INTRINSIC SEMICONDUCTOR
Lecture-3

TDC PART -1

PAPER 1(GROUP B)

Chapter -4

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TYPES OF SEMICONDUCTOR

- Intrinsic Semiconductor
- Extrinsic semiconductor

- THESE ARE THE TYPES OF SEMICONDUCTOR WHICH ARE DIVIDED BY THE PRESENCE AND THE QUANTITY OF IMPURITIES

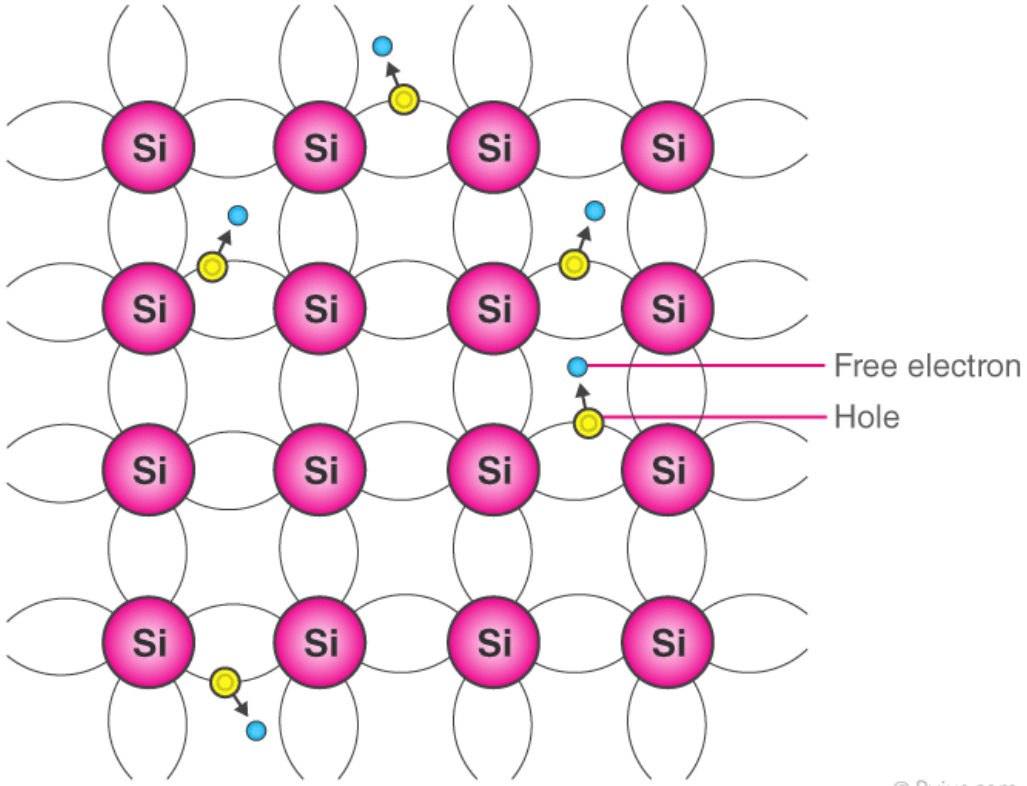
Intrinsic Semiconductor

- At zero K very high field strengths (~ 1010 V/m) are required to move an electron from the top of the valence band to the bottom of the conduction band
- $\Rightarrow$ Thermal excitation is an easier route

- Intrinsic Semiconductors are THE PURE FORM OF SEMICONDUCTOR. Here ,In these types of semiconductor no external impurities are added to incraese or decraese the conductivity

Electronic Configuration of Silicon and Germanium

Silicon	$1s^2\ 2s^2 2p^6\ 3s^2\ 3p^2$
Germanium	$1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 4s^2\ 3d^{10}\ 4p^2$



SOME OF THE IMPORTANT FEATURES

- Materials are in the pure form. (no doping is done)
- Free electrons in conduction band is equal to the numer of holes in valence band.
- Electrical conductivity is low and completely dependent on tempreture only.

ENERGY BAND REPRESENTATION (at 0 degree)

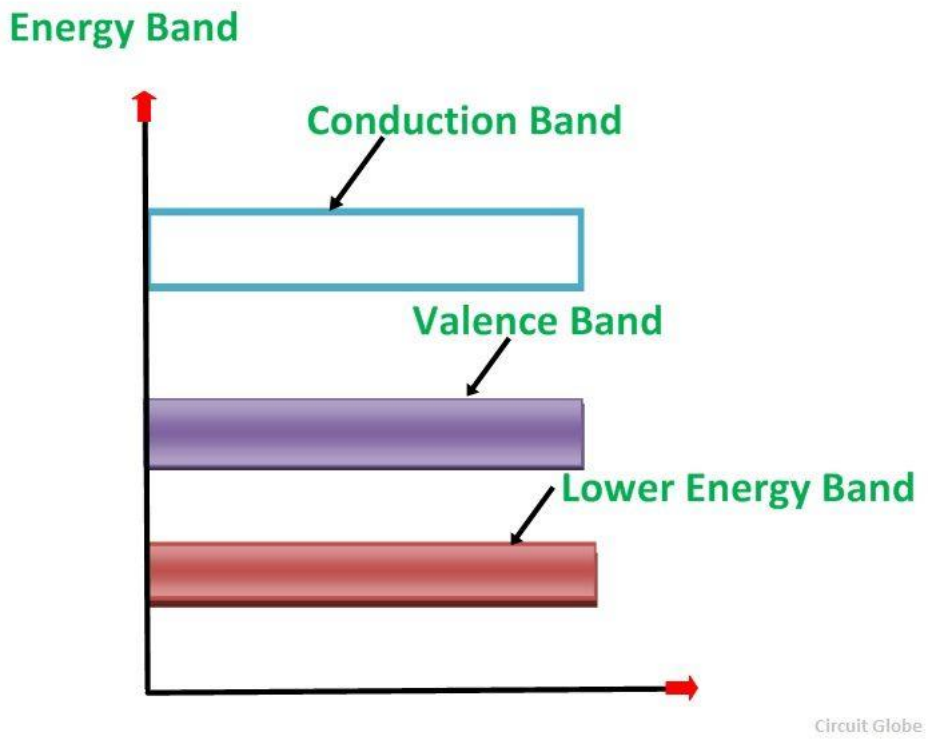


Fig-1, Lecture 3

- An intrinsic semiconductor at absolute zero temperature is shown.
- Here,we can see its conduction band is completely vacant and valence band is completely filled.

ENERGY BAND REPRESENTATION (wHen the temp. rises)

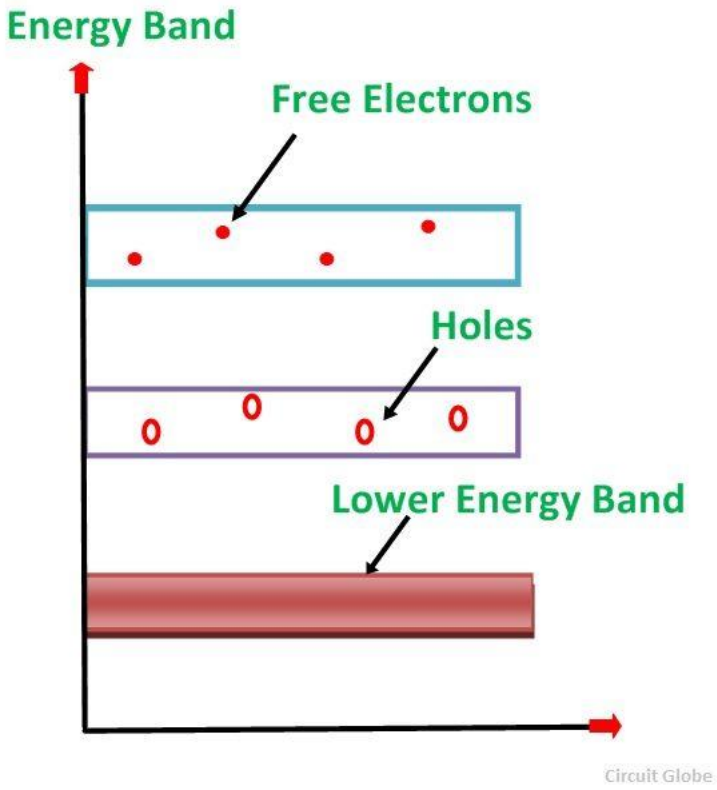


Fig-2, Lecture 3

- When the temperature is raised , some of the valence electrons are lifted to conduction band leaving behind holes in the valence band as shown.
- Electrons reaching at the conduction band move randomly and so does the holes.

Outcome of energy band

- The above behaviour of the semiconductor shows that they have a negative temperature coefficient of resistance.
- which means that with the increase in temperature, the resistivity of the material decreases and the conductivity increases.

SOME OF THE IMPORTANT QUESTIONS

- WHAT IS DOPING OF SEMICONDUCTOR?HOW CAN WE CHANGE intrinsic semiconductor into extrinsic semiconductor
- difference between intrinsic semiconductor and extrinsic semiconductor
- energy band diagram of semiconductors.