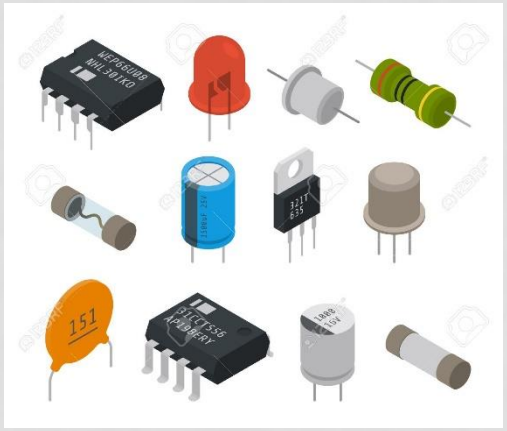
BASIC ELECTRONIC CIRCUITS

INSTITUTE CORE

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.



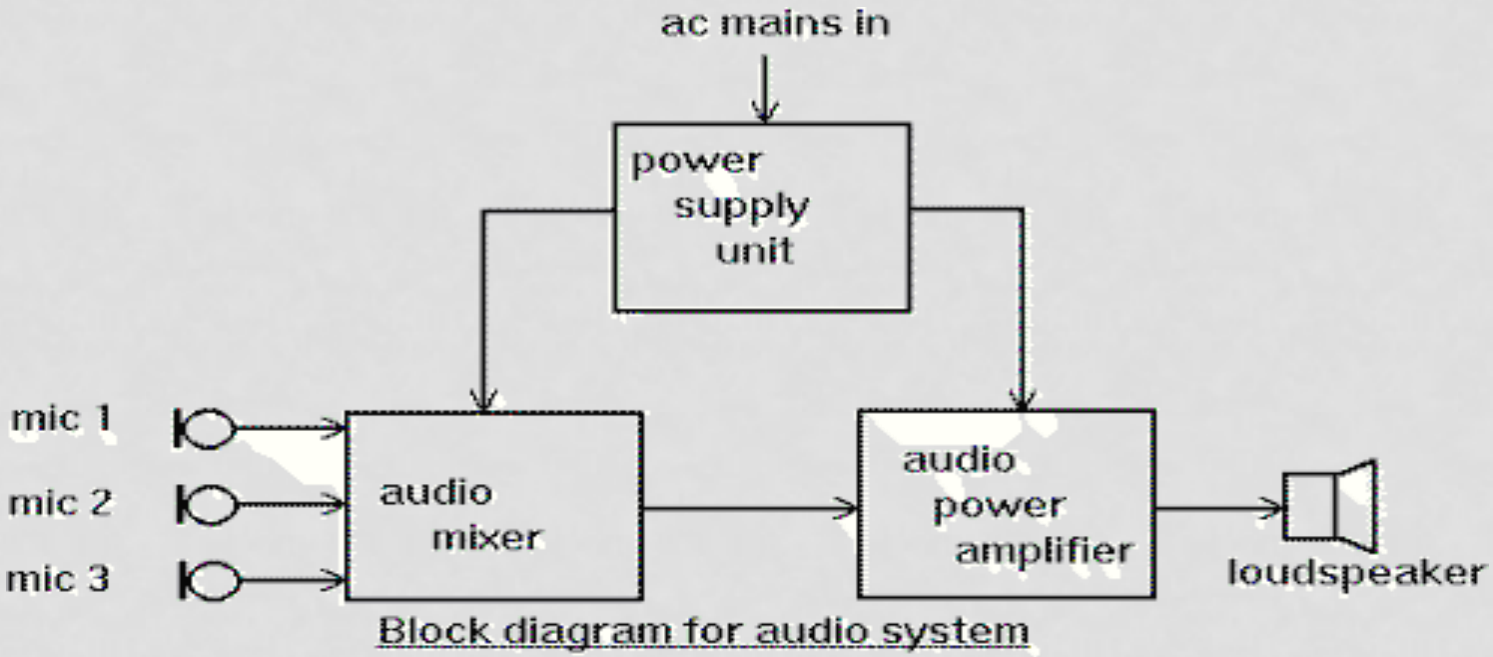
What is an electronic circuit?

is a path that directs and controls electric currents to perform some specified function

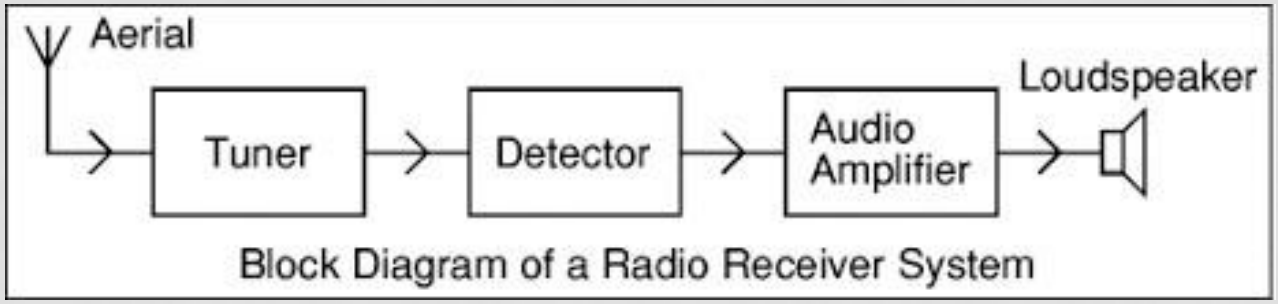
What is an electronic system?

composed of electronic circuits, which include amplifiers, signal sources power supplies and digital logic circuits.

EXAMPLES OF ELECTRONIC SYSTEMS



Block diagram for audio system

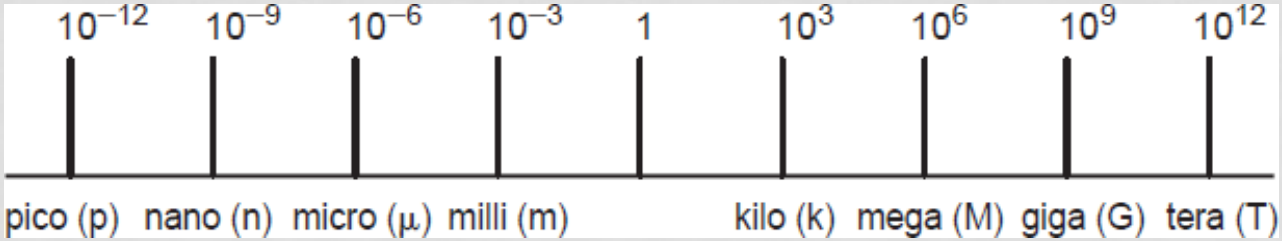


Block Diagram of a Radio Receiver System

SI UNITS CONTD..

Table 1: Fundamental quantities

Quantity	Unit	Abbreviation
Current	Ampere	A
Length	meter	m
Mass	kilogram	kg
Temperature	Kelvin	K
Time	second	s



SI UNITS

Table 2: Derived quantities

Quantity	Unit	Abbreviation	Equivalent	Symbol
Frequency	Hertz	Hz	s^{-1}	f
charge	coulomb	C	A s	Q
force	Newton	N	Kg m s^{-2}	F
Energy	Joule	J	N m	W
Flux (magnetic)	Weber	Wb	V s	Φ
potential	Volt	V	kg m^2 s^{-3} A^{-1}	V
Power	Watt	W	J s^{-1}	P
Resistance	Ohm	Ω	V A^{-1}	R
Inductance	Henry	H	V s A^{-1}	L
Capacitance	Farad	F	A s V^{-1}	C

- Basic quantities: Charge, Current, Voltage and Power
- Ohm’s Law: Resistance and Resistivity
- Kirchhoff’s laws
- Resistors in series and parallel

CHARGE

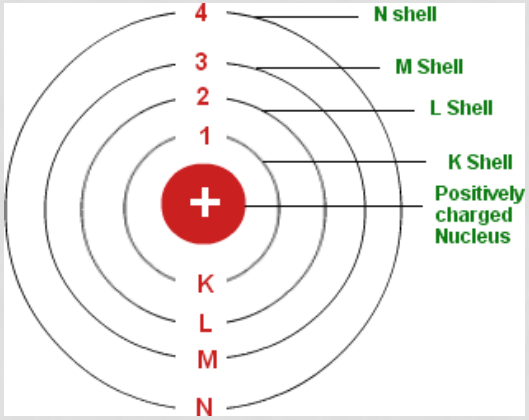
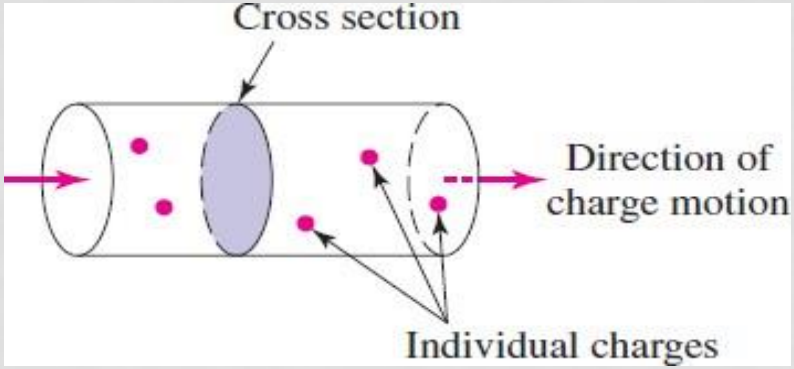


Fig. Bohr's Atomic Model

- Charge conservation: "Neither create nor destroy"
- Two type: +ve (proton) and –ve (electron)
- Electron flow is relevant
- Flow of +ve charge is important in understanding internal operation (Eg: battery, diode, and transistor)
- A single electron has a charge of -1.602×10^{-19} C

CURRENT



- Flow of charge leads to "CURRENT", in moving charge from one place

  to another, we also transfer energy from one point to another.
- Ex: electrical power transmission.
- Further, it is possible to vary the rate at which the charge is transferred in order to communicate or transfer information (Ex: communication systems)
- Measure of rate at which charge is moving past a given reference point in a specified direction.

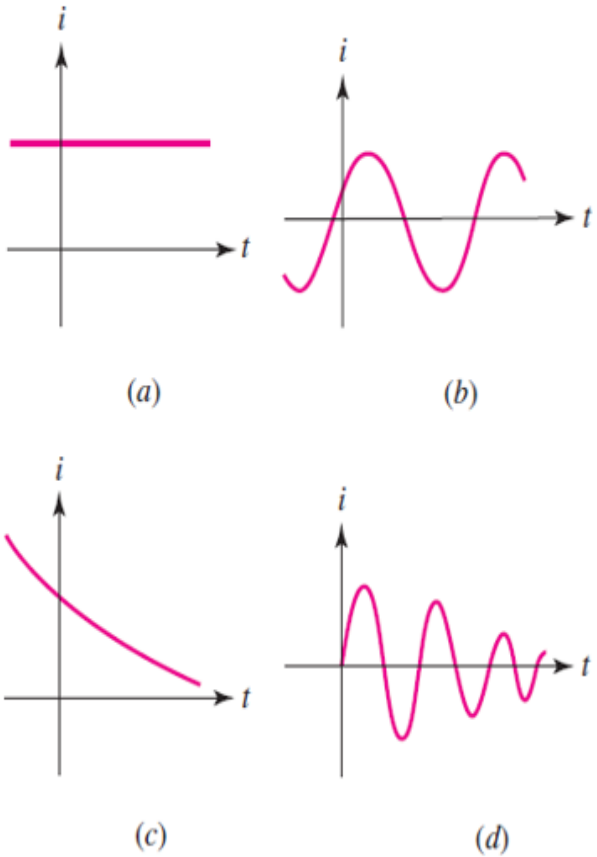


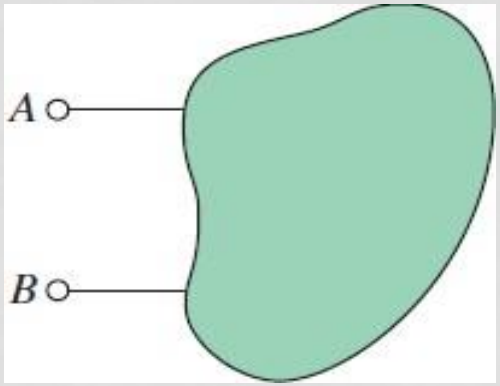
Fig. Several types of current

Fig. Representation of current

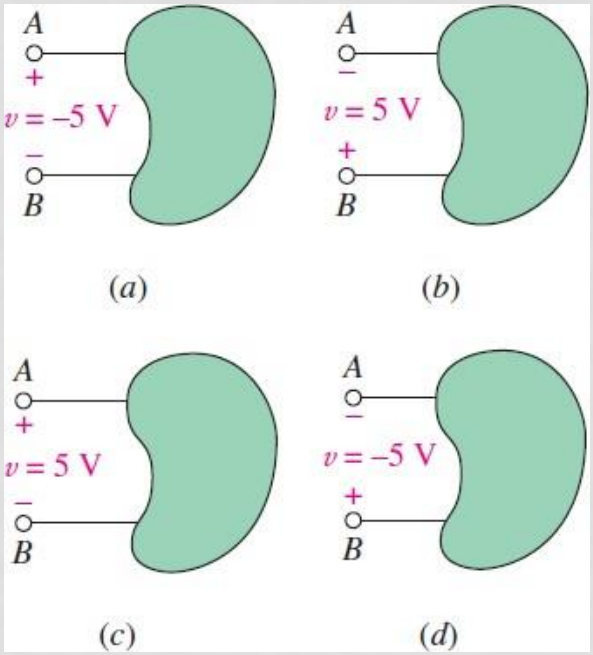
RELATION BETWEEN CHARGE & CURRENT?

VOLTAGE

- A DC current is sent into A and back out of B, Hence an electric voltage exists between the two terminals



An example of a two terminal circuit element.

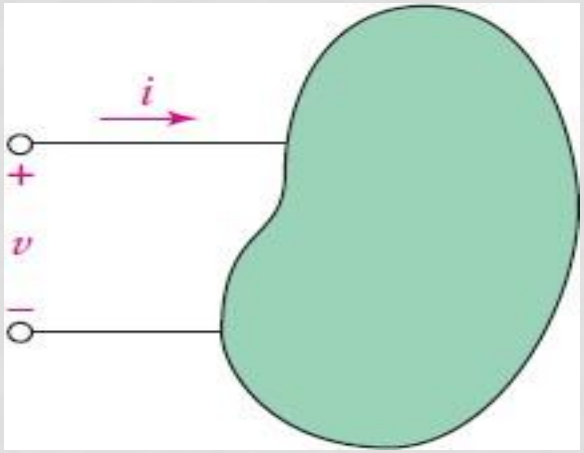


Terminal voltage representation.

POWER

- Rate at which the electrical energy is transferred.

$$P = VI$$

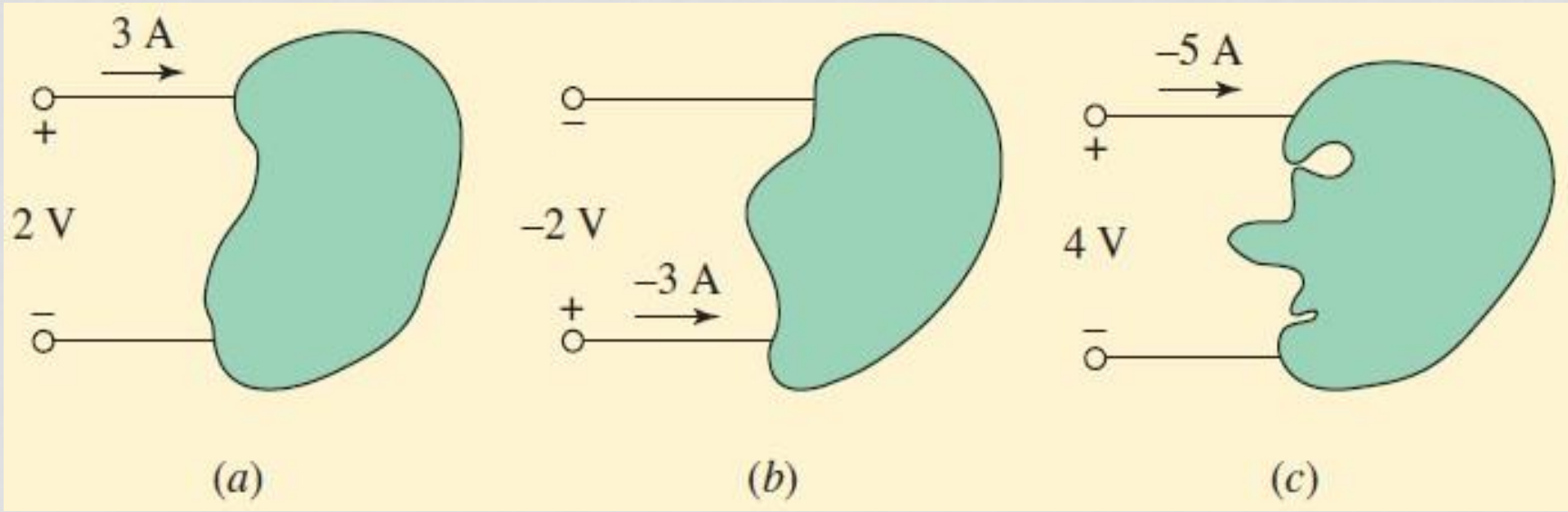


The power absorbed by the element is given by the product of P = VI.

- Units: Watt, Joule/sec
- Sign conventions: +10 J/s, -10 J/s

POWER

- Compute the power absorbed:



THANK YOU