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By- Ramesh Sir

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⇒ Krishna Kumar Sir
Branch - Electronics

Ramesh

- Electronics : The study of the motion of the electron inside a semi-conductor is known as Electronics ; Also called as semi-conductor Physics (Dynamics of the e^- in semiconductor)

- A charge is the fundamental property of a particle responsible for electric force.

- Mass is fundamental property of the particle respo-nsible for gravitational force.

- Types of charges :

  i) Positive & Negative.

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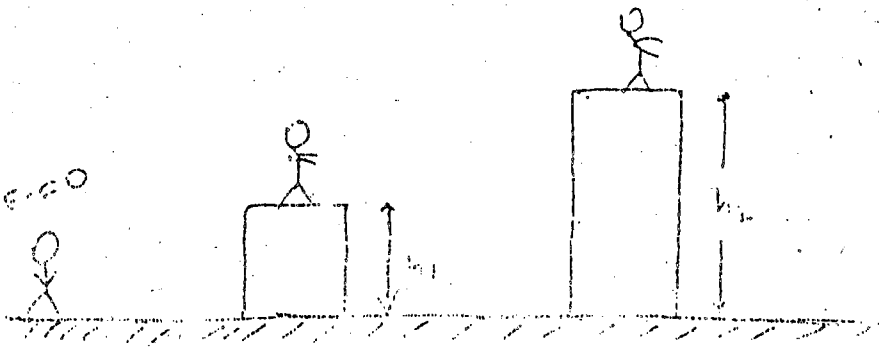
Potential Energy :

- Energy possessed by a body by virtue of its position
- Its expression is :

$$P.E. = mgh$$



Just like Earth is reference for objects to get the potential energies, nucleus is treated as reference based on which electron possible potential energy values can be defined.

According to the Quantum Mechanics, the allowed states should satisfy the condition of angular momentum of e^-; i.e.

$$\boxed{mvr = \frac{nh}{2\pi}} \quad ; \quad n = 1, 2, 3 \ldots\ldots$$

'h' → Plank's constant

Energy level is simply the position of an empty space with nucleus as reference and giving some P.E. value.

Electronic ckts are of three types:

1) Analog circuits
2) Digital circuits
3) Mixed circuits.

$mvr = \frac{nh}{2\pi}$

- Device which can act as energy source is called Active Device.

▷ PASSIVE DEVICE:

- In passive devices the ~~type~~ time average power delivered to the device over an infinite time period is always greater than or equal to zero.

→ Ionization Potential:

- This is the energy required to remove an e^- from outer orbit of an atom

→ Electronegativity:

- A tendency of an atom to attract an electron to itself during the formation of bonds with other atoms.

→ WORK FUNCⁿ:

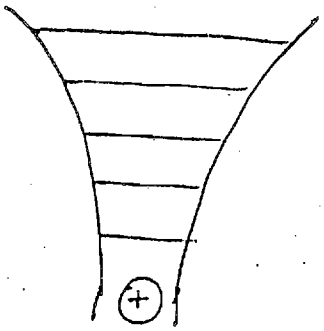
- The minimum amount of energy required for an e^- to escape from the metal at absolute zero.

→ POTENTIAL WELL:

- Atom can be represented in the form of a potential well with the nucleus as reference

and from the nucleus the increased potential energy values.

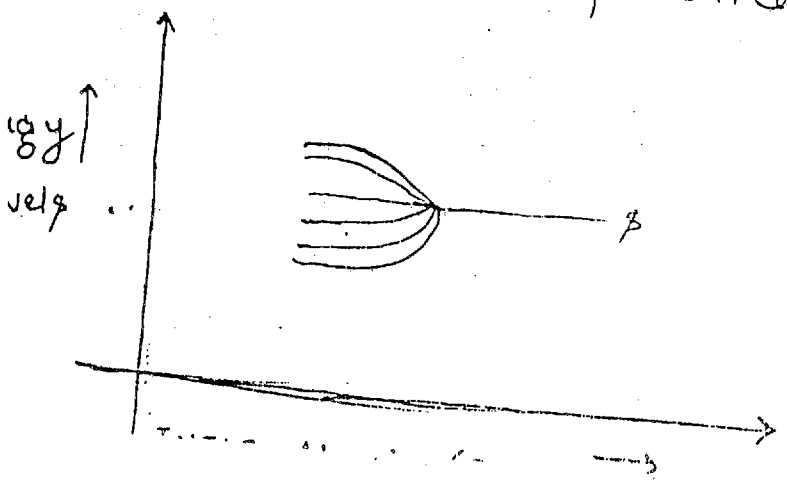
Fig. →



- According to the quantum mechanics e^- is treated as a wave and 'ψ' is wave function ~~of the~~ and it can have so many possible solutions

These possible soln$^{n}_{s}$ are nothing but possible potential energy values for the electrons which group only known as Energy BAND.

An isolated atom will have ~~one~~ single possible potential energy value for its electron, but by the neighbouring atoms influence the different possible P.E. values can be represented as shown



the possible potential energy values by 'n'-number of atoms should be considered.

- Among these energy levels same energy possessed energy levels can be overlapped known as orbitals hybridization. Eg: s-s hyb'n ; p-p hyb'n. and so on.

- These orbitals hybridization causing the formation of bonding and anti-bonding levels i.e. valence band and conduction band respectively and all these together treated as Energy Band of the material.

The above energy levels overlapping must be treated with Pauli's Exclusion principle and the concerned figures are as follows:

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