

INSTITUTO POLITECNICO NACIONAL

Escuela Superior de Cómputo

Practice 6

Voltaje comparators

Teacher:

Raúl Luna Santillán

Group:

2CV5

Members

* Konishi Govantes Jorge Agustín
* Luciano Espina Melisa
* Mena Ortíz Erick Jafet

Date of delivery: October 13th 2016

# ÍNDICE

[INTRODUCTION 3](#_Toc461378591)

[THEORICAL FRAMEWORK 3](#_Toc461378592)

[OBJECTIVE: 4](#_Toc461378593)

[MATERIALS 4](#_Toc461378594)

[EQUIPMENT 4](#_Toc461378595)

[EXPERIMENTAL DEVELOPMENT 5](#_Toc461378596)

[Rectifier of half a wave 5](#_Toc461378597)

[Rectificador de media onda con filtro de integración 6](#_Toc461378598)

[Wave rectifier completes with two diodes 7](#_Toc461378599)

[Wave rectifier completes with two filters of integration 8](#_Toc461378600)

[Wave rectifier completes type bridge 9](#_Toc461378601)

[Wave rectifier completes type bridge with filter of integration 10](#_Toc461378602)

[THEORETICAL ANALYSIS 11](#_Toc461378603)

[COMPARISON OF THE THEORETICAL RESULTS, PRÁCTIOS AND SIMULATED 11](#_Toc461378604)

[QUESTIONNAIRE 11](#_Toc461378605)

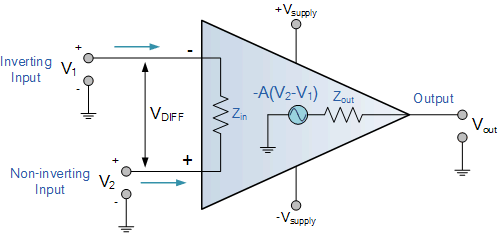
[CONCLUSIONS 11](#_Toc461378606)

# Introduccion

As well as resistors and capacitors,**Operational Amplifiers**, or **Op-amps** as they are more commonly called, are one of the basic building blocks of Analogue Electronic Circuits.

# Theorical Frame

## Operational Amplifier Basics



Operational amplifiers are linear devices that have all the properties required for nearly ideal DC amplification and are therefore used extensively in signal conditioning, filtering or to perform mathematical operations such as add, subtract, integration and differentiation.

An **Operational Amplifier**, or op-amp for short, is fundamentally a voltage amplifying device designed to be used with external feedback components such as resistors and capacitors between its output and input terminals. These feedback components determine the resulting function or “operation” of the [amplifier](https://www.arrow.com/en/products/amplifiers) and by virtue of the different feedback configurations whether resistive, capacitive or both, the amplifier can perform a variety of different operations, giving rise to its name of “Operational Amplifier”.

## What are photoresistors?

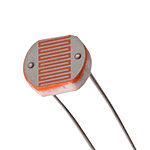


Photo resistors, also known as light dependent resistors (LDR), are light sensitive devices most often used to indicate the presence or absence of light, or to measure the light intensity. In the dark, their resistance is very high, sometimes up to 1MΩ, but when the LDR sensor is exposed to light, the resistance drops dramatically, even down to a few [ohms](http://www.resistorguide.com/ohms-law/), depending on the light intensity. LDRs have a sensitivity that varies with the wavelength of the light applied and are nonlinear devices. They are used in many applications but are sometimes made obsolete by other devices such as photodiodes and phototransistors. Some countries have banned LDRs made of lead or cadmium over environmental safety concerns.

## Triacs

**Triac** is a three terminal AC switch which is different from the other silicon controlled rectifiers in the sense that it can conduct in both the directions that is whether the applied gate signal is positive or negative, it will conduct. Thus, this device can be used for AC systems as a switch.

### construction of a triacConstruction of Triac

Two [SCRs](http://www.electrical4u.com/silicon-controlled-rectifier-(scr)/) are connected in inverse parallel with gate terminal as common. Gate terminals is connected to both the N and P regions due to which gate signal may be applied which is irrespective of the polarity of the signal. Here, we do not have anode and cathode since it works for both the polarities which means that device is bilateral. It consists of three terminals namely, main terminal 1(MT1), main terminal 2(MT2), and gate terminal G.

## Optocoupler

An optocoupler (or an [optoelectronic](http://www.circuitstoday.com/optoelectronic-devices) coupler) is basically an interface between two circuits which operate at (usually) different voltage levels. The key advantage of an optocoupler is the electrical isolation between the input and output circuits. With an optocoupler, the only contact between the input and the output is a beam of light. Because of this it is possible to have an insulation resistance between the two circuits in the thousands of megohms. Isolation like this is useful in high voltage applications where the potentials of two circuits may differ by several thousand volts.

# OBJETIVES

* Check the use of the simple comparators and with hysteresis
* Perform with the simple comparators for some applications
* Perform with the comparators with hysteresis with some applications
* Interpret the results obtained for the circuits made

# Materials

* Experimentation Tablet (protoboard)
* Coaxial cables 1m with BNC terminal-caiman
* Banana-banana cables
* Operational amplifiers 741
* 13 Resistors of 1KΩ a ¼ w
* 1 Resistors of 680Ω to ¼ w
* 2 Resistors of 10KΩ to ¼ W
* 2 Resistors of 180KΩ to ¼ W
* 1 Resistors of 3.9KΩ to ¼ W
* 1 Resistors of 2.2KΩ to ¼ w
* 4 Resistors of 100Ω to ¼ W
* 4 Photoresisters of 10KΩ
* Zener diode of 5.1 to ½ w
* 2 Triacs 2N6344
* 2 Optoacoplers MOC3011
* 5 Red Leds or any other one
* 4 Preset of 10KΩ
* 1 Socket for área
* 1 foco of 40W
* 1 pin
* 2 meters of dúplex cable of No. 14

# Equipment

* Power Supply
* Analog or digital multimeter
* Function generator 10Hz- 1Mhz
* General purpose oscilloscope

# Experimental Development

**Note**: In all ciruitos will be used the 741 Operational Amplifier with 12V of power supply.

Zero crossing Detector Non Inverting

Build the circuit as shown in the following figure, enter a sine signal of 16 at a frequency of 1 KHz in the input terminal