2024 – 25

Semiconductor Electronics

Recall what did you study in previous class

Semiconductors

I. Semiconductors behave both like conductors and insulators they behave like conductors when temperature is increased. They behave like insulators at low temperature i.e. 0 Kelvin (0 K) Ex. silicon and Germanium
II. In all solids, different energy levels combine to form two bands.
III. Valence band (VB) contains valence electrons which may be partially or fully filled.
IV. Conduction band (CB) contains free electrons which may be empty or partially filled.
V. The energy difference between valence band and conduction band is called forbidden energy gap.
VI. The forbidden energy gap is less for conductors and large for insulators and in between for semiconductors.
VII. Pure semiconductors are called intrinsic semi conductor Ex. Silicon and Germanium (Si and Ge).

P-N Junctions Diode

I. A p-n junction is a single piece of semiconductor one half of which is p-type and the other half is n-type
II. The region near the junction is called depletion layer.
III. There are two types of connection of diode
Forward bias
Reverse bias
IV. When p-type is connected to positive and n-type connected to negative terminal then it is forward biased.
V. In forward bias it offers minimum resistance, depletion region is narrowed. It is similar to 'on' in an electrical switch.
VI. In reverse bias p-type is connected to negative terminal and n-type is connected to positive terminal
VII. In reverse bias it offers maximum resistance, does not conduct and depletion region is widened. It is similar to 'off' in an electrical switch.

Zener Diode

I. A properly and highly doped p-n junction diode which operates in reverse bias condition is called 'Zener diode'.
II. Silicon is preferred for making Zener diodes.
III. Zener diode is operated in reverse bias, which operates at a voltage called 'Zener voltage'.
IV. Zener diode is used as a 'Voltage regulator'

Transistors

I. Transistor means transfer resistor
II. There are two types of transistors called
(a) npn transistor
(b) pnp transistor
III. In transistor there are three terminal called emitter, base and collector
IV. Current gain of common emitter configuration is the ratio of small change in collector current to a small change in base current when collector emitter voltage is constant.

V. Transistor works as an amplifier and switch

VI. Amplifier is a device which converts weak signals to Strongs, and this process of converting weak signals to strong signals is called amplification

VII. Amplifiers are of two types
   (a) Power amplifier
   (b) Voltage amplifier

VIII. The amplifier which is used to raise the power level is known as 'Power amplifier'

IX. The amplifier which is used to raise voltage level is known as 'Voltage amplifier'.

PW Web/App - https://smart.link/7wwosivoicgd4
Library- https://smart.link/sdfez8ejd80if