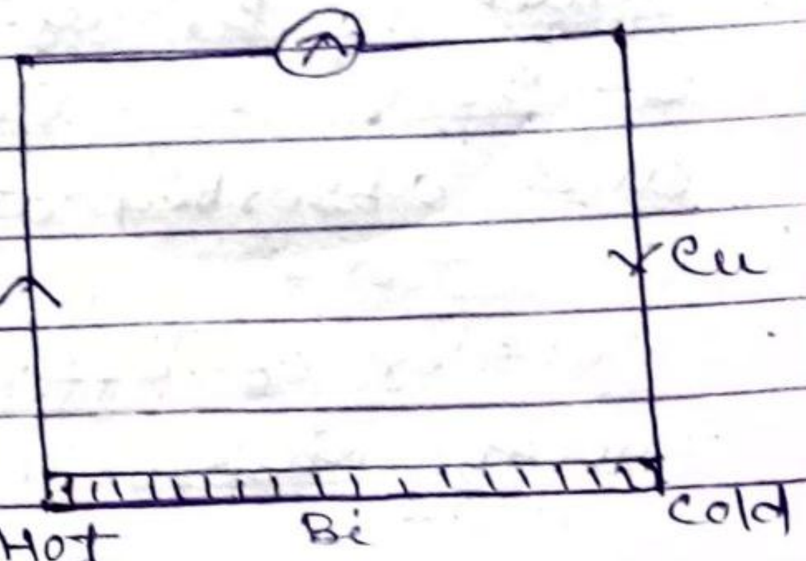
Notes for
B.Sc. Part-II
Paper - IV(5)

"Thermo-electricity"

Seebeck-effect :- In 1821 Seebeck found that a "current flows in a circuit consisting of two dissimilar metals when one function is heated while the other function is kept cold." This was remarkable experiment because no cell was used in the circuit.

He connected a plate of Bismuth two Copper wires connected to a galvanometer. He found that if one of the junction was heated, while the other was kept cold, then a current flows Through the galvanometer.



The current Produced in this way without the use of cell or battery is known as thermo-electric current and the branch of electricity is known as thermo-electricity. The effect is known as Seebeck-effect.

Peltier-effect :- It was discovered by Peltier in 1834 that if a current was sent round the circuit of a thermo couple, heat was evolved at one function and absorbed at the other.

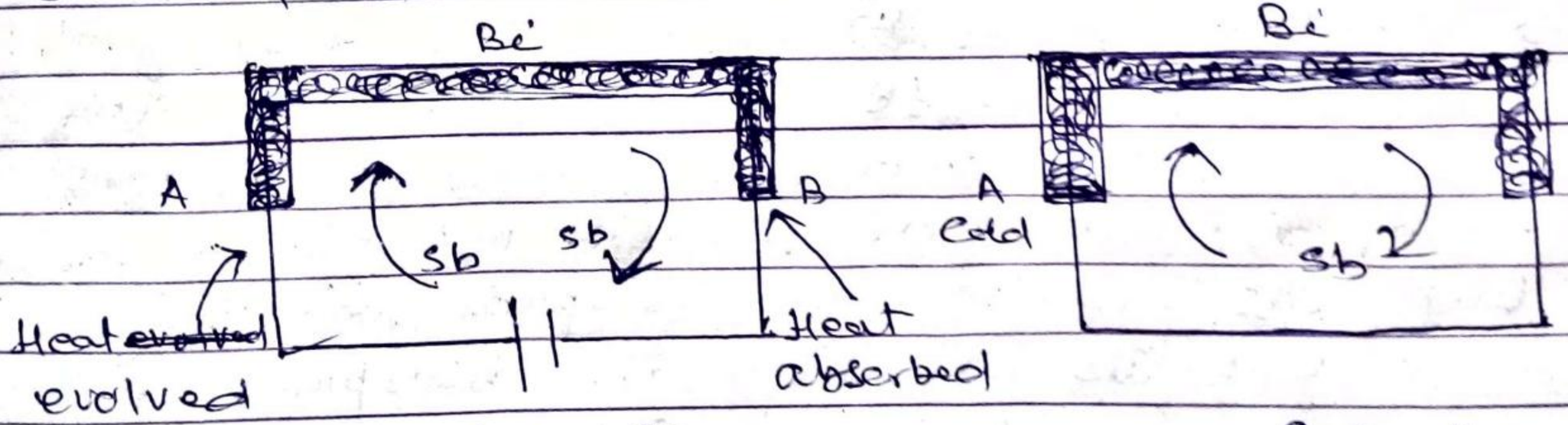


fig - (a) fig - (b)

In an Sb-Bi couple, when the junction B is heated and A is kept Cold, current flows from Sb to Bi, →

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→ at the junction A and from Bi to Sb at the junction B (fig(b)). when a battery is placed in the circuit and both the junction A and B are kept at the same temperature, heat is evolved at the junction A and absorbed at junction B, provided the current flows from Sb to Bi at the junction A and from Bi to Sb at the junction B (fig-@). when the direction of the current is reversed, the heat is evolved at the junction B and absorbed at A. This shows that Peltier effect is reversible.

Peltier Co-efficient :— It is the amount of heat energy absorbed or evolved at a junction when a unit current flows for one second. when the Peltier Co-efficient is represent as π and a current of I amp is passed for t seconds, then energy absorbed or evolved = $\pi I t$ joule.

If e volt is the junction P.D. Set up then

$$e I t = \pi I t \quad \text{or} \quad e = \pi$$

The Peltier Co-efficient is not constant but depends on the temperature of the junction.

Thomson ~~Co~~-effect :— ~~It is the heat energy~~ ~~absorbed~~ or Thomson in 1856 suggested that when a current flows through unequally heated conductors, the heat energy is evolved or absorbed not only at the junctions but its evolution or absorption not only at the junctions but its evolution or absorption also takes place throug out the metals of the thermocouple. This effect is reversible. In the case of Copper and the hotter Parts are at a heigher Potential than the colder ones and is opposit in the case of iron.

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