

Roll. No:	Date:
Checked By:	Grade:

Power Electronics Laboratory-3

1 – Ø and 3 – Ø Controlled Rectifiers

Objectives:

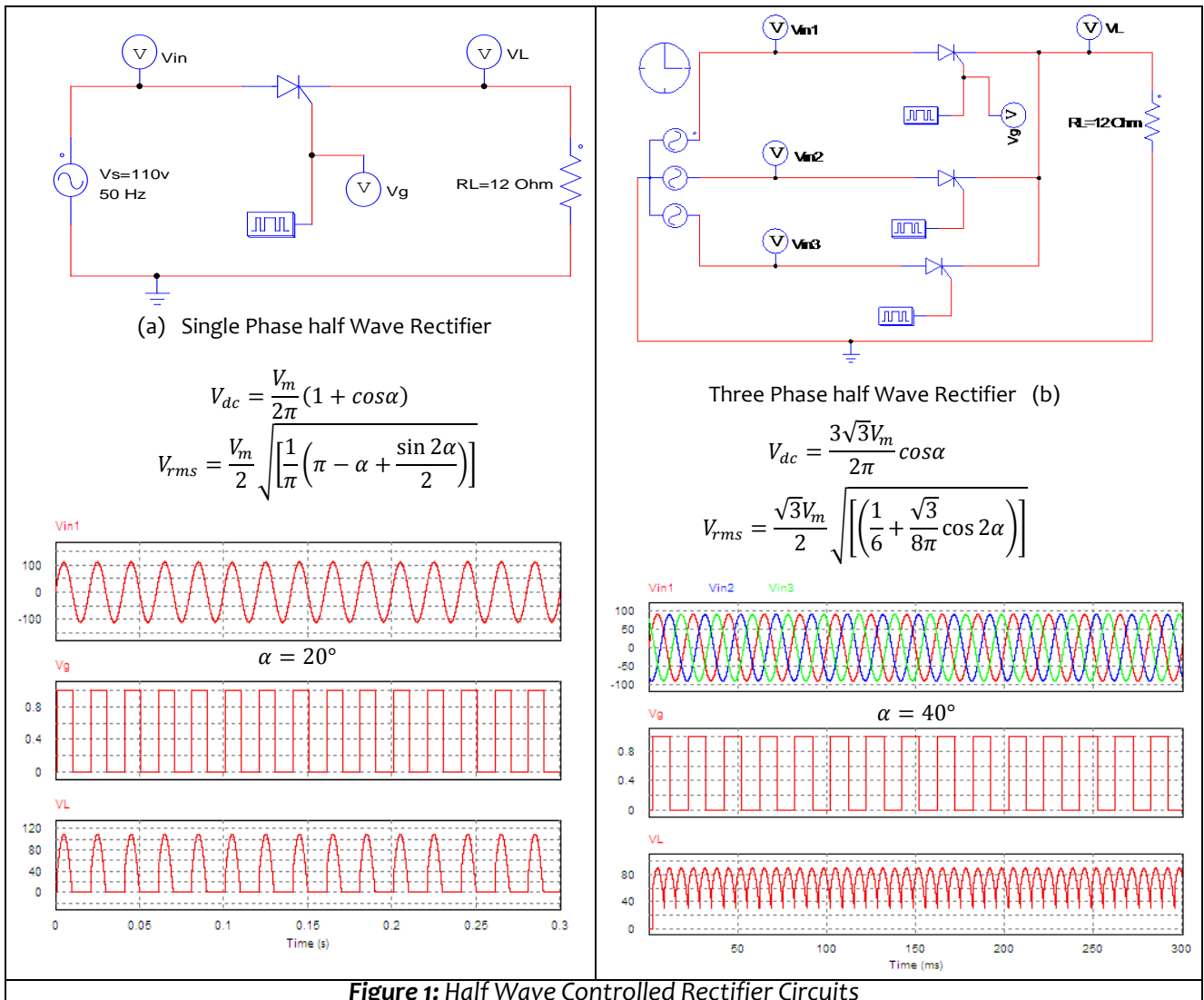
1. To analyze the working and performance of a 1 – Ø and 3 – Ø half wave controlled rectifier.
2. To analyze the working and performance of a 1 – Ø and 3 – Ø full wave controlled rectifier.

Equipment:

AC supply, thyristors, resistors, oscilloscope, multimeter, hard wires.

Section-1: Analysis of a half-wave controlled rectifier with Resistive Load

Arrange the circuits as shown in Figure-1.



Simulation Activity 1.1-1:

Simulate the circuits shown in Figure 1 in PSIM and observe the waveforms of V_s and V_L . Use parameter values: $R=12\Omega$, Source voltage $V = 110\text{v}$, Frequency $f= 50\text{Hz}$, thyristor voltage drop = 1V . Observe the operation of both rectifiers for various values of firing angles (e.g. $\alpha = 10^\circ, 30^\circ$ e. t. c)

Lab Activity 1.1-1:

Practically verify the above waveforms with same parameter values.

Practically observing the waveform of current on Oscilloscope in the Lab:

Connect a 1Ω resistor within the path of which the current is to be observed. Now according to Ohm's law, the voltage waveform across the 1Ω resistor is also the waveform of the current flowing through it.

Performance Parameters:

Peak output voltage = $V_m =$ (use oscilloscope waveform)

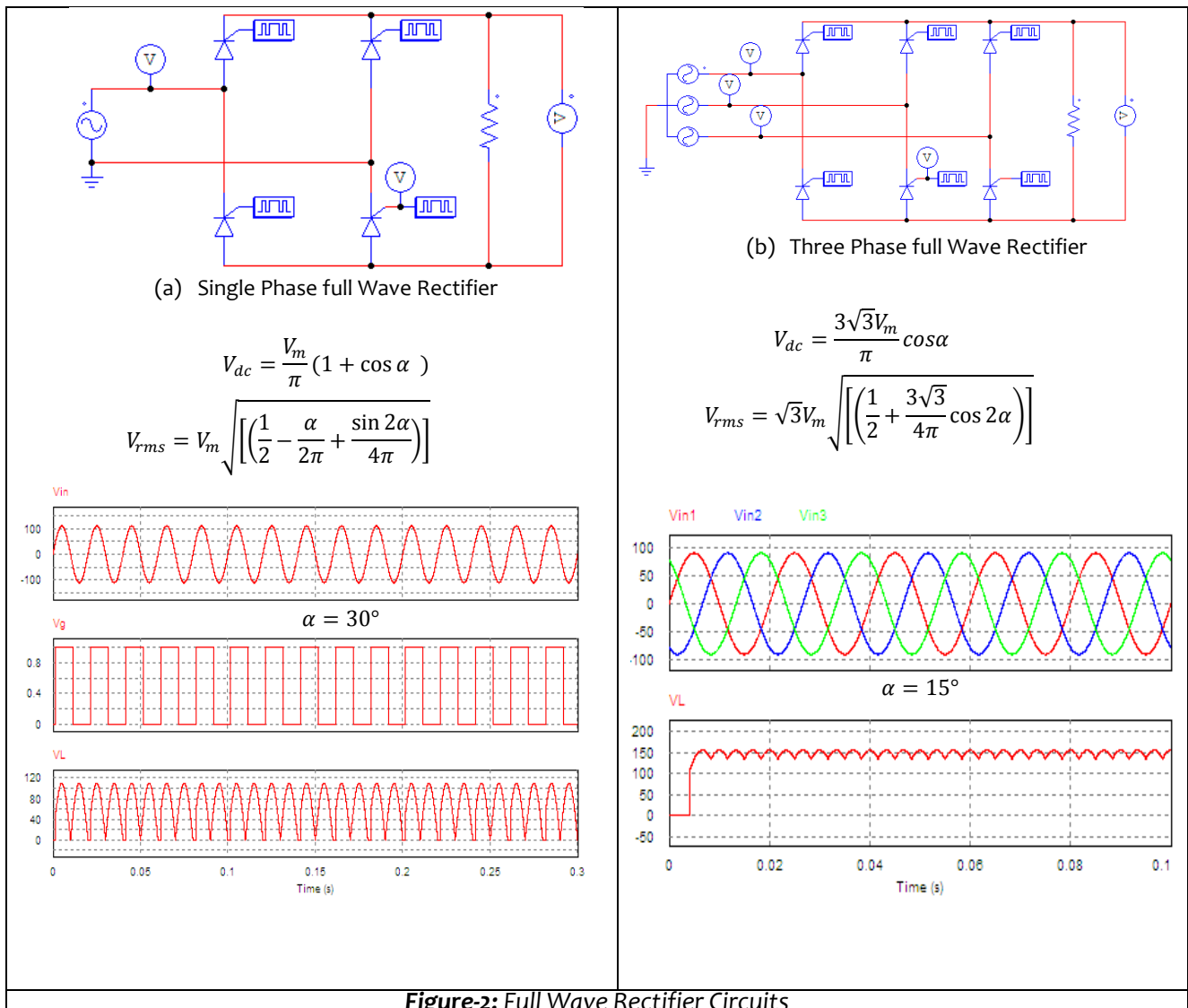
Average value of output voltage = $V_{dc} =$

RMS value of output voltage = $V_{rms} =$

R = ohms (use multi-meter)

Section 2: Analysis of a full-wave controlled rectifiers.

Arrange the circuit as shown in Figure 2.



Simulation Activity 1.2:

Simulate the circuit shown in Figure 2 in PSIM and observe the waveforms of V_{in} and v_R . Use parameter values: $R=12\Omega$, $V = 110v$, Frequency $f = 50Hz$ and thyristor threshold voltage set at 1 volts with various values of firing delay angles.

Firing Angle Adjustment:

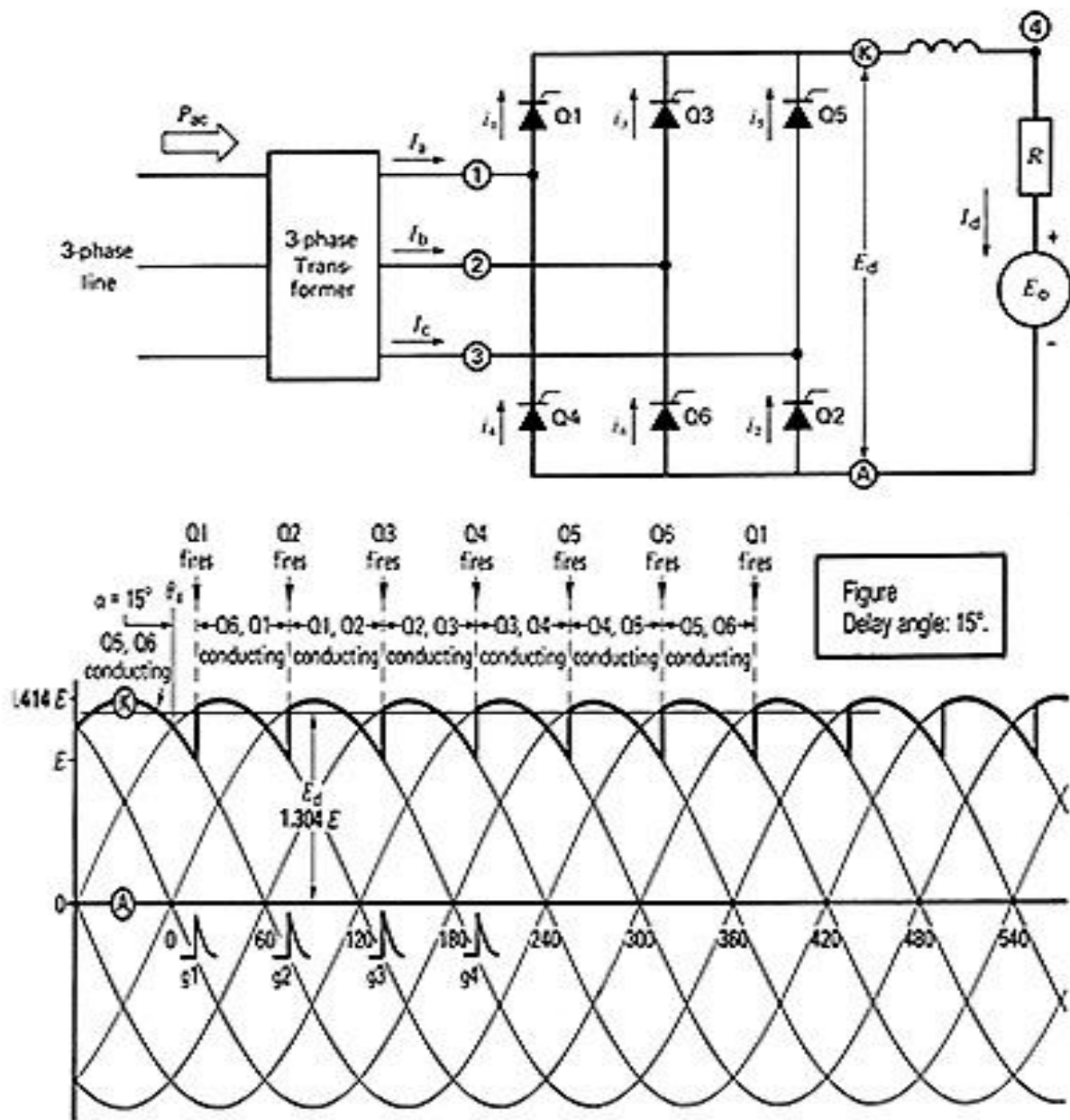


Figure-3: Firing Angle Adjustment

The End