Course Title: Solid State Devices  
Course Code: PHYS 314
Level: B.Sc. (Applied Physics)  
Cr. Hrs: 3
Year: III  
Semester: II

Course Objectives: This course is designed for the students to know the different types of solid state devices like bipolar junction transistor, optoelectronic devices, thin film transistor and operational amplifiers that are commonly used in practice. At the end of this course students will have a good idea of optoelectronic devices like solar cells, photo detectors and MIS diodes, principle and characteristics of oscillators and applications of operational amplifiers.

1. Physics of Semiconductors: Semiconductor materials, Qualitative and Quantitative analysis of homojunction, Depletion width, Potential Barrier, Capacitance, Diffusion Capacitance, Continuity Equation, Graded homojunction, Tunnel diode, Characteristics of tunnel diode, p-i-n diode, Current voltage relation, Characteristics of p-i-n diode, Point contact diode, IMPATT diode, TRAPATT diode. [12 Hrs.]

2. Bipolar Junction Transistor: Gummel-Poon model, Hetrojunction and Hetrojunction devices. [4 Hrs.]

3. Optoelectronic Devices: Solar cells, Photodetectors, Charge-coupled device, MIS diode. [6 Hrs.]

4. Thin Film Transistor: Silicon on insulator, SOI devices Hex, FET, Nonvolatile memory devices, Floating gate devices, MIOS devices, V-Groove FET, Multichannel FET. [6 Hrs.]


6. Oscillations: Introduction, Classification, Barkhousen criterion for oscillation, Hartely oscillator, Colpits oscillator, Phase shift oscillator, Wien bridge oscillator, UJT relaxation oscillator, Astable, Monostable and bistable multivibrators. [10 Hrs.]

References


