

GENERATION OF ELECTRICITY

PRODUCTION OF ELECTRICITY

Electrical energy can be produced in a number of methods. The four most common are **pressure, chemical, thermal, and light**.

LIGHT:

- 1, solar cell or a photovoltaic cell is a device that converts light energy into electricity
- 2, the device contains certain chemical elements that when exposed to light energy, they release electrons
- 3, Photons in sunlight are taken in by the solar panel or cell, where they are then absorbed by semi conducting materials, such as silicon.
- 4, Electrons in the cell are broken loose from their atoms, allowing them to flow through the material to produce electricity.
- 5, The EMF generated by this method is a small continuous voltage that when connected to a circuit produces a **direct current (DC)**.

HEAT: thermocouples

- 1, thermocouples are widely used as temperature sensors
- 2, thermocouples are pairs of dissimilar metal wires joined at least at one end, which generate a voltage between the two wires (have different conductivity) that is proportional to the temperature at the junction
- 3, different metal combinations have a different voltage difference
- 4, Thermocouples are used in aviation as ways to measure:
 - a) cylinder head temperatures,
 - b) inter turbine temperature
 - c) exhaust gas temperature
- 5, The EMF generated by this method is a small continuous voltage that when connected to a circuit produces a **direct current (DC)**.
- 6, In case of uniformly heated wires no potential difference between the wires can exist because under identical temperature conditions there is no thermal gradient to produce a current.

FRICTION

- 1, the production of electricity by friction refers to the build up of static electricity when non-conductive materials are rubbed together
- 2, A transfer of electrons occurs resulting in an imbalance of charges between the materials

PRESSURE

- 1, this form of electrical generation is commonly known as piezoelectric
- 2, result of the application of mechanical pressure on a dielectric or non-conducting crystal.
- 3, If a crystal of quartz is squeezed, charges of opposite polarity **will appear on two opposite surfaces of the crystal.** ■
- 4, If the force is reversed and the crystal is stretched, charges will again appear, but **will be of the opposite polarity** from those produced by squeezing. ■
- 5, **EMF generated by this method** is a small alternating voltage, and when connected to a circuit produces a small **alternating current (AC).**

CHEMICAL SOURCE

- 1, Chemical energy **can be converted into electricity; the most common form of this is the battery**
- 2, a chemical reaction between the metals and the chemicals frees more electrons in one metal than in the other.
- 3, The **two** metallic materials are called **electrodes** and the **solution** is called the **electrolyte**; **these together form an electrochemical cell**
- 4, **The EMF generated by this method** is a continuous voltage that when connected to a circuit produces a **direct current (DC).**

MAGNETISM AND MOTION SOURCE

- 1, **a conductor is moved through the magnetic lines of flux created by a magnet or electromagnet**

2, electromotive force is created, and current flow produced for use by various electrically operated devices and components.

EMF generated by this method is a small alternating voltage, and when connected to a circuit produces a small **alternating current (AC).**

PHOTO-CELLS

- 1, Photo-cells are a source of electricity with applications in electronics and electronic control of mechanical systems
- 2, **Light contains electromagnetic energy that is carried by photons.**
- 3, **The amount of energy depends on the frequency of light of the photon.**
- 4, When a photon strikes a semiconductor atom, it raises the energy level above what is needed to hold its electrons in orbit. The extra energy frees an electron enabling it to flow as current.
- 5, **The current can be used in a circuit to initiate any number of actions such as energizing a coil to close a circuit enabling its operation.**

