SEMESTER -IV			
ELECTIVE - I LASER AND ITS TYPES			
Code : 19PPHE41	**Hrs/Week: 6**	**Hrs/Semester: 90**	**Credits:5**

Vision

To present the various aspects of the foundations, designs, operation and applications of laser along with the fundamentals of light matter interaction.

Mission

To gain a good knowledge about the building blocks of lasers and a significantly enhanced understanding of how lasers work and which type of lasers are most relevant for specific performance and subsequent applications.

CO No.	Course Outcomes Upon completion of this course, students will be able to	PSOs addressed	CL
CO 1	Recall the forms of Polarisation modifiers	1	Re
CO 2	Explain the laser Exposition Pumping methods	1	Un
CO 3	Examine the confinement of laser beam with resonator	1	An
CO 4	Design the basic structure of p-n junction laser	1	Cr
CO 5	Interpret population inversion by the method of collision	1	Ev
CO 6	Compare semiconductor and gas lasers	1	Un
CO 7	Identify plasma and non-plasma schemes	1	Ap
CO 8	Find the scientific and historical origin of laser	1	Re

Unit 1: Peculiar Properties of Laser Light

Light waves – Monochromaticity – Brightness – Directionality – The laser Speckle Pattern – Light Interference – Coherence-Correlation – Measuring coherence – The Fabry-Perot Interferometer – The Michaelson Interferometer – Polarisation – Forms of Polarisation – Polarisation Modifiers.

Unit 2: Types of Lasers

Laser Exposition Pumping Methods – Photodissociation Laser – Ion and Atomic Laser – Molecular Laser – Electroionisation Laser – Chemical Laser – Plasma Laser – Confinement of Beam with Resonator.

Unit 3: Semiconductor Lasers and Gas Laser

Introduction – Basic concepts – Threshold Condition for Oscillation – Basic Structure of (p-n) Junction Laser – Confinement of Electromagnetic Radiation in p-n Junction – Quantum well Lasers – Introduction to Gas Laser – Population Inversion by Collision – Energy Levels of Helium and Neon – Design of He – Ne laser – CO_2 Laser

Unit 4: Far Ultraviolet and X-Ray Lasers

Introduction – Mossbauer Line Narrowing – Survey of Current XUV Laser – Non Plasma Schemes – Plasma Schemes: Collisionally Pumped Ne- like Se – X-Ray Laser Cavity – Uses of X-Ray Lasers.

Unit 5: Highlights in the Development of Laser

Laser: An Optical Achievement – Scientific and Historical origin of Laser – Highlights with Ammonia Beam – Analogous Phenomena in Nature – Einstein's Relation – Stimulated Emission, Population Inversion and Gain – Three Levels System – Properties of Laser Light

Books for study:

1. B M K Prasad, LASERS Techniques and Applications.

Books for reference:

1. John Gowar, Optical Communication System, Second Edition
2. John M Senior, Optical Fibre Communications Principles and Practice, Second Edition
3. Dr. R. K. Kar, Optics (Classical & Quantum)