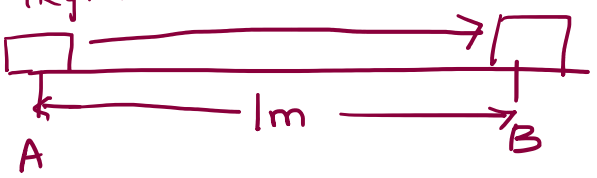
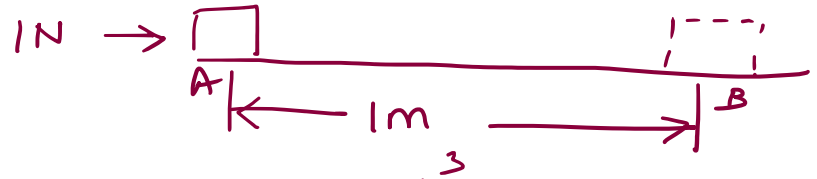
Force :- 1Kg. → 1 m/sec^2



1N

$1\,N = 1\ \frac{kg\,m}{s^2}$

Energy:- 1Kg



$1\,J = 1\,N\text{-}m$

$1\ unit = 1\ KWh = 1\ kWh$ (10^3)

Power : $\frac{dE}{dt}$;

✓ V = 220–230V

180V — 290V, 1Ø

✓ I = mA, 2A, 5A, 10A, 15A

✓ f = 50 Hz

Power Rating 'P' → 500W → → 750W → → 2.5 kW

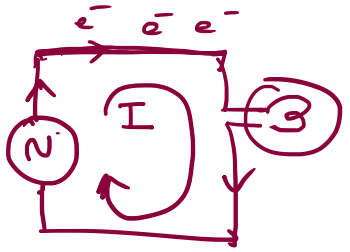
Energy Consumed by the Iron box over 2 hrs ⇒ Wh

$500\,W * 2\,hrs = 1000\,Wh = 1\,kWh = 1\ unit$

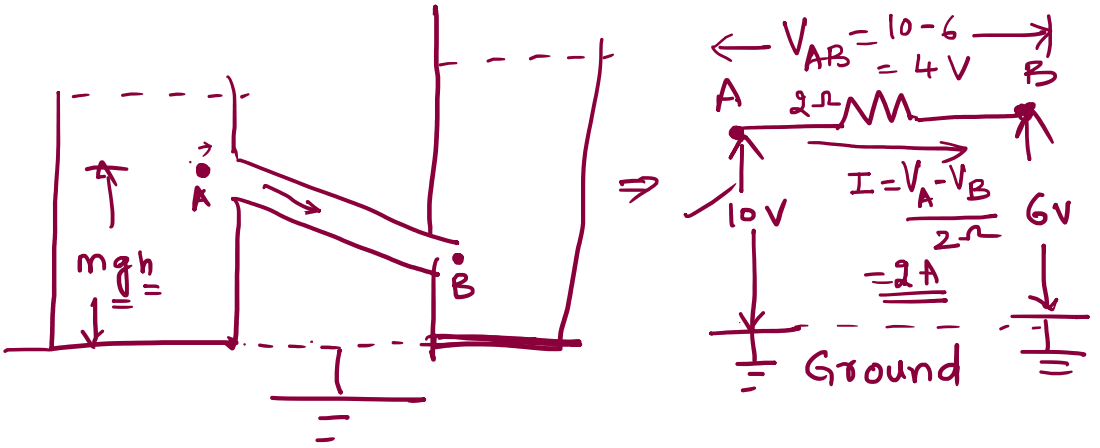
Voltage :- Is a force from an electric ckt power source that pushes charged e^- thro' a conductive loop, enabling to do a work [pumping H_2O, bulb lighting, etc]

e^- e^- e^-

loop, causing ... bulb lighting, etc.)

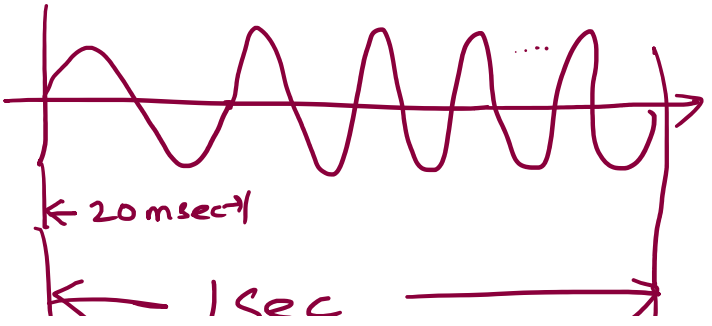


2) Voltage is the Potential difference b/w 2 points

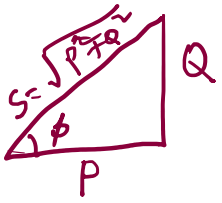


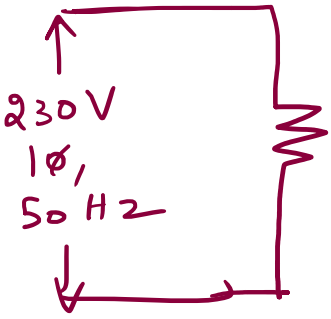
3) $\text{Voltage} = \frac{\text{Work done}}{1 \text{ coloumb}} = 1V = \frac{1J}{1 \text{ coloumb}}$

Quantity	Unit	Symbol
Charge	Coloumb (c)	C, Q, q
Current	Ampere (A)	I, i(t),
Voltage	Volts (V)	V, v(t)
Frequency	Hertz (Hz)	f = 50 Hz = 50 cycles/sec

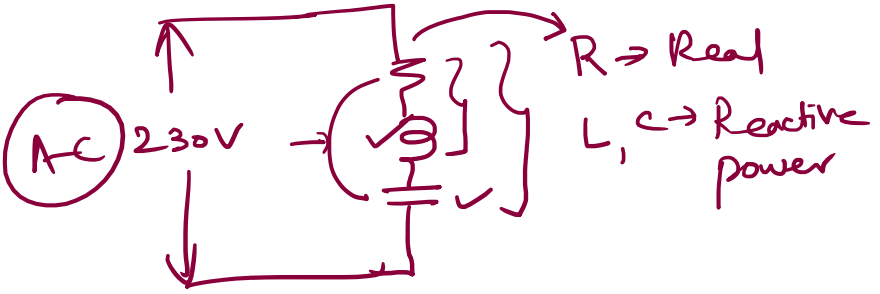


Power	Watt	P, p(t)
→ Real Power (W) P		
→ Imaginary Power (Reactive) "Q" (VAR)		
→ Apparent Power → VA		





Room heater
Iron, Induction stove
Immersion heat
P_{avg} = 500 W
Only Real Power (P)



Energy	Joule, Cal, Wh, Units → 1kwh	E.
Resistance	Ohms (Ω)	R, r(t)
Inductance	Henry (H)	L

Inductance	Henry (H)	L
Inductive Reactance	Ohms (Ω)	$X_L = \omega L$ $= (2\pi f) L$
Capacitance	Farad (F)	C
Capacitive Reactance	Ohms (Ω)	$X_C = \frac{1}{\omega C}$ $= \frac{1}{2\pi f C}$
Impedance	ohms (Ω)	$Z = R + jX_L$ (or) $= R + jX_C$ (or) $= R + j(X_L \pm X_C)$
Conductance	Mho (℧) Seimens	$G = \frac{1}{R}$
Ground	-	⏚ (or) ⏚

Resistance:

Material	Zero Resitance
Tungsten	−202°C
Copper	−234.5°C
Aluminium	−237°C

Aluminium	$-237^{\circ}C$
Silver	$-243^{\circ}C$

Electric Circuit Elements

- **Active Elements** (Capable of generating energy)
  - Battery, Amplifier, Generator
  - Voltage, Current Source
  - Voltage Source
- **Passive Elements** (Unable to generate energy)
  - R, L, C

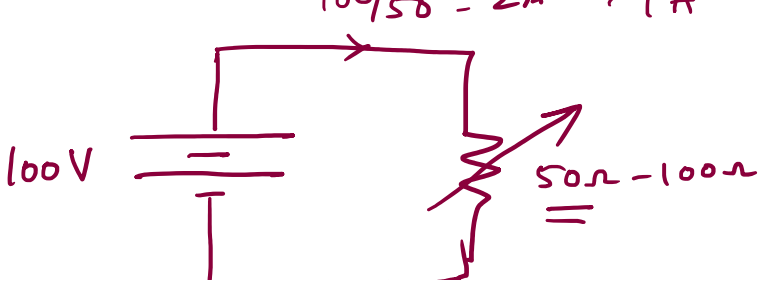
SOURCE

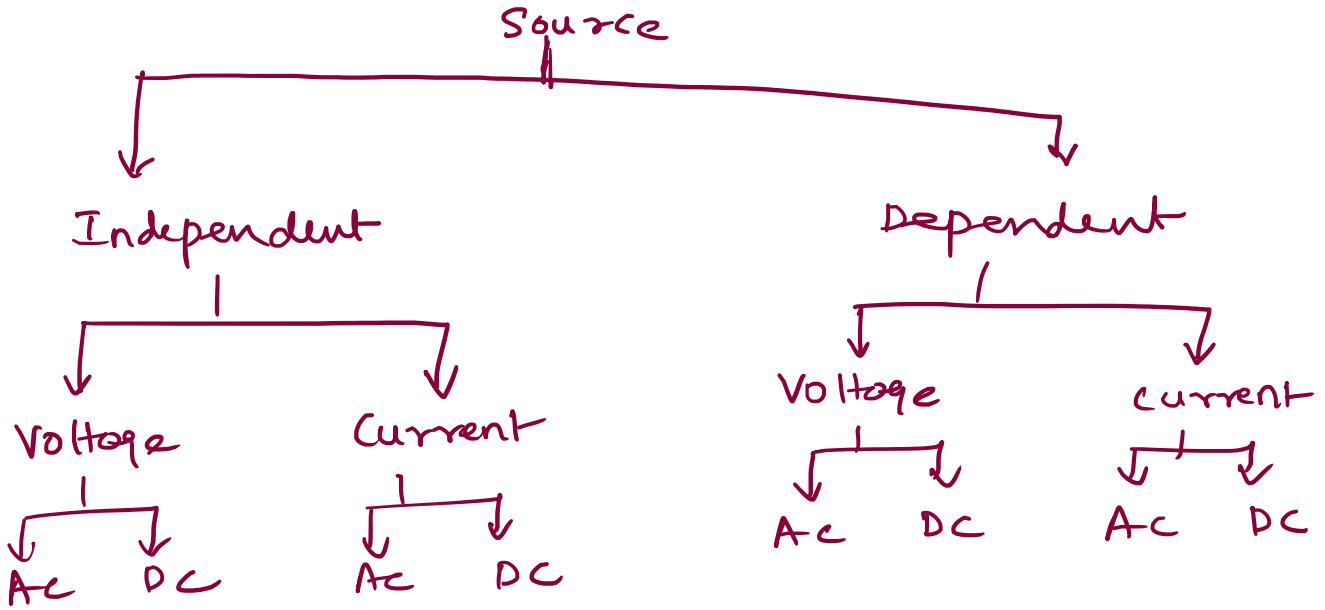
→ Solar energy → DC voltage source

→ Battery → " " "

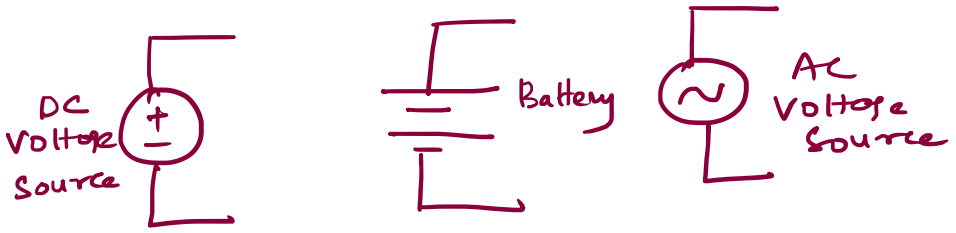
→ AC Generator → 3ϕ Ac; 1ϕ Ac

Independent Voltage Source

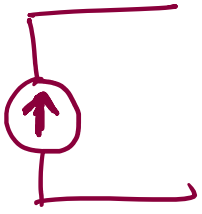




Independent Voltage Source



Independent Current Source



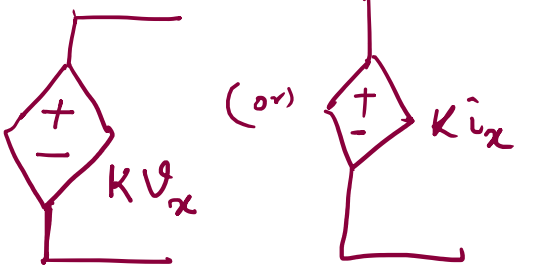
Vande Graff
Generator

Dependent Source

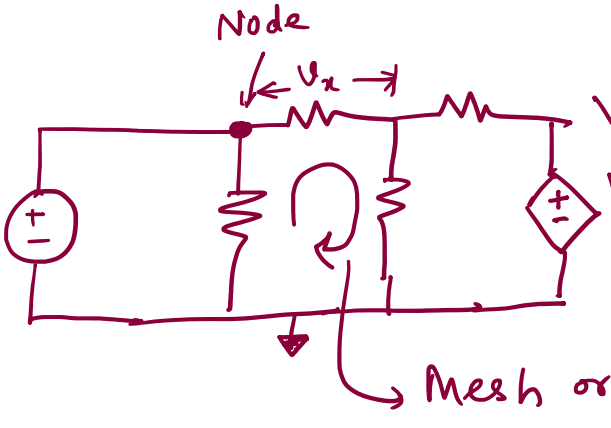
→ Transistors, operational-amplifier (op-amp), Integrated ckt

Dependent Voltage | Depende Current Sour

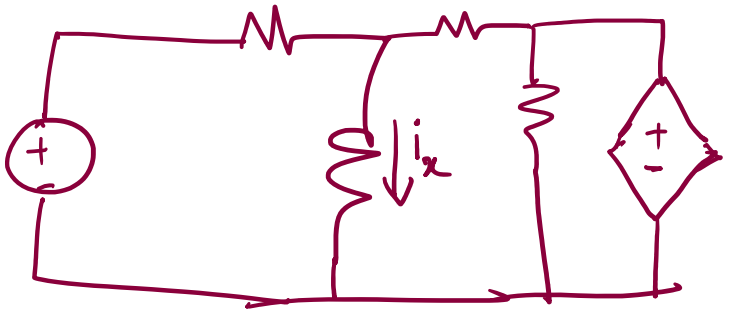
Dependent Voltage



Depende Current Sour

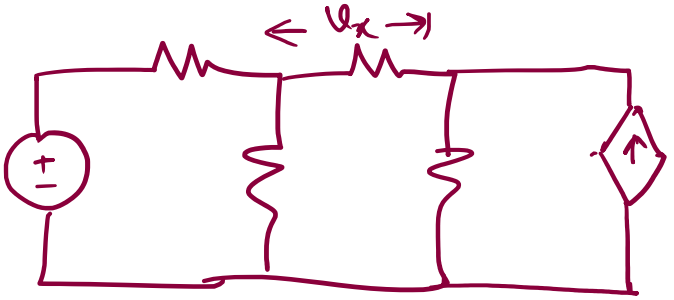


Voltage dependent Voltage Source

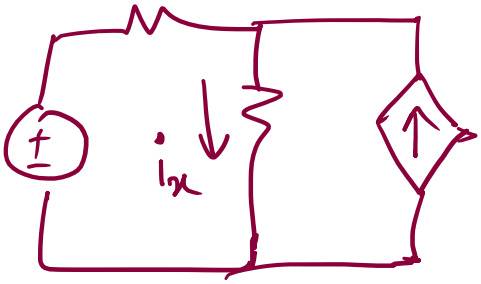


current dependent Voltage Source

Dependent Current Source



Voltage dependent current source



$I_D = k\, i_x$ → Current dependent Current Source

Ideal Voltage source