BASIC ELECTRONIC CIRCUITS

INSTITUTE CORE

OBJECTIVES

 Provide clear understanding of basic concepts in analyzing the electronic circuits.

 Make familiar with crucial components of electronic systems and their applications.

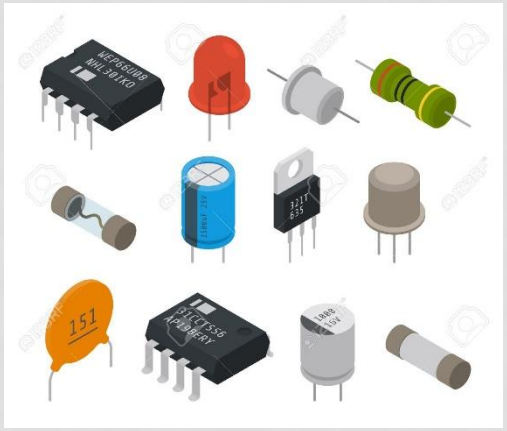
 Verify the theoretical concepts learnt, in the classroom, in the lab sessions.

To make the student understand about the working principle of electronic components.

Live demonstration and inspection of basic electronic components.

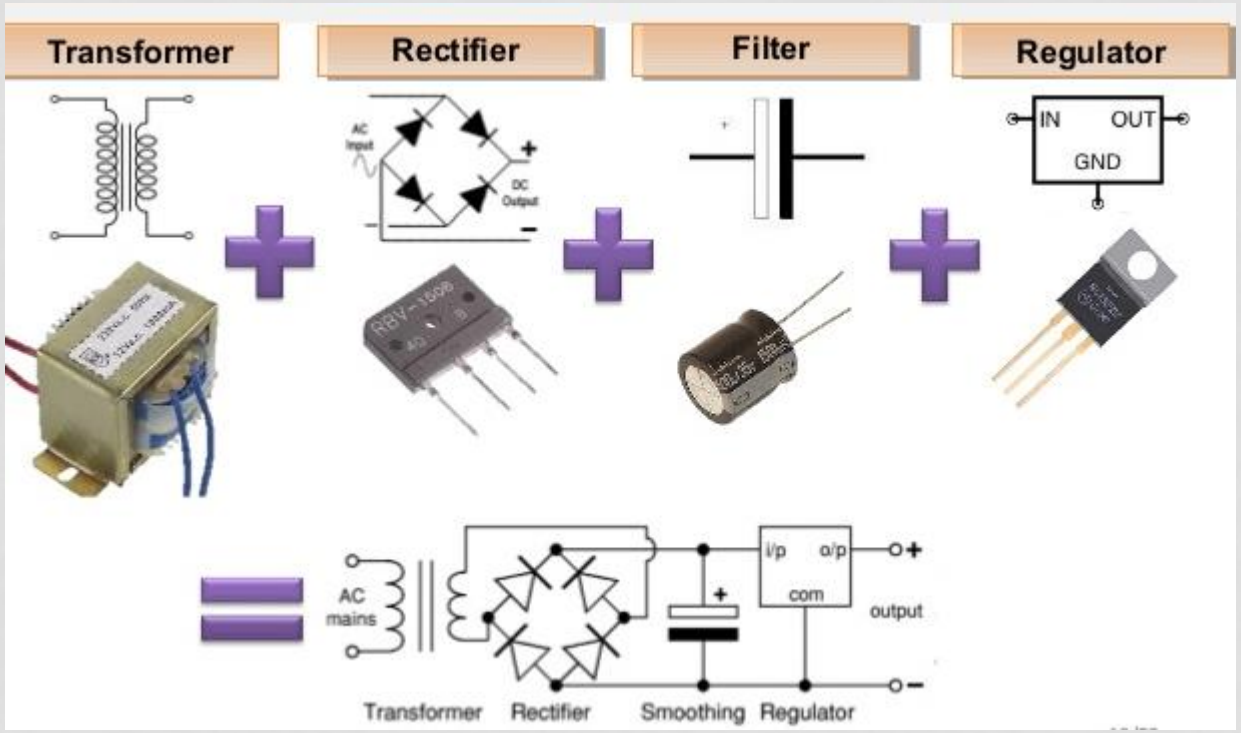
UNIT-I

SI units, Time, frequency, wavelength, Charge, Current, Voltage, Power, Voltage and current sources, Review of basic concepts, physical and mathematical representations of Ohm’s law, Kirchhoff's laws, passive elements: resistor, inductor and capacitor, Series and parallel resistive networks, Voltage and current division.



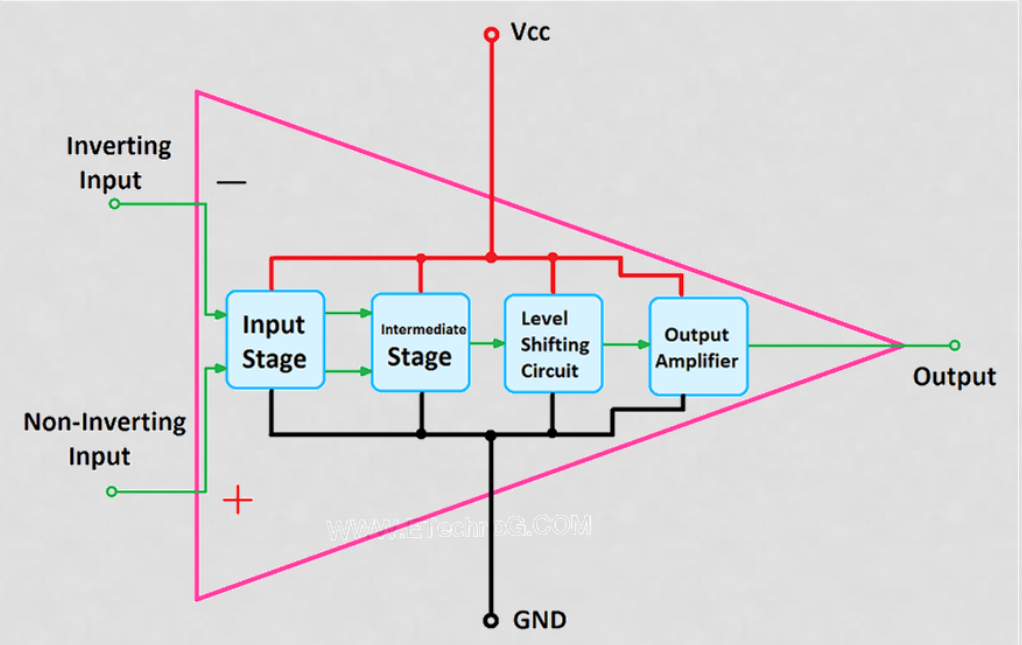
UNIT-II

D-C power supply: Diode characteristics, half-wave and full wave rectifiers, shunt capacitor filter, voltage regulator, regulated D-C power supply. Transistor: BJT, modes of operation, CE configuration input/output characteristics.



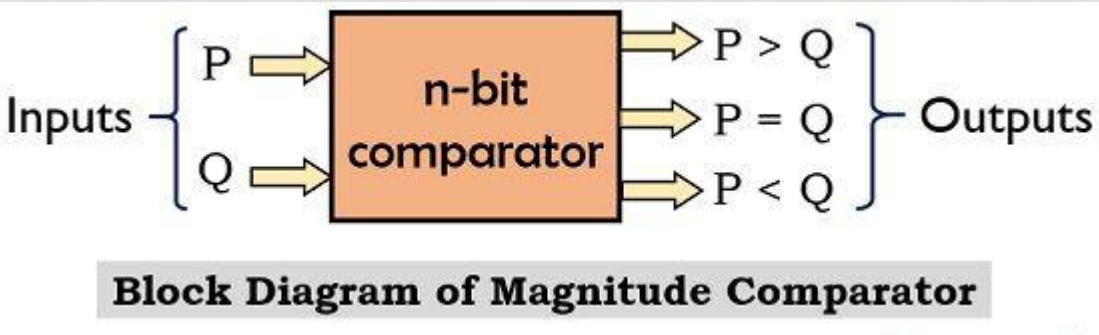
UNIT-III

Amplifier: Amplifier parameters, operational amplifier (OP-AMP), the VCVS model of an op-amp, Op-amp configurations: inverting and non-inverting, Difference amplifier, instrumentation amplifier, Op-Amp as: adder, subtractor, integrator etc. Filters: Concepts of low-pass, high-pass and band-pass filters, ideal (brick-wall) filter response, frequency response of simple RC filters, active RC filters using Op-amp.

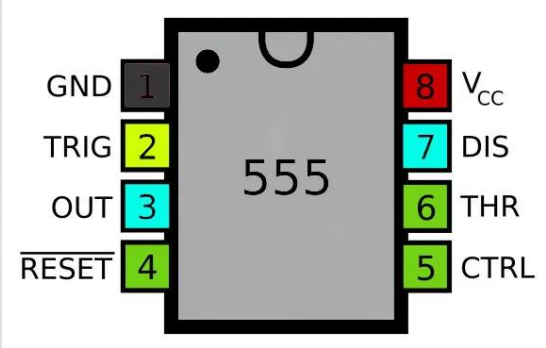


UNIT-IV

Op-amp based Comparator: inverting and non-inverting comparators, Applications: zero crossing detector, window detector, Schmitt trigger, square wave generator (Astable multivibrator), Monostable multivibrator, sine wave generator. 555 timers: functional diagram, monostable operation.

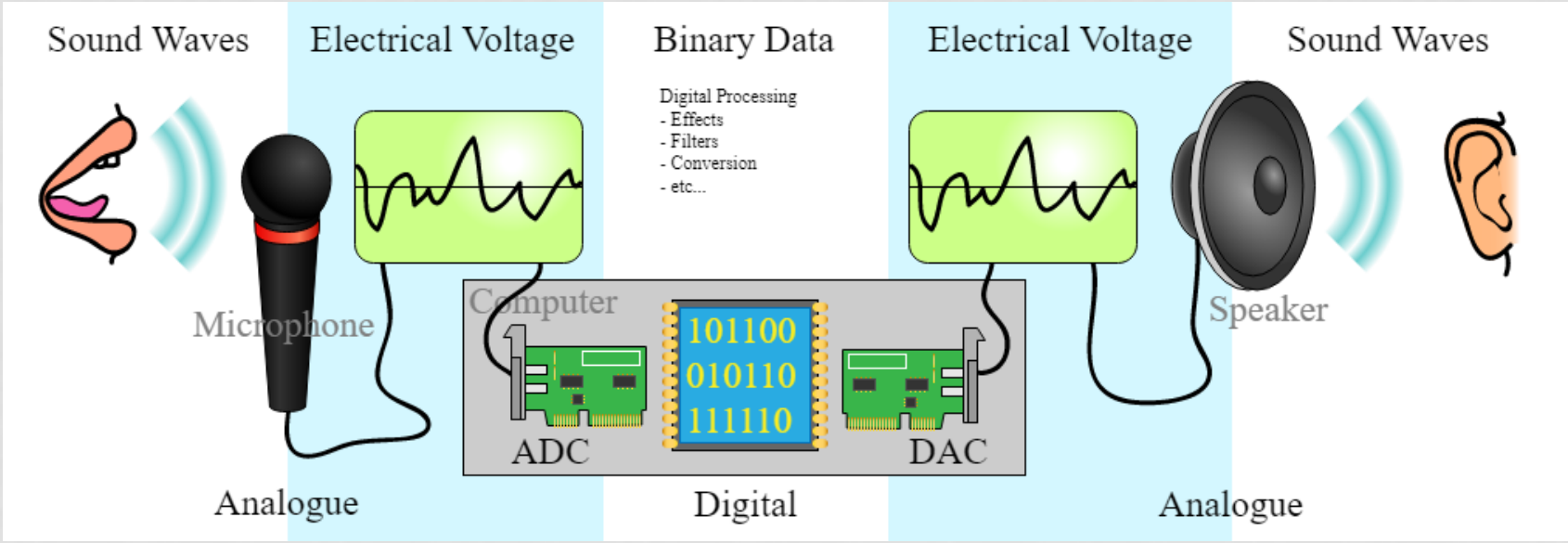


Block Diagram of Magnitude Comparator



UNIT-V

Analog-Digital conversion: Digital to Analog Converter (DAC) using binary resistor scheme, R-2R ladder DAC, Analog to Digital converter (ADC): Parallel comparator, ADC using counter and DAC, ADC using successive approximation.



TEXT BOOKS

- Circuits and Networks analysis and synthesis by **Sudhakar and Shyammohan**
- • Engineering circuit analysis by **Wiliam Hayt, Jr et. al.**
- • Microelectronic circuits theory and applications by **Sedra and Smith**
- • Electronic Circuits analysis and design by **D A Neamen**
- • Linear Integrated circuits by **Roy Chaudhary.**

GRADING POLICY

- 1. MID EXAM – 20%
- 2. End Exam – 30%
- 3. Class participation/surprise quizzes – 15%
- 4. Scheduled Quiz – 10%
- 5. LAB: 25%
- (a) Lab report – 10%
- (b) Lab Exam – 15%

LAB EXPERIMENTS

- 1. Familiarization of laboratory Equipment.
- 2. (a) verification of voltage and Current Division principles in the resistive circuits. (b) Diode Characteristics i) PN Junction Diode and ii) Zener Diode.
- 3. DC power supply: (a) Rectifier circuits (i) Half Wave Rectifiers (ii) Full Wave Rectifiers; (b) DC Power Supply.
- 4. Characteristics of BJT transistor in common emitter Configuration.

LAB EXPERIMENTS

5. Design of Operational Amplifier Configurations: a) Inverting Amplifier b) Non-Inverting Amplifier c) Summing Amplifier d) Differential Amplifier e) Instrumentation Amplifier.

- 6. Filters using Op-Amps (a) Low-pass, (b) High-pass, (c) Band-pass and (d) band Stop.
- 7. Design of waveform generators using Operational Amplifier: a) Sine b) Square c) Triangular
- 8. 555 timer based: (a) Astable, (b) Mono-stable, and (c) Schmitt Trigger.
- 9. Analog to Digital and Digital to Analog converters.

THANK YOU