

FUNDAMENTALS OF ELECTRICITY

Lesson 3
EET 150



Electricity Fundamentals Learning Objectives

- ▣ In this lesson you will:
- ▣ examine the nature of work and energy.
- ▣ study the different types of energy and how they are converted.
- ▣ see the definition of potential difference for electric circuits.
- ▣ see how electric potential causes charges to move.
- ▣ study different voltage types.
- ▣ define electric current.
- ▣ define electric power.



Nature of Energy

What is energy?

Energy –capacity to do work

What is work?

Work Examples – motion, light, heat

Energy can neither be created or destroyed,
just converted to another form



Types of Energy

Potential Energy (Stored Energy)

Examples

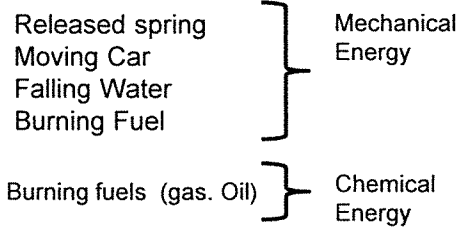
Water behind dam	}	Mechanical Energy
Compressed springs		
Gasoline or fuel oil	}	Chemical Energy



Types of Energy

Kinetic Energy (Energy of Motion)

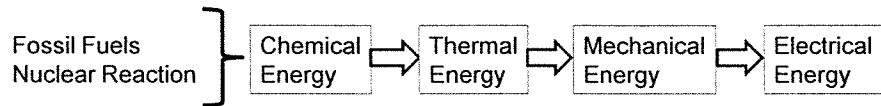
Examples



Energy Conversion

Electric energy produced from other forms of energy
(Potential and Kinetic)

Potential



Kinetic



Voltage (Potential Difference)

Energy source is necessary in all electric circuits.

Energy comes from voltage source.

Voltage is electrical pressure that produces force.

Force starts electrons moving.

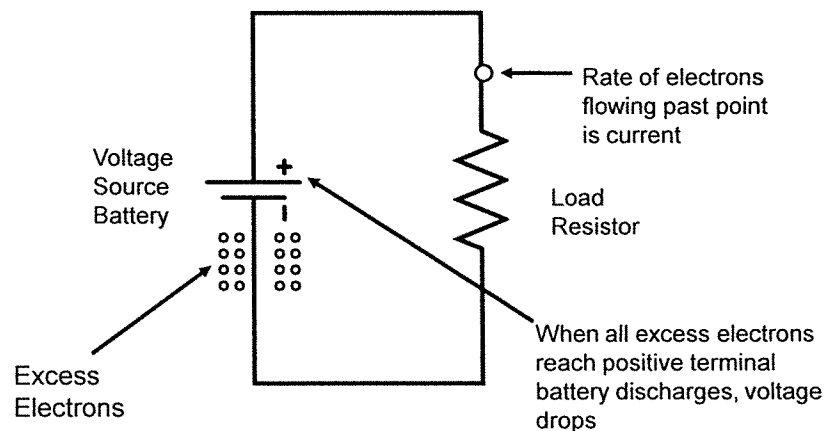
Voltage develops when there is excess of electrons across device terminals (Charge Difference)

Voltage Symbols = V or E Units (Volts, V)

Other names for voltage: electromotive force (EMF), potential difference

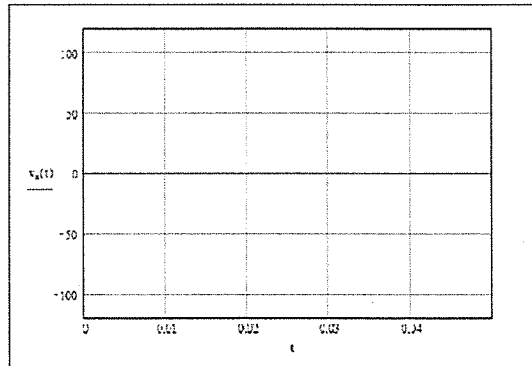


Potential Difference and Electrical Current



Voltage Types

Alternating (AC) Voltage changes polarity over time
Positive and negative values

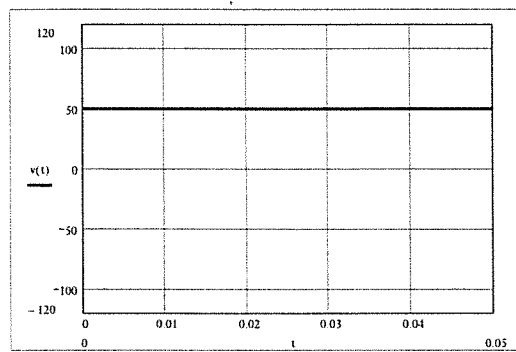


Examples

Home Outlets
Emergency Generators

Voltage Types

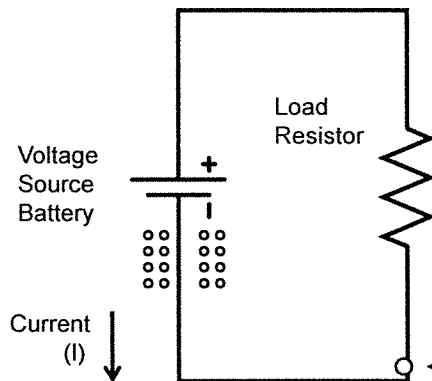
Direct (DC) Voltage – polarity of voltage never changes over time. Always positive or negative with respect to other terminal.



This is pure DC.

Electric Current

Electric currents are flow rates of electrons moving through circuits
(Electron charges/sec)



Analog: gallons per minute through pipes

Current Symbol: I Units Amps (A)

Also Milliamps (mA) = $1/1000$ A
And Microamp (μ A) = $1/1,000,000$ A

Current can be either AC or DC

Rate of electrons
flowing past point
is current

Electric Power

Electric Power is rate of energy conversion or doing work

Symbol: P , Units: Watts (W)

Active Power, P , is $P = VI$ for dc circuits

Examples of active power

Heat

Light

Motion

Apparent Power, S , is $S = VI$ for ac circuits

Units: voltamperes (VA)

Fundamentals of Electricity

End Lesson 3 EET 150

Coming Next: DC Voltage Sources-
Batteries and Power Supplies



