ELECTRONICS DEVICES AND CIRCUITS

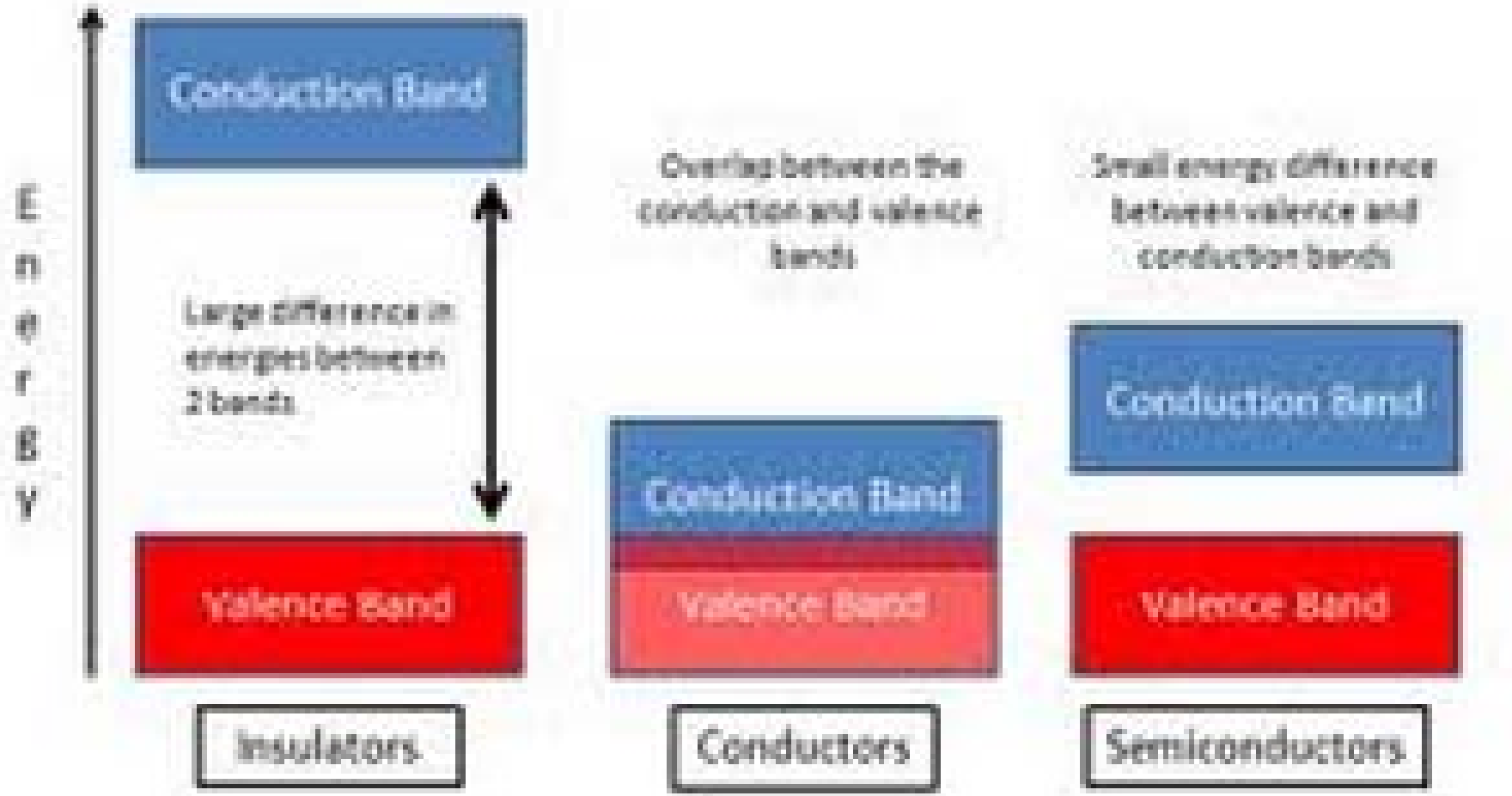
Section A

Conducting Materials

OBJECTIVE

ELECTRICAL CONDUCTIVITY OF METALS, SEMICONDUCTORS AND INSULATORS.

ENERGY BAND DIAGRAM



Energy Band Diagram :-

- The range of energies that an electron may possess in an atom is known as the energy band.
- Valence Band
- Conduction Band
- Forbidden Band

Conductors

- The materials in which conduction and valence bands overlap as shown in figure are called conductors.

- → The overlapping indicates a large number of electrons available for conduction.
- → Hence the application of a small amount of voltage results a large amount of current.

Semiconductors :

→ The materials, in which the conduction and valence bands are separated by a small energy gap (<3eV) are called semiconductors.

→ Silicon and germanium are the commonly used semiconductors.

→ A small energy gap means that a small amount of energy is required to free the electrons by moving them from the valence band in to the conduction band.

→ The semiconductors behave like insulators at 0^0K, because no electrons are available in the conduction band.

→ If the temperature is further increased, more valence electronics will acquire energy to jump into the conduction band.