

PPH439: ELECTRONIC AND OPTOELECTRONIC MATERIALS

L	T	P	Cr
3	1	0	3.5

Course Objectives: The course aims at to introduce the behavior of different types of semiconducting materials to the students.

Semiconductors: Element and compound semiconductors, Conduction mechanisms, Amorphous semiconductors, Oxide and magnetic semiconductors.

Junction Devices: Contact potential, Metal-semiconductor contact and its properties, P-N junction, Potential barrier and barrier width, Forward and reverse saturation current, junction capacitance.

Optoelectronic Materials: Luminescence from quantum well, Photo luminescence and phosphorescence, Phototransistors electro luminescence process, Light emitting materials, Materials of LEDs, Polymer LEDs, Organic semiconductors and molecular electronics, Semiconductor lasers.

Materials for Optical Communication: Electro-optic effect, Kerr and Pockels effect, liquid crystal displays and display materials, TN and STN effect.

Course Learning Outcomes (CLO):

Students will have understanding of

1. the mechanism of charge transport in semiconductors
2. absorption and emission of light from semiconductors and related devices
3. the use of materials for optical communication

Recommended Books:

1. Sze, S.M., *Physics of Semiconductor Devices*, Wiley, (2007).
2. Bhattacharya, P., *Semiconductor Opto-electronic Devices*, Prentice-Hall of India, (2006).
3. Wilson, J., and Hawkes, J.F.B., *Optoelectronics*, Prentice-Hall of India, (1988).
4. Singh, J., *Semiconductor Devices*, John Wiley & Sons, (2001).