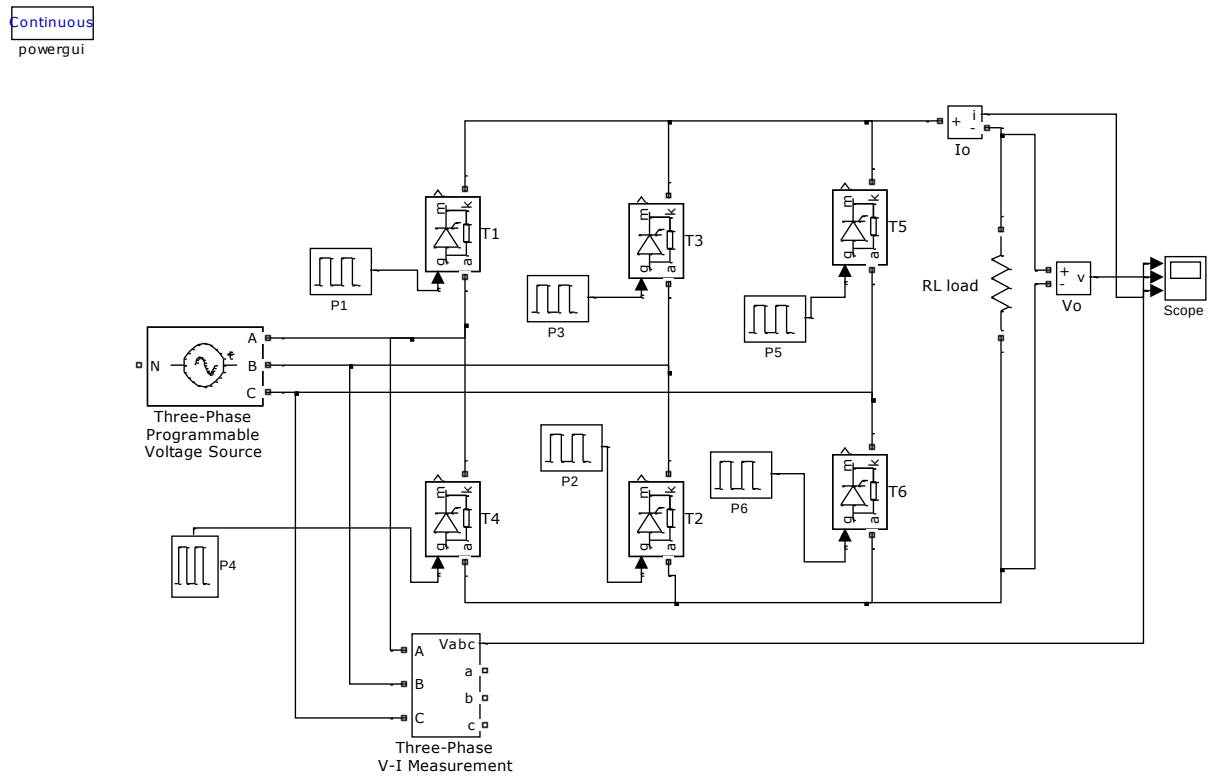
1. Sim power system
2. MATALAB version 7.0

THEORY:

The Three phase converter is work as a three phase ac to dc converter for firing angle delay 0°< α < 90°.and three phase line commutated inverter for 90°< α <180°. The load is assumed to be R or RL load. The Three phase converter employing six SCRs the numbering of SCRs is 1.3.5 as positive group and 4, 6, 2 as negative group. For α = 0° all thyristor act as diode.Note that α=0° T1 triggered at 30° T2 at 90° T3 at 150° .For zero degree firing angle ,thyristor behave as a diode and the voltage output waveform Vo is shown in diagram.

SIMULINK MODEL:

THREE PHASE FULLY CONTROLLED CONVERTER – R LOAD:



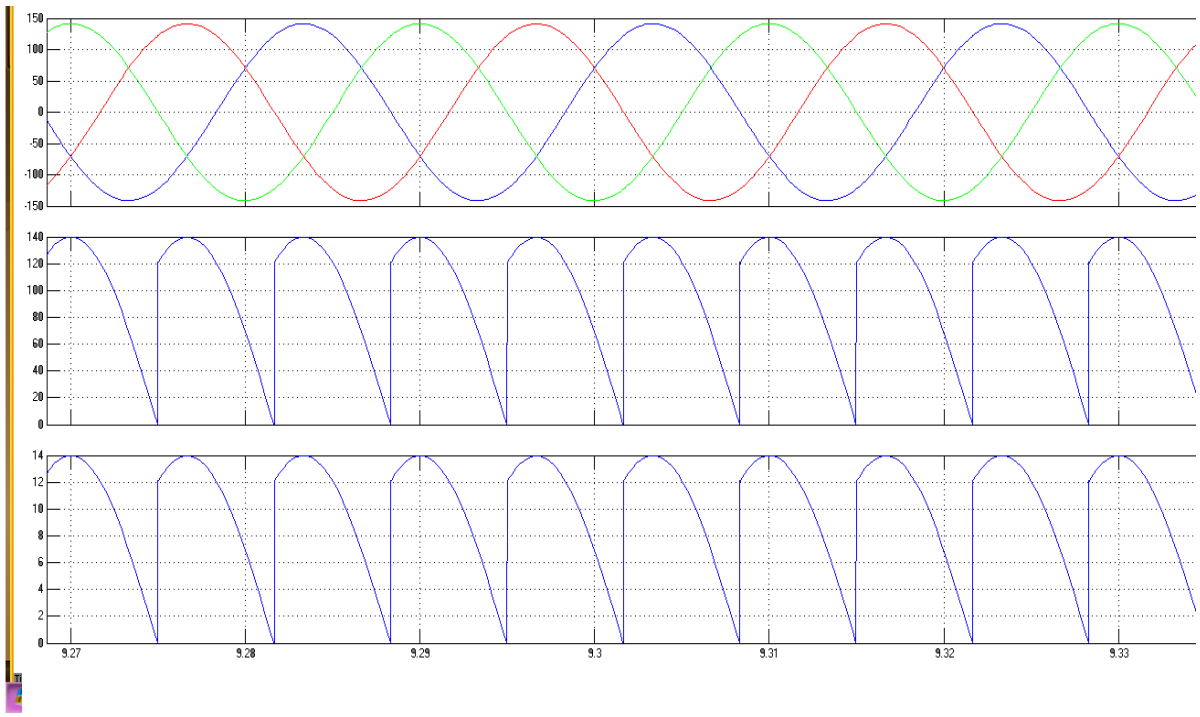
PROCEDURE:

R-Load:

1. A model is created by using the component available in the simulink browser
2. Go to the voltage measurements block & set the magnitude as 100 V and frequency as 50 Hz
3. Next go to the thyristor gate of pulse generator block and set the firing angle as 30°, 90°, 130°.
4. Then go to the resistive load block and enter the value as R=5Ω (or)10 Ω
5. Verify all the model parameters values & re enter for the various firing angle for the required rating of the parameter block.
6. Then run the program by clicking the arrow in the top box (Or) Go to the simulink parameter and click the start.
7. Double click the scope to see the out put waveform.
8. Then output is printed for result analysis.

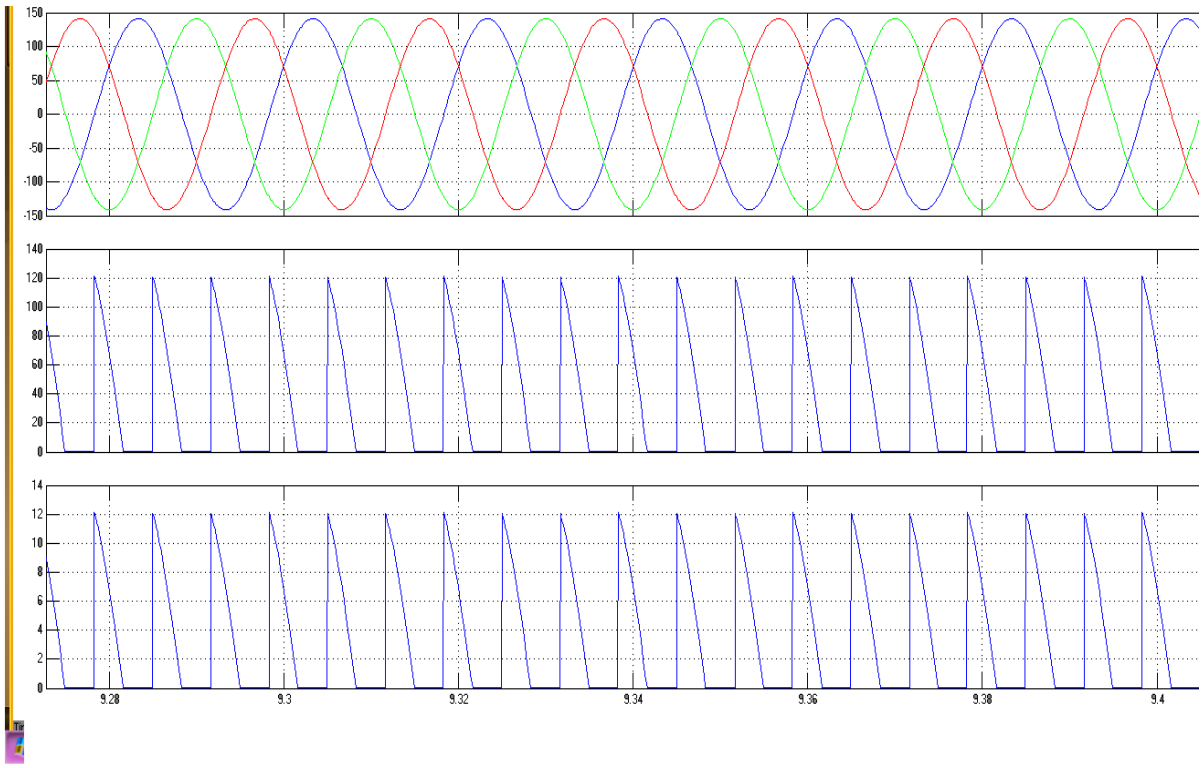
R-LOAD: R = 10Ω

OUT PUT WAVE FORM FOR 0°



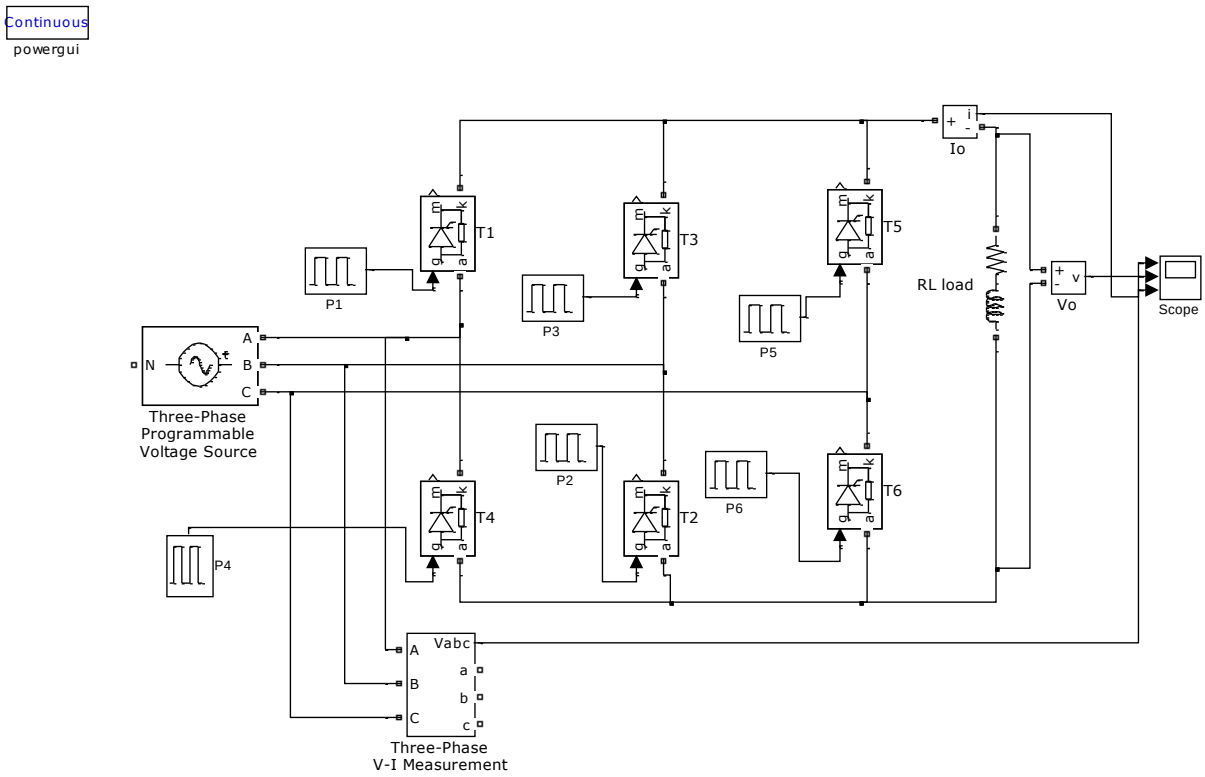
R-LOAD: R = 10Ω

OUTPUT WAVEFOR FOR 60°



SIMULINK MODEL:

THREE PHASE FULLY CONTROLLED CONVERTER – RL LOAD:

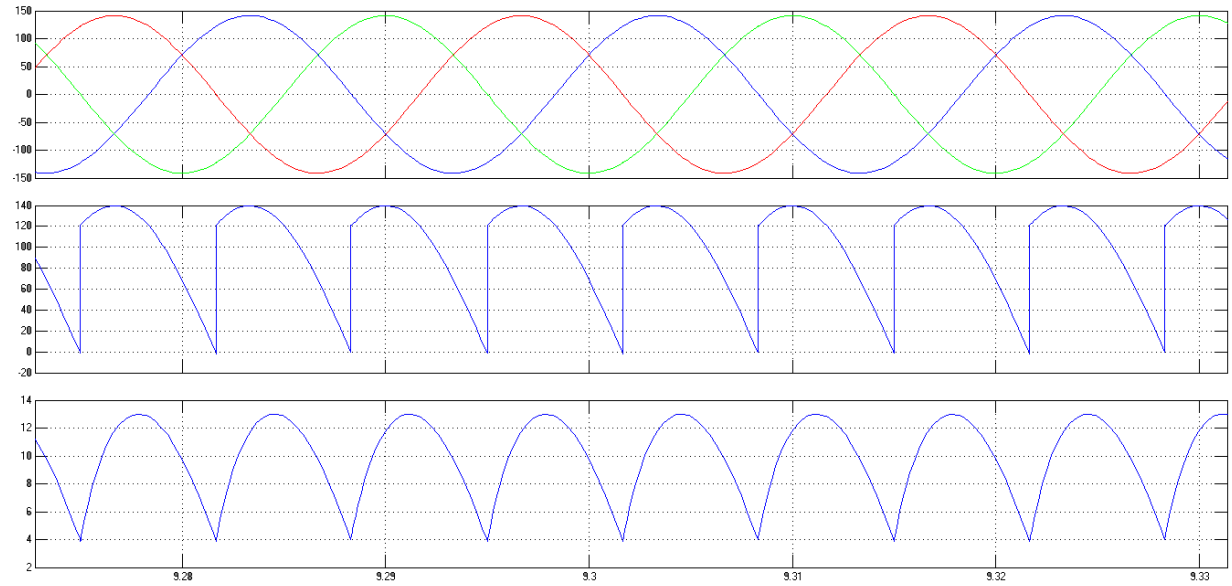


PROCEDURE:
RL-Load:

1. A model is created by using the component available in the simulink browser
2. Go to the voltage measurements block & set the magnitude as 100 V and frequency as 50 Hz
3. Next go to the thyristor gate of pulse generator block and set the firing angle as 30°, 90°, 130°.
4. Then go to the resistive load block and enter the value as R=5Ω (or)10 Ω,1mH,1H
5. Verify all the model parameters values & re enter for the various firing angle for the required rating of the parameter block.
6. Then run the program by clicking the arrow in the top box (Or) Go to the simulink parameter and click the start.
7. Double click the scope to see the out put waveform.
8. Then output is printed for result analysis

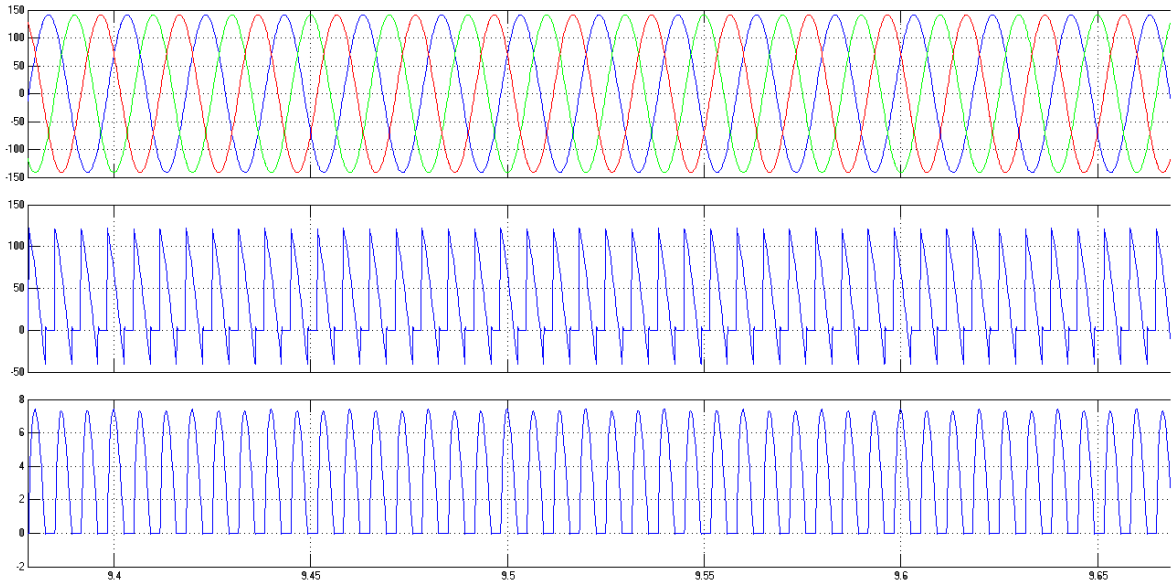
RL LOAD: R = 5Ω ; L = 1mH

OUT PUT WAVE FOR FOR 45 °



RL LOAD: R = 5Ω ; L = 1mH

OUTPUT WAVE FORM FOR 60°



RESULT:

Thus the three phase fully controlled converter model is created and simulated by using MATLAB simulink and the following

1. output voltage Vo (vs.)time ,
2. output current Io (vs.) time

was obtained.

Expt No: 5 Date:	CLASS A, CLASS B CHOPPER WITH R,RE, RLE LOAD

AIM:

To simulate the CLASS A, B CHOPPER withR.RE. RLE LOAD by using MATLAB Simulink

SOFTWARE REQUIRED:

1. Sim power system
2. MATALAB version 7.0

THEORY:

CLASS A CHOPPER:

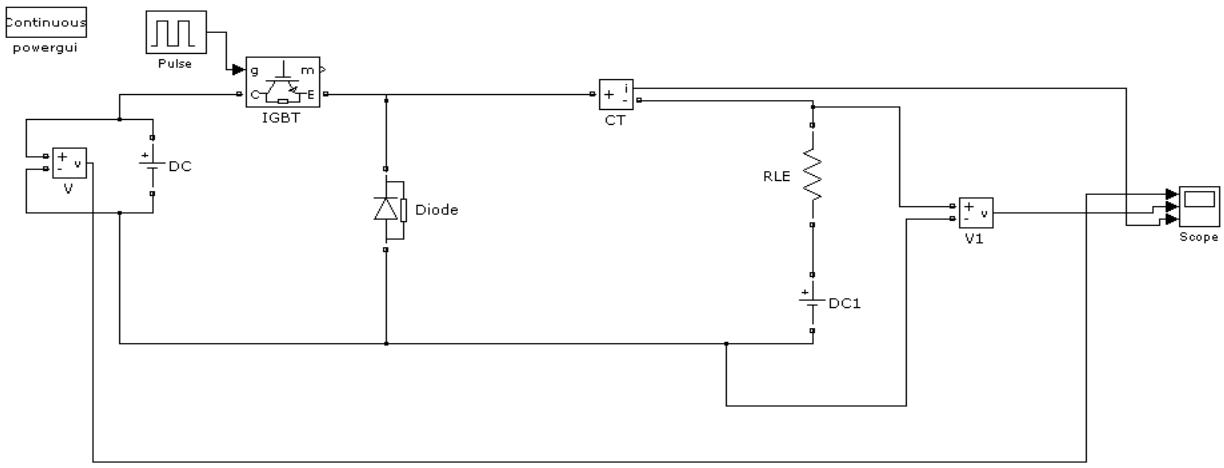
The type A chopper is also called as first quadrant chopper. When chopper is on Vo=Vs and current io flows in the arrow direction. When CH1 is off Vo=0 but io in the load continuous flowing in the same direction through freewheeling diode. Thus the both the load voltage and current are in positive This chopper is also called as step down chopper as Vo is always less than input DC voltage.

CLASS B CHOPPER:

The type B chopper is also called as second quadrant chopper. When chopper is on Vo=0 and load voltage E drives through L and CH2.L stores energy during Ton of CH2,Vo=(E+L di/dt) exceed the sources voltage Vs.Ch2 is on or off io flows out of the load So, io is a negative power flow from load to sources. Thus the load voltage are in positive and current is negative. This chopper is also called as step up chopper as Vo is always greater than input DC voltage.

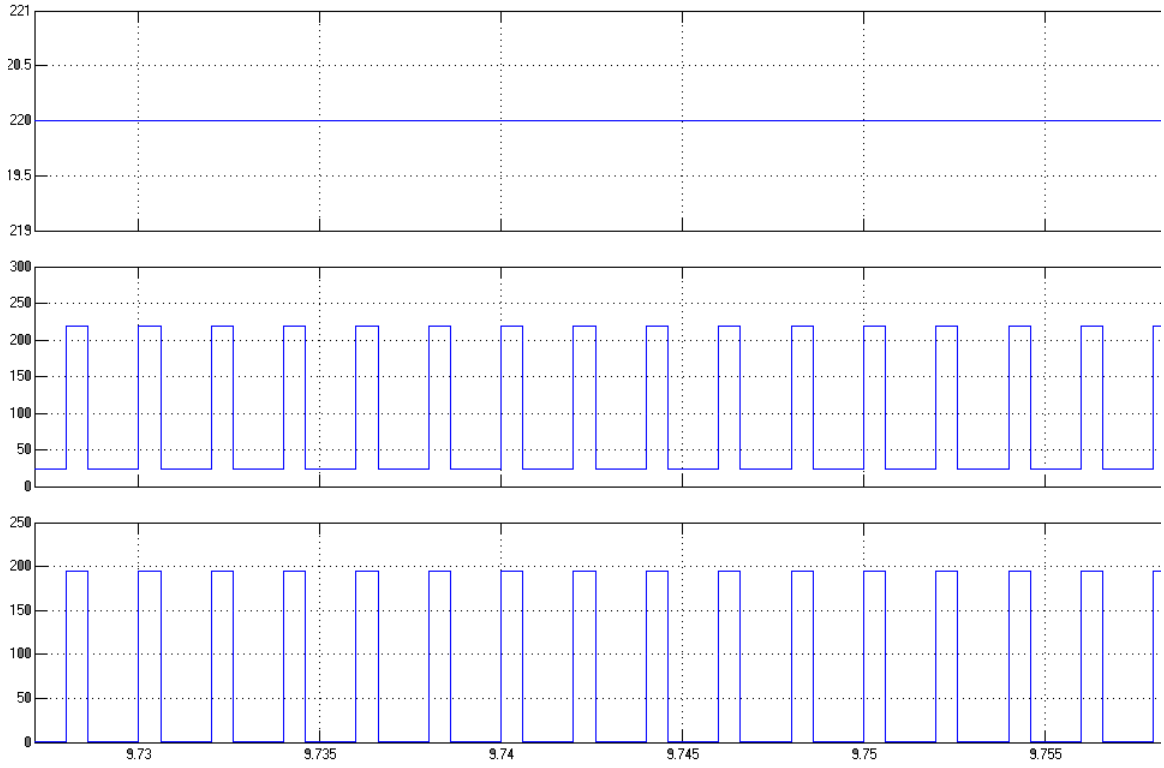
SIMULINK MODEL:

CLASS A CHOPPER – RE LOAD:



RE-LOAD: R = 1Ω ;E=24V

OUT PUT WAVE FORM FOR 0°



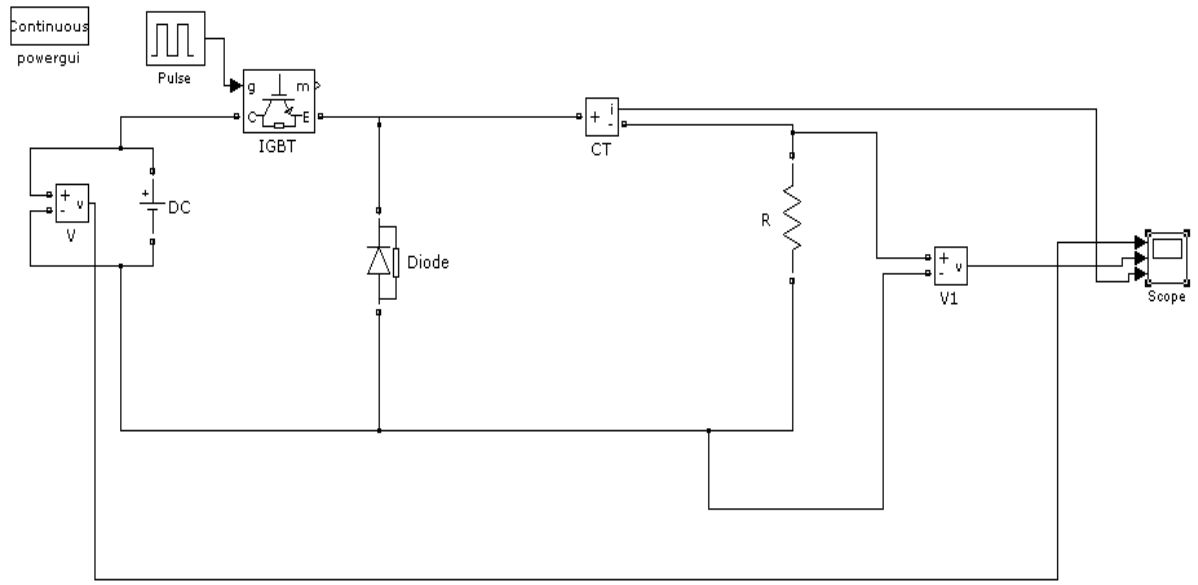
PROCEDURE:

R, RE.RLE-Load:

1. A model is created by using the component available in the simulink browser
2. Go to the voltage measurements block & set the magnitude as 100 V and frequency as 50 Hz
3. Next go to the thyristor gate of pulse generator block and set the firing angle as 0°.
4. Then go to the resistive load block and enter the value as R=5Ω (or)10 Ω
5. Verify all the model parameters values & re enter for the various firing angle for the required rating of the parameter block.
6. Then run the program by clicking the arrow in the top box (Or) Go to the simulink parameter and click the start.
7. Double click the scope to see the out put waveform.
8. Then output is printed for result analysis.

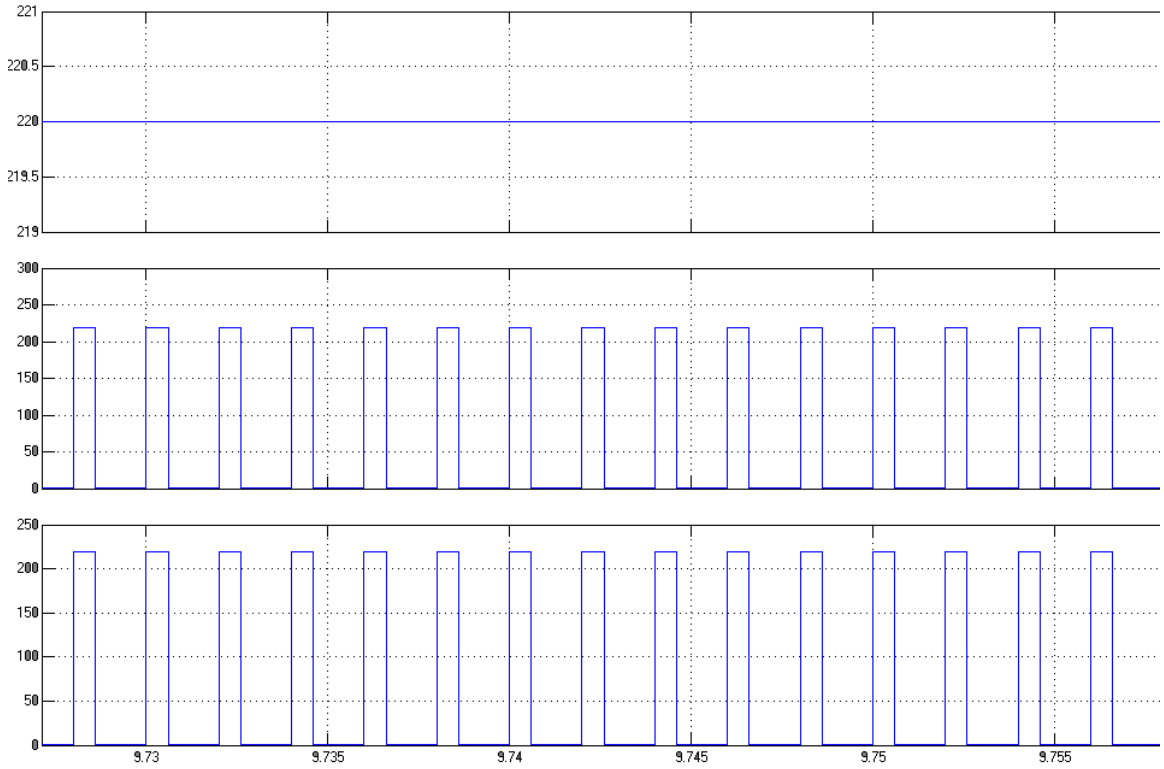
SIMULINK MODEL:

CLASS A CHOPPER – R LOAD:

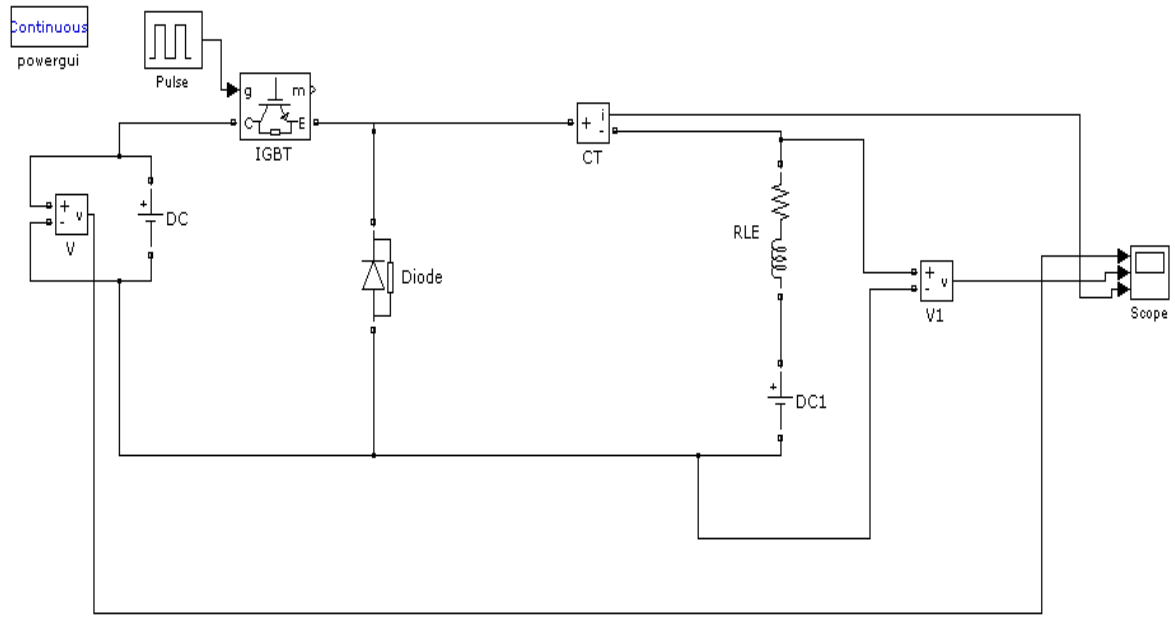


R-LOAD: R = 1Ω

OUT PUT WAVE FORM FOR 0°

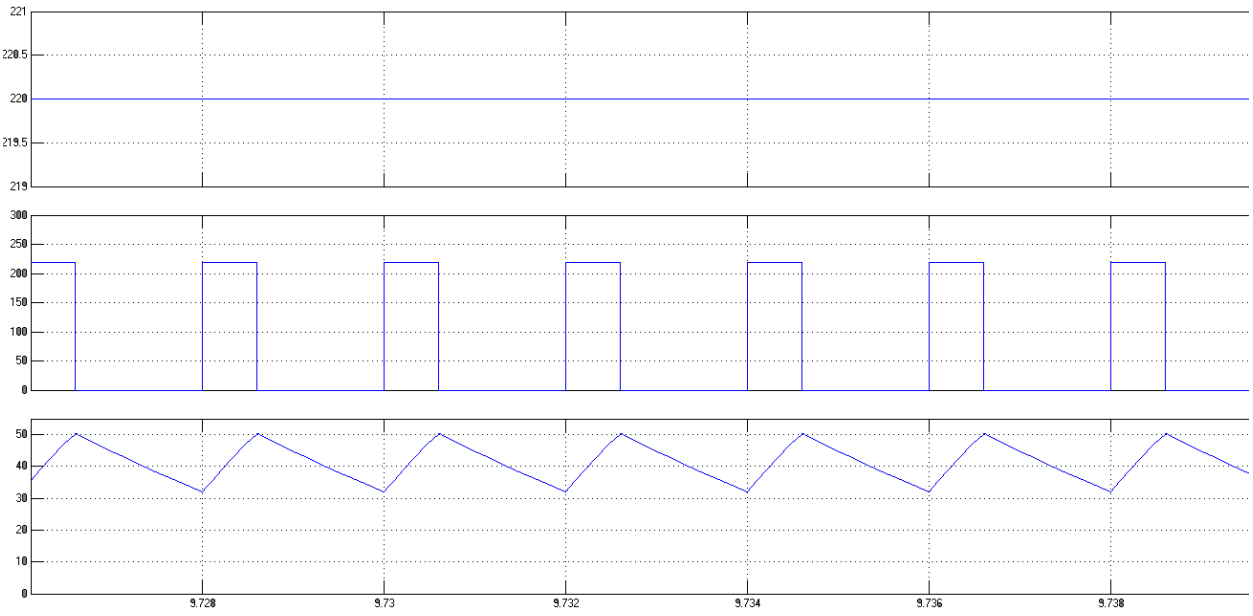


CLASS A CHOPPER – RLE LOAD:



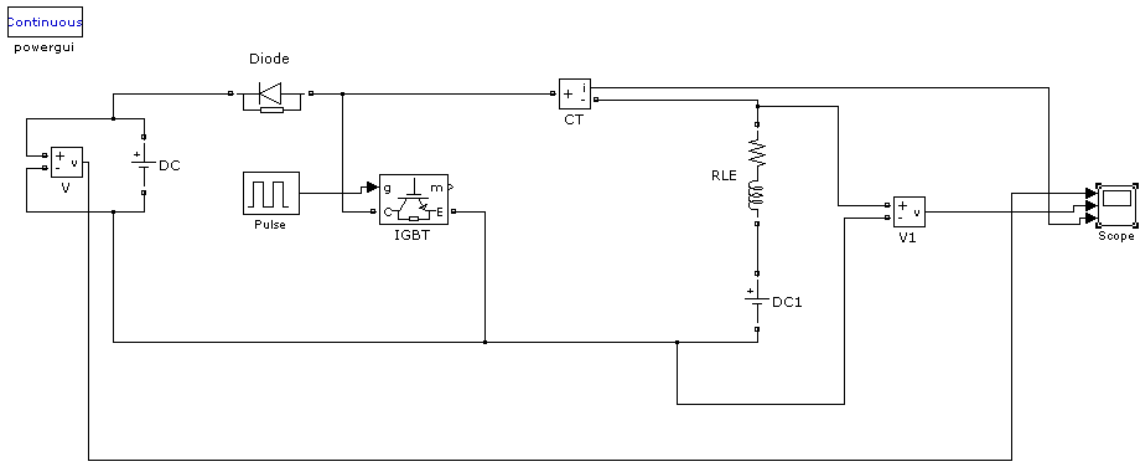
R-LOAD: R = 1Ω ;L=5mH;E=24V

OUT PUT WAVE FORM FOR 0°



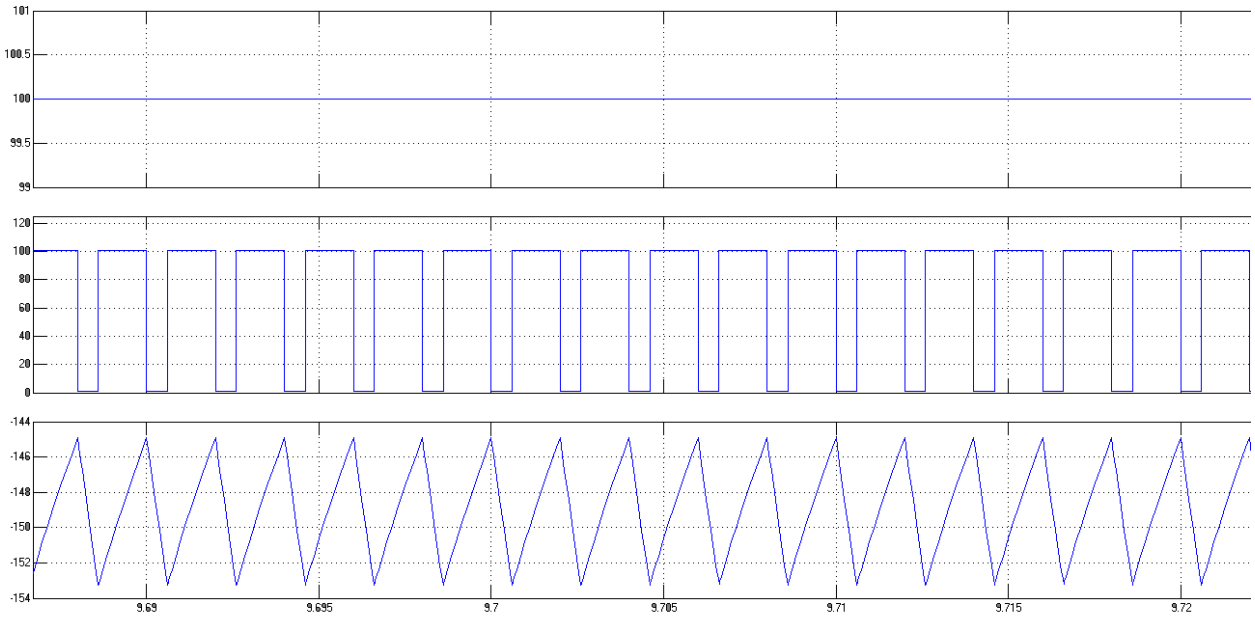
SIMULINK MODEL:

CLASS B CHOPPER – RLE LOAD:



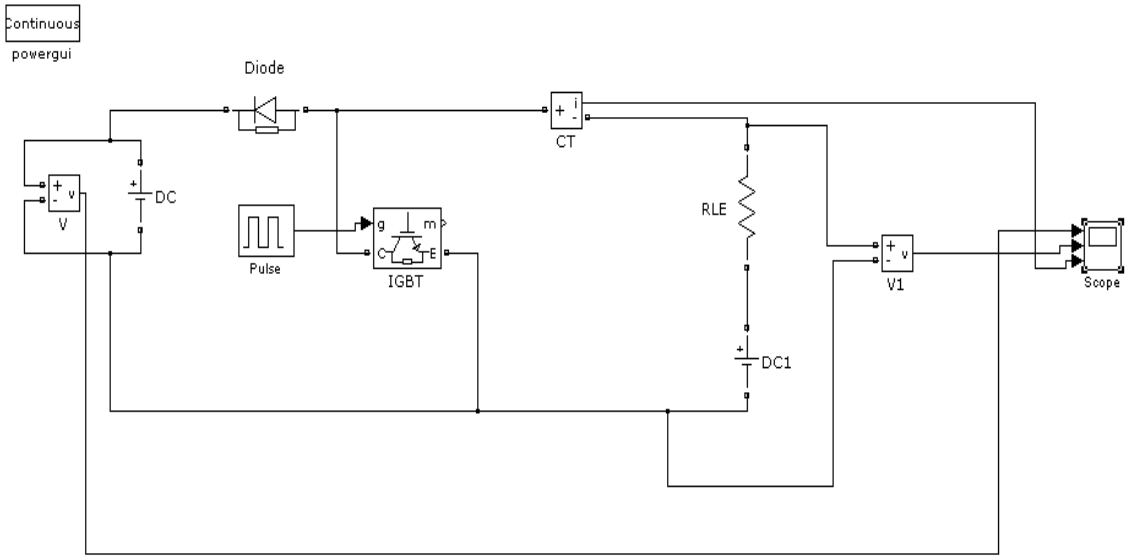
R-LOAD: R = 1Ω ;L=5mH;E=220V

OUT PUT WAVE FORM FOR 0°



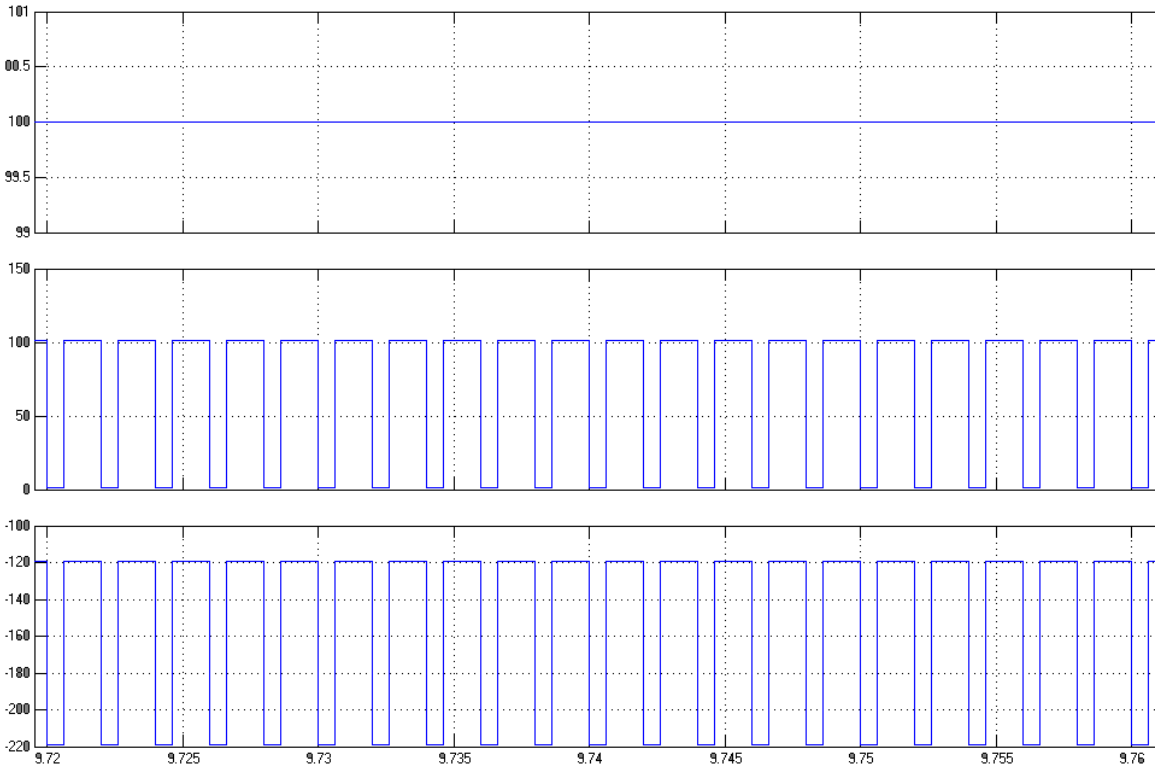
SIMULINK MODEL:

CLASS B CHOPPER – RE LOAD:



RE-LOAD: R = 1Ω ;L=5mH;E=220V

OUT PUT WAVE FORM FOR 0°



CLASS B CHOPPER

PROCEDURE:

RE,RLE-Load:

1. A model is created by using the component available in the simulink browser
2. Go to the voltage measurements block & set the magnitude as 100 V and frequency as 50 Hz
3. Next go to the thyristor gate of pulse generator block and set the firing angle as 30°, 90°, 130°.
4. Then go to the resistive load block and enter the value as R=5Ω (or)10 Ω
5. Verify all the model parameters values & re enter for the various firing angle for the required rating of the parameter block.
6. Then run the program by clicking the arrow in the top box (Or) Go to the simulink parameter and click the start.
7. Double click the scope to see the out put waveform.
8. Then output is printed for result analysis.

RESULT:

Thus the Class A & Class B chopper model is created and simulated by using MATLAB simulink and the following

1. output voltage Vo (vs.)time ,
2. output current Io (vs.) time

was obtained.

Expt No: 6 Date:	SINGLE PHASE AC VOLTAGE CONTROLLERS WITH R AND RL LOAD

AIM:

To simulate the SINGLE PHASE AC VOLTAGE CONTROLLERS by using MATLAB Simulink

SOFTWARE REQUIRED:

1. Sim power system
2. MATALAB version 7.0

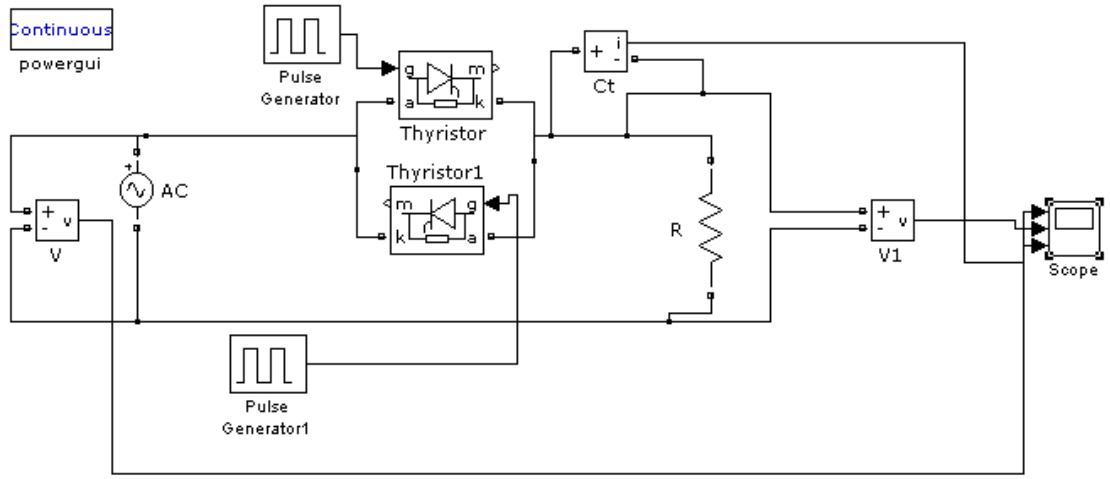
THEORY:

The single phase AC voltage controllers consists of two SCR connected in antiparallel.During the positive half cycle of supply voltage terminal α is positive with respect to terminal b.In positive half cycle SCR T1 is in forward bias. when T1 is off T2 will conduct. The load voltage now follows the positive

& negative envelop of supply voltage

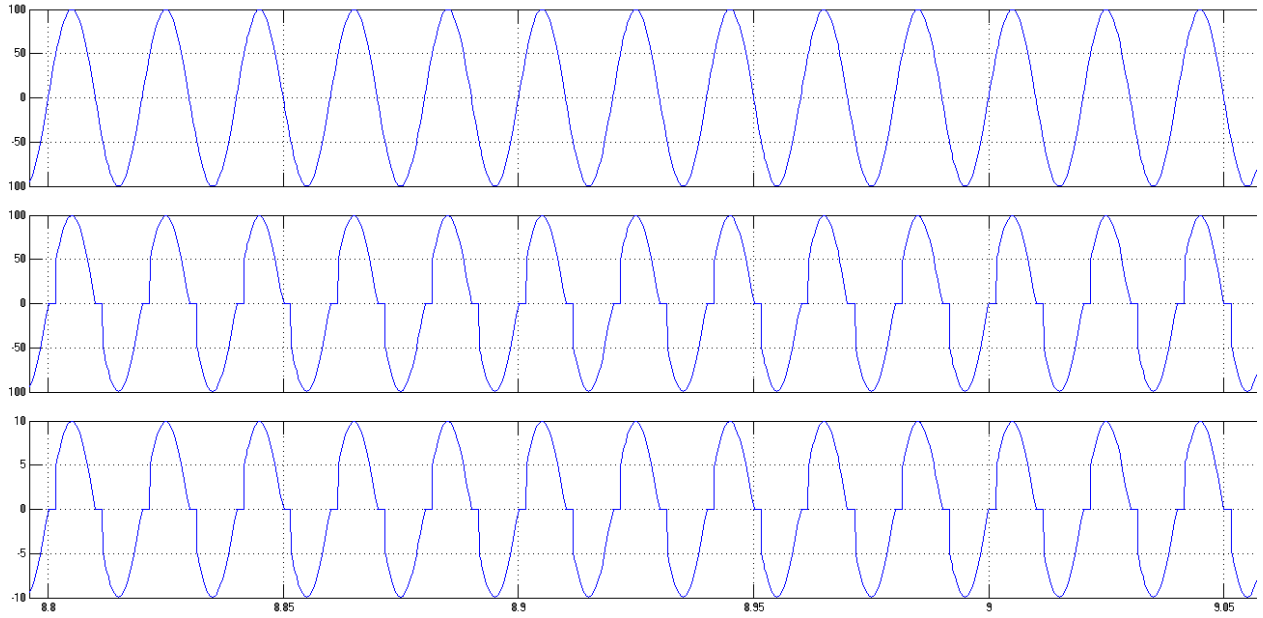
SIMULINK MODEL:

SINGLE PHASE AC VOLTAGE CONTROLLERS – R LOAD:



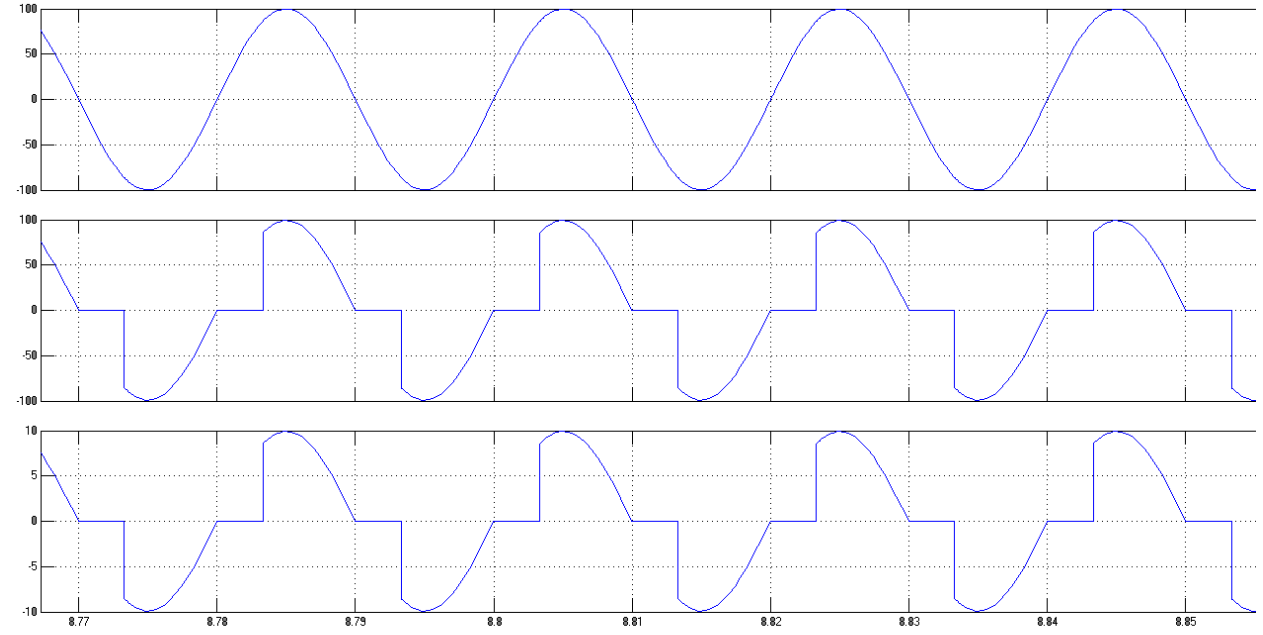
R-LOAD: R = 10Ω

OUT PUT WAVE FORM FOR 30°



R-LOAD: R = 10Ω

OUTPUT WAVEFOR FOR 60°



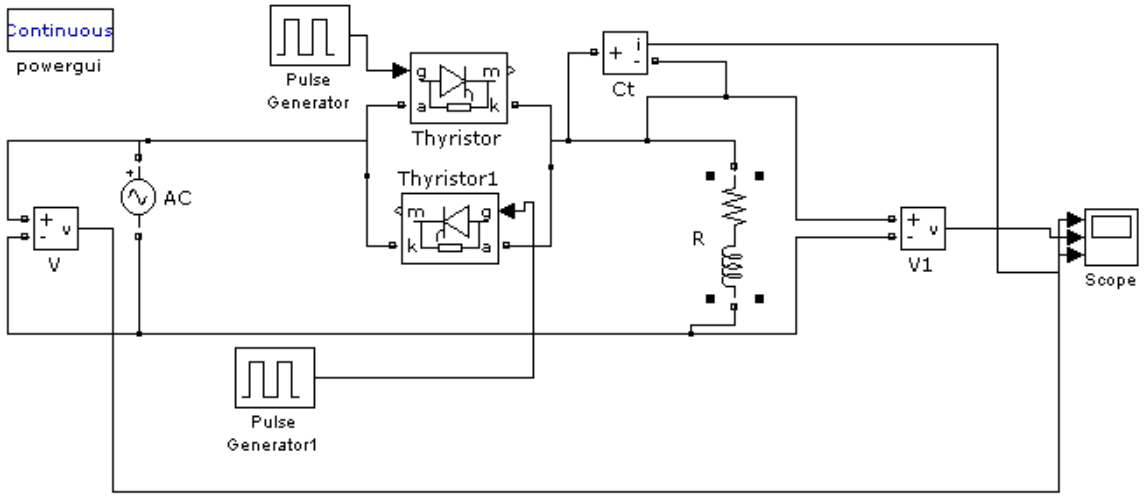
PROCEDURE:

R-Load:

1. A model is created by using the component available in the simulink browser
2. Go to the voltage measurements block & set the magnitude as 100 V and frequency as 50 Hz
3. Next go to the thyristor gate of pulse generator block and set the firing angle as 30°, 90°, 130°.
4. Then go to the resistive load block and enter the value as R=5Ω (or)10 Ω
5. Verify all the model parameters values & re enter for the various firing angle for the required rating of the parameter block.
6. Then run the program by clicking the arrow in the top box (Or) Go to the simulink parameter and click the start.
7. Double click the scope to see the out put waveform.
8. Then output is printed for result analysis.

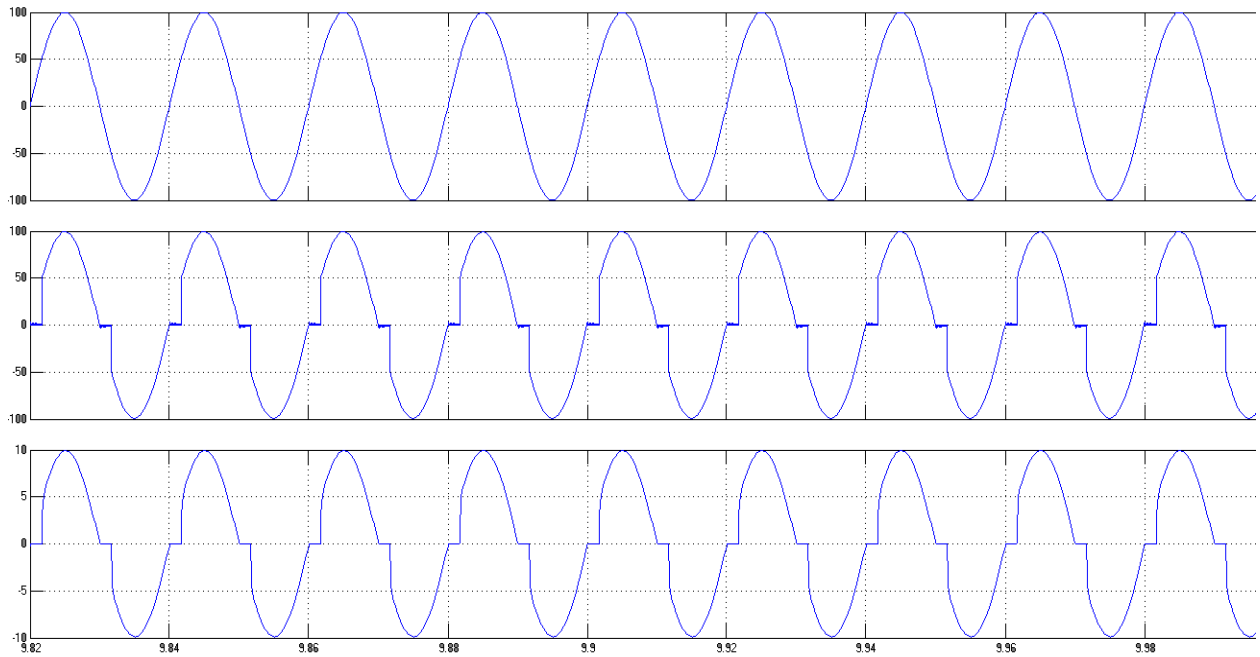
SIMULINK MODEL:

SINGLE PHASE AC VOLTAGE CONTROLLERS – RL LOAD:



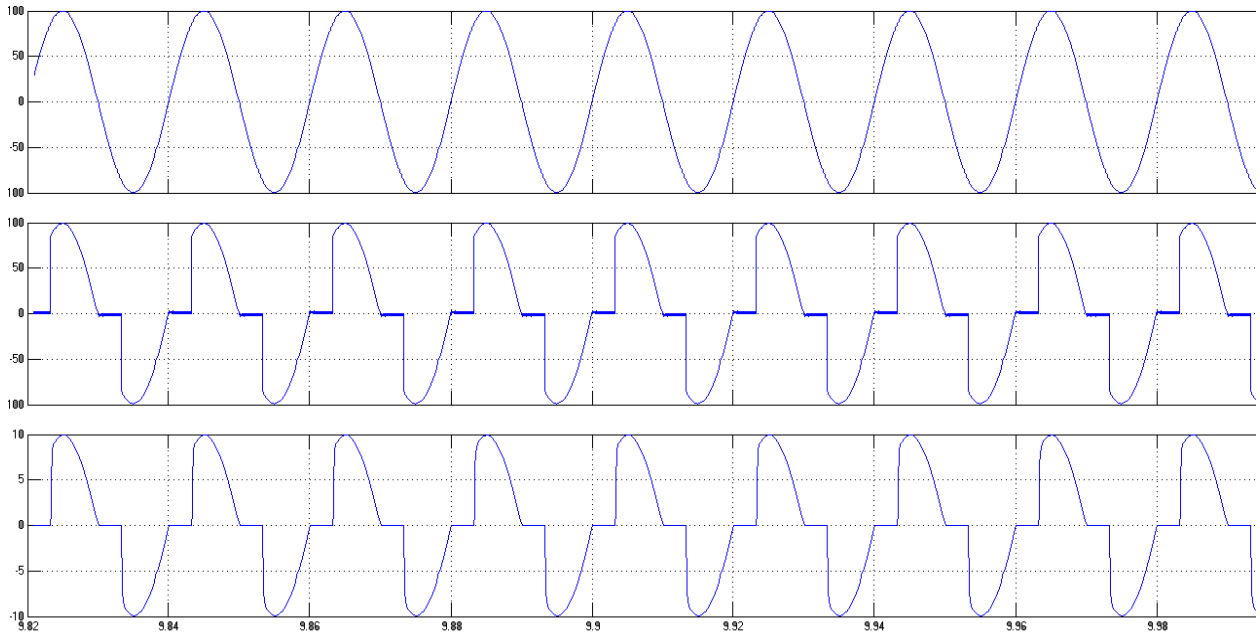
R-LOAD: R = 10Ω; L=1mH

OUT PUT WAVE FORM FOR 30°



R-LOAD: R = 10Ω; L=1mH

OUT PUT WAVE FORM FOR 60°



RESULT:

Thus the single phase ac voltage controller model is created and simulated by using MATLAB simulink and the following

1. output voltage Vo (vs.)time ,
2. output current Io (vs.) time

was obtained.

Expt No: 7 Date:	THREE PHASE AC VOLTAGE CONTROLLERS WITH R AND RL LOAD

AIM:

To simulate the THREE PHASE AC VOLTAGE CONTROLLERS by using MATLAB Simulink

SOFTWARE REQUIRED:

1. Sim power system
2. MATALAB version 7.0

THEORY:

The three phase AC voltage controllers consists of six SCR connected in antiparallel.During the positive half cycle of supply voltage terminal α is positive with respect to terminal b , positive group SCR will conduct,after that negative group cycle will conduct. The load voltage now follows the positive

& negative envelop of supply voltage.

PROCEDURE:

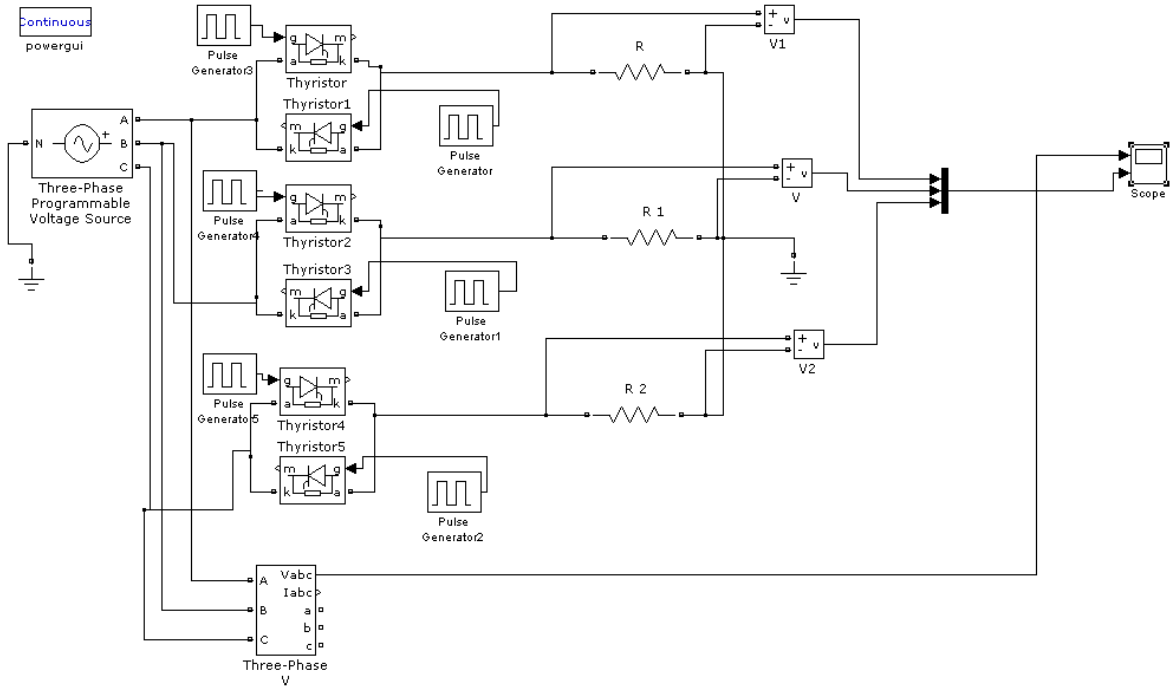
R-Load:

1. A model is created by using the component available in the simulink browser
2. Go to the voltage measurements block & set the magnitude as 100 V and frequency as 50 Hz
3. Next go to the thyristor gate of pulse generator block and set the firing angle as 30°, 90°, 130°.
4. Then go to the resistive load block and enter the value as R=5Ω (or)10 Ω
5. Verify all the model parameters values & re enter for the various firing angle for the required rating of the parameter block.
6. Then run the program by clicking the arrow in the top box (Or) Go to the simulink parameter and click the start.
7. Double click the scope to see the out put waveform.
8. Then output is printed for result analysis.

SIMULINK MODEL:

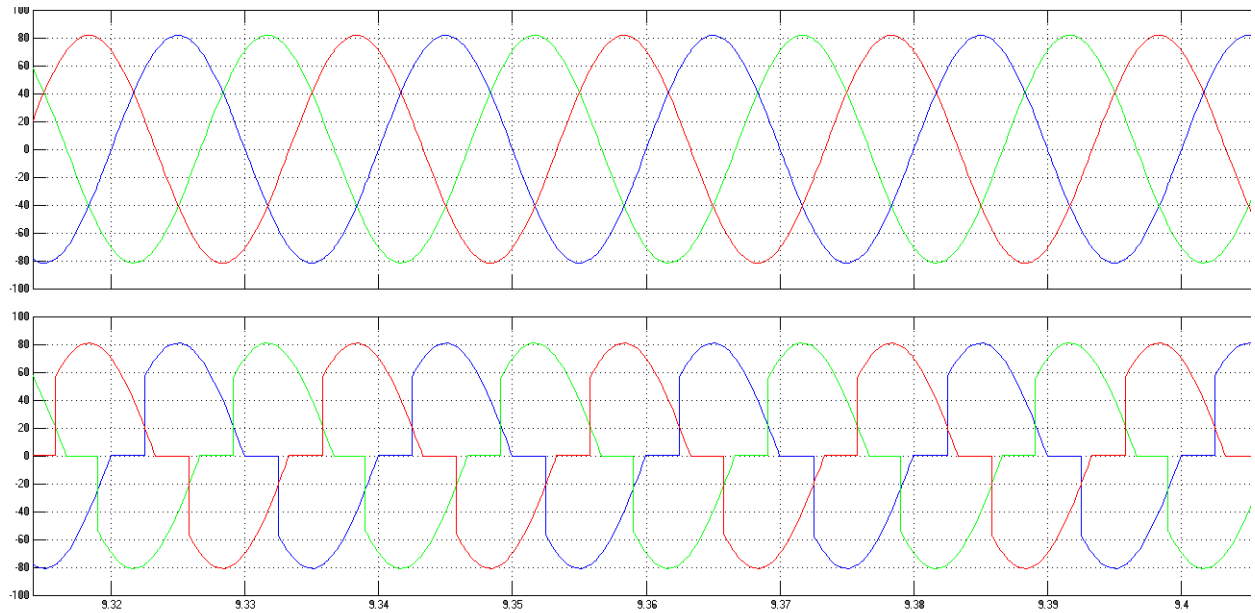
THREE PHASE AC VOLTAGE CONTROLLERS – R LOAD:

STAR CONNECTION:



R-LOAD: R = 10Ω

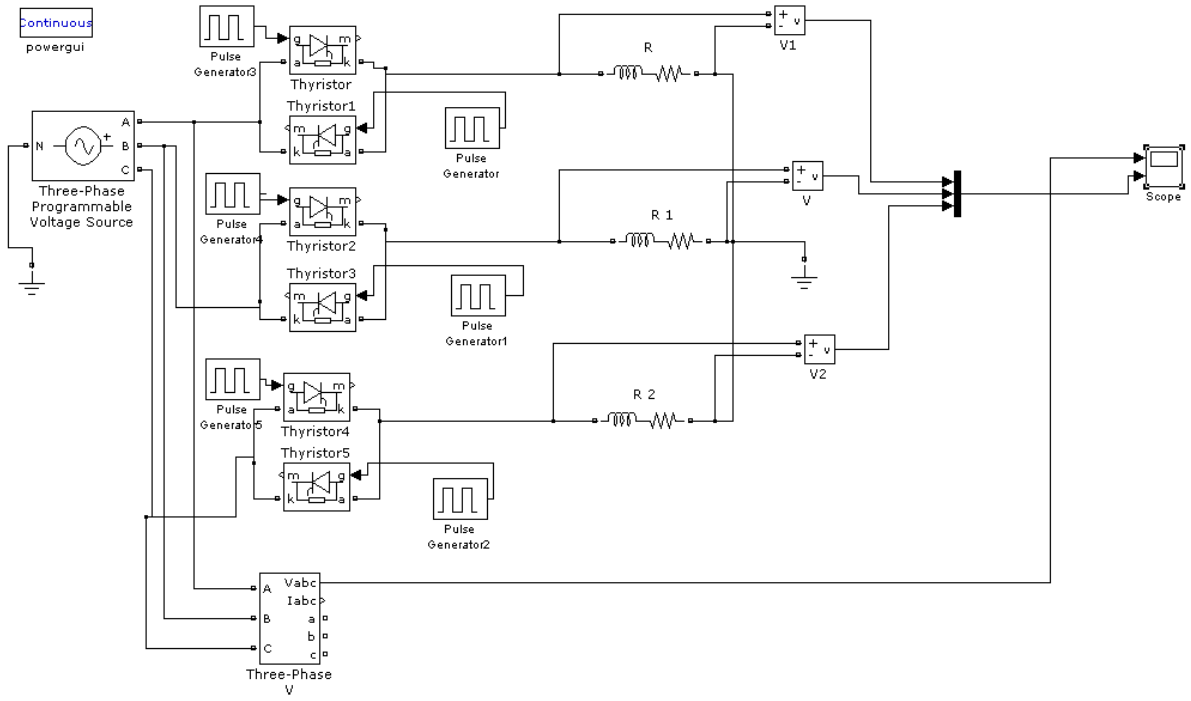
OUT PUT WAVE FORM FOR 15°



SIMULINK MODEL:

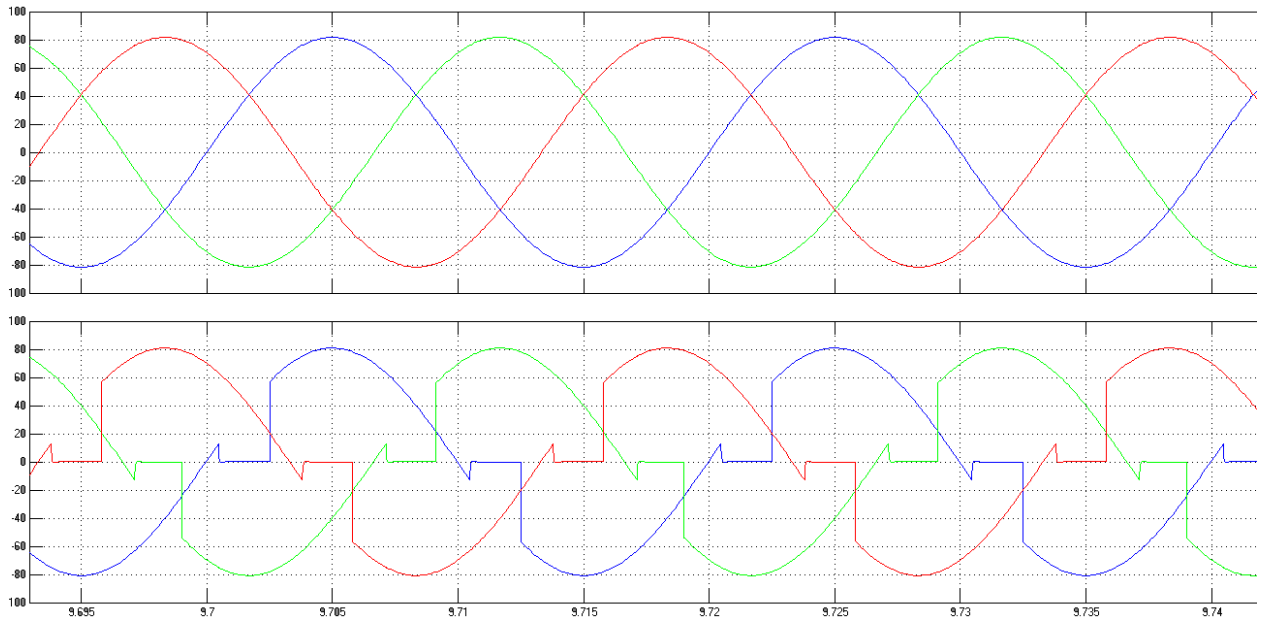
THREE PHASE AC VOLTAGE CONTROLLERS – RL LOAD:

STAR CONNECTION:



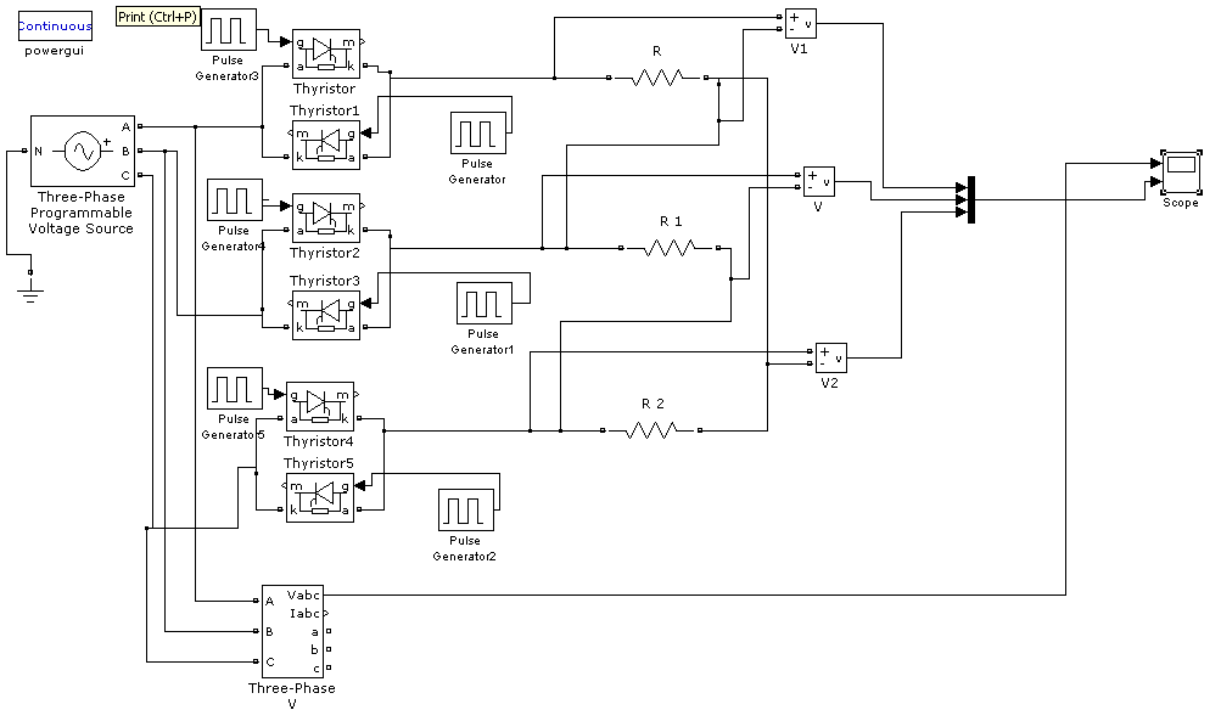
R-LOAD: R = 10Ω ;L=5mH

OUT PUT WAVE FORM FOR 15°



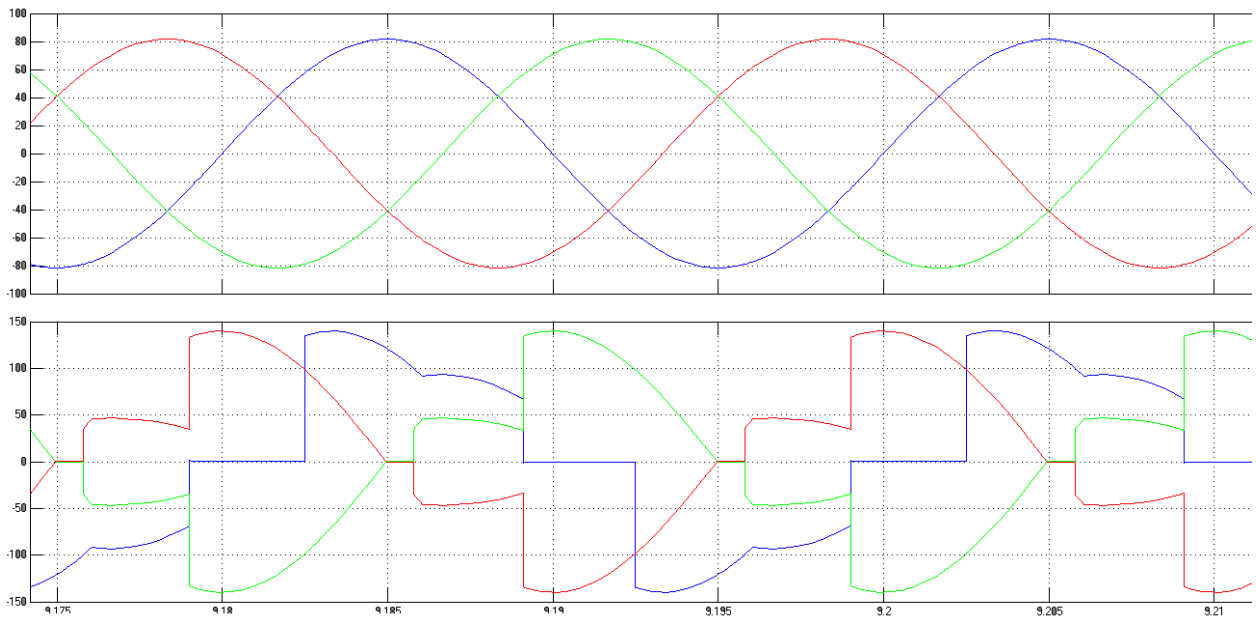
THREE PHASE AC VOLTAGE CONTROLLERS – R LOAD:

DELTA CONNECTION:



R-LOAD: R = 10Ω

OUT PUT WAVE FORM FOR 15°



RESULT:

Thus the three phase ac voltage controller model is created and simulated by using MATLAB simulink and the following

1. output voltage Vo (vs.)time ,
2. output current Io (vs.) time

was obtained.

Expt No: 8 Date:	SINGLE PHASE BASIC MODIFIED SERIES INVERTER

AIM:

To simulate the SINGLE BASIC MODIFIED SERIES INVERTER by using MATLAB Simulink

SOFTWARE REQUIRED:

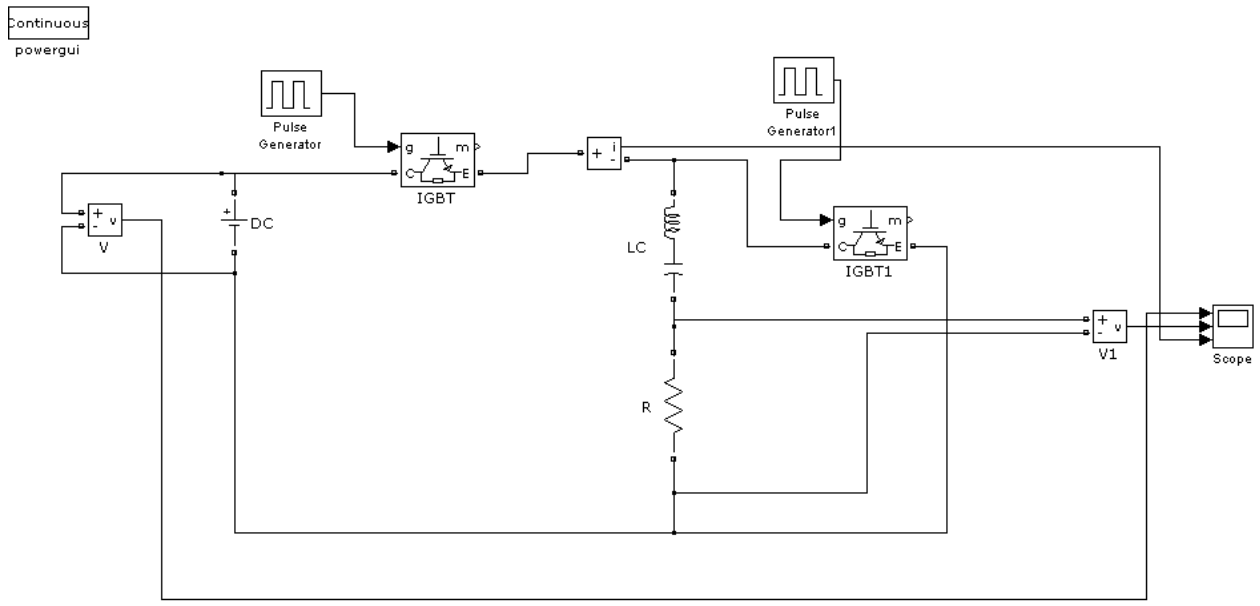
1. Sim power system
2. MATALAB version 7.0

THEORY:

The inverters which commutating components are permanently connected in series with the load are called as series inverter. The series circuit so formed as under damped circuit. AS the current attains zero value due to the nature of the series circuits series inverter is also called as self commutated inverters or load commutated inverters. The inverter operate at a frequency as 200Hz to 100KHz.When T1 on T2 off, I start building up in the RLC circuit.T1 off T2 on The capacitor stores charge during one half cycle and release the same amount of charge during next half cycle.

SIMULINK MODEL:

SINGLE PHASE BASIC MODIFIED SERIES INVERTER – R LOAD:



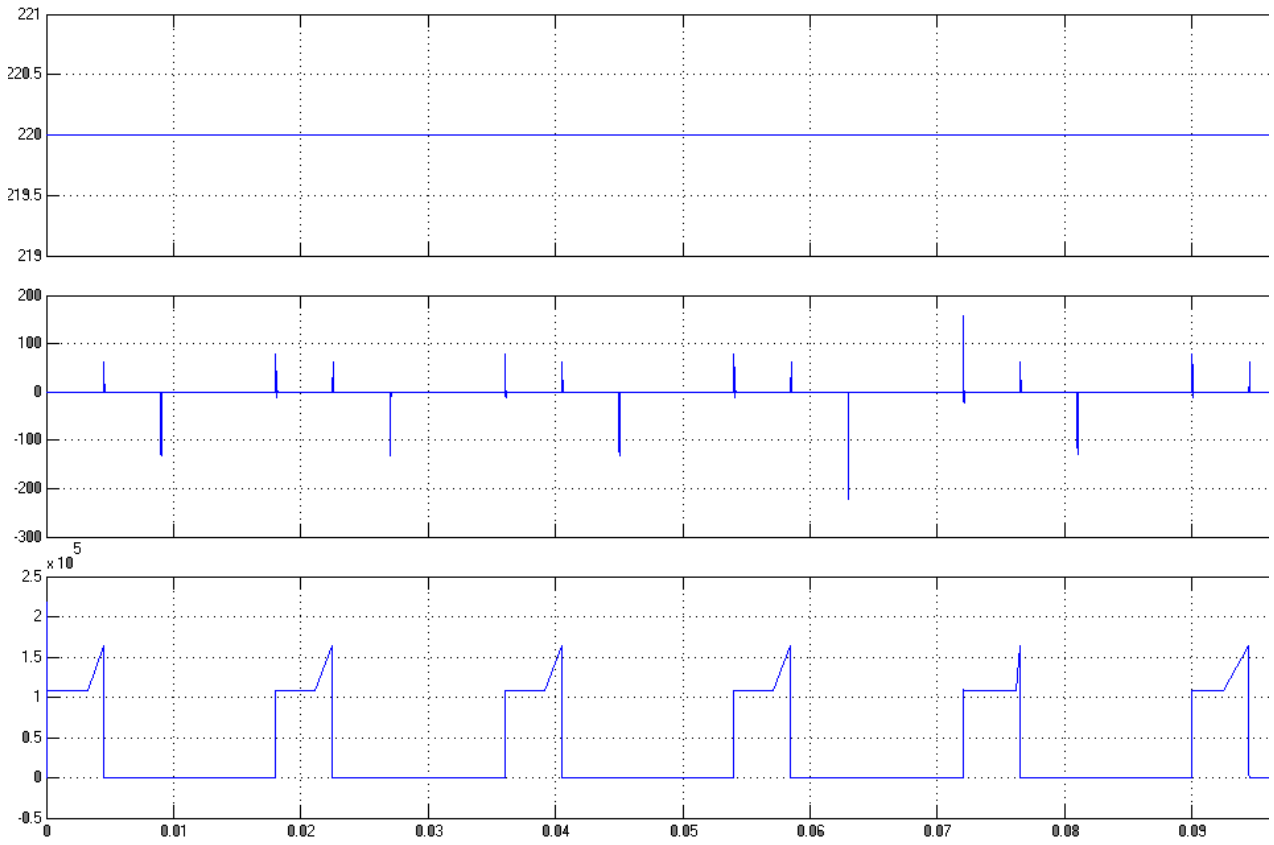
PROCEDURE:

RLC-Load:

1. A model is created by using the component available in the simulink browser
2. Go to the voltage measurements block & set the magnitude as 100 V and frequency as 50 Hz
3. Next go to the thyristor gate of pulse generator block and set the firing angle as 30°, 90°, 130°.
4. Then go to the resistive load block and enter the value as R=5Ω (or)10 Ω
5. Verify all the model parameters values & re enter for the various firing angle for the required rating of the parameter block.
6. Then run the program by clicking the arrow in the top box (Or) Go to the simulink parameter and click the start.
7. Double click the scope to see the out put waveform.
8. Then output is printed for result analysis.

R-LOAD: R = 10Ω ,L=60micro F,C=7.5 micro F

OUT PUT WAVE FORM FOR 0°



RESULT:

Thus the single phase ac voltage controller model is created and simulated by using MATLAB simulink and the following

1. output voltage Vo (vs.)time ,
2. output current Io (vs.) time

was obtained.

Expt No: 9 Date:	SINGLE PHASE BASIC MODIFIED SERIES INVERTER

AIM:

To simulate the SINGLE BASIC MODIFIED SERIES INVERTER by using MATLAB Simulink

SOFTWARE REQUIRED:

1. Sim power system
2. MATALAB version 7.0

THEORY:

The inverters which commutating components are permanently connected in series with the load are called as series inverter. The series circuit so formed as under damped circuit. AS the current attains zero value due to the nature of the series circuits series inverter is also called as self commutated inverters or load commutated inverters. The inverter operate at a frequency as 200Hz to 100KHz.When T1 on T2 off, I start building up in the RLC circuit.T1 off T2 on The capacitor stores charge during one half cycle and release the same amount of charge during next half cycle.

SIMULINK MODEL:

SINGLE PHASE BASIC MODIFIED SERIES INVERTER – R LOAD:

PROCEDURE:

RLC-Load:

1. A model is created by using the component available in the simulink browser
2. Go to the voltage measurements block & set the magnitude as 100 V and frequency as 50 Hz
3. Next go to the thyristor gate of pulse generator block and set the firing angle as 30°, 90°, 130°.
4. Then go to the resistive load block and enter the value as R=5Ω (or)10 Ω
5. Verify all the model parameters values & re enter for the various firing angle for the required rating of the parameter block.
6. Then run the program by clicking the arrow in the top box (Or) Go to the simulink parameter and click the start.
7. Double click the scope to see the out put waveform.
8. Then output is printed for result analysis.

R-LOAD: R = 10Ω ,L=60micro F,C=7.5 micro F

OUT PUT WAVE FORM FOR 0°

RESULT:

Thus the single phase ac voltage controller model is created and simulated by using MATLAB simulink and the following

1. output voltage Vo (vs.)time ,
2. output current Io (vs.) time

was obtained.