



NATIONAL INSTITUTE OF TECHNOLOGY RAIPUR (C. G.)

DEPARTMENT OF PHYSICS Syllabus for BASIC ELECTRONICS

Unit-1 Solid State Physics

Crystalline and amorphous solids, coordination number, atomic radius, density of packing, Miller indices, separation between lattice planes, reciprocal lattice, determination of crystal structure, Bragg's law, formation of energy bands in solids, classification of solids as conductor, insulator and semiconductor, charge neutrality equation, Fermi level in intrinsic and extrinsic semiconductors, dependence of Fermi level on impurity concentration.

Unit-2 Electro-Magnetic Theory

Basic idea of gradient, divergence and curl, line, surface and volume integrals, Gauss's divergence and Stoke's curl theorems continuity equation for charge and current, Ampere's law and its inconsistency for time varying fields, concept of displacement current density, Maxwell's equation, wave equation for E & H, propagation of electro magnetic – waves in dielectric medium, energy density in electromagnetic field: Poynting vector.

Unit-3 Solid State Devices

Transistor: fabrication and working of NPN & PNP transistor in CB and CE modes, input and output characteristic curves, transistor as a switch, FET (J-FET & MOSFET), FET as

switch, Amplifier and their types, Oscillators, Operational Amplifier, Hall effect.

Unit-4 Digital Electronics

Digital and analog circuits, number system and their conversions, Boolean arithmetic, De – Morgan laws, basic logic gates: their realization and applications, Universal gates, Exclusive – OR and Exclusive NOR-gates. A/D and D/A converter

Unit -5 Lasers & Fiber Optics:

1. Lasers: Temporal and spatial coherence of light waves, Principal of laser, Laser characteristics, Basics Component of Laser, Principal and working of Ruby, He-Ne & semiconductor lasers, applications of lasers, Basics concepts of Holography.
2. Fiber Optics: Optical fibers: introduction, advantages, structure & classification, Principle of propagation in fibers, acceptance angle and cone, numerical aperture, attenuation & distortion, basic concepts of optical communication.