37 th Series SPP

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DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING
[ACCREDITED BY AICTE-NBA, RECOGNIZED RESEARCH CENTER OF VTU BELGAUM]

HYBRID SOLAR AND TEM SYSTEM FOR WASTE HEAT RECOVERY (SPP:37S1360)

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Chapter-1: Introduction

1.1 OVERVIEW

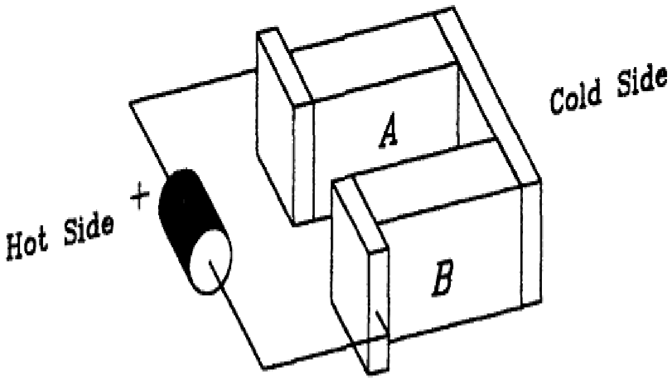

Fig 1.1:Thermoelectric effects

1.1.1 THERMOELECTRIC EFFECTS

Three thermoelectric effects are known; the Seebeck, Peltier, and Thomson effects.

1. **Seebeck Effect**

Consider the junction of two materials, A and B. If a temperature differential exists between the two junctions, one junction may be referred to as the hot side and the other the cold side. An open circuit voltage can be measured between the two junctions. This net conversion of thermal energy into electrical energy under zero current conditions is known as the Seebeck effect. The voltage observed, referred to as the Seebeck voltage, is proportional to the temperature differential between the hot and cold sides of the couple:

$$dEs \propto dT$$

$$dEs = \pm \alpha dT$$

$$Es = \pm \int_{T1}^{T2} \alpha dT \ (V)$$

where

Es = Seebeck voltage (V)
α = Seebeck coefficient of material (V/°C)