Indian Institute of Information Technology, Design and Manufacturing Kancheepuram

Introduction of New course

Course Title	**Engineering Optics**	Course No	**PH2000**			
Department/ Specialization	Physics	Credits	L	T	P	C
			3	1	0	4
Faculty proposing the course	Dr. Vivek Kumar	Status	Core □		Elective ■	
Offered for	UG	Type	New ■		Revision □	
To take effect from	March 2021	Submitted for approval	44th Senate			
Prerequisite	Nil					
Learning Objectives	• To introduce the principles of physical optics and application of the physical concepts to topical engineering domains. • Understand basic lasing action, study various types of lasers and to have basic idea of fiber optics.					
Learning Outcomes	• Interpret the intensity variation of light due to Polarization, interference and diffraction. • Learn the concept and operating principles of optical instruments. • State the working principle of lasers and describe its applications.					
Course Contents (with approximate breakup of hours for lecture/ tutorial/practice)	**Module 1:** Wave Optics (L17+T8) • Interference- Introduction to waves, Coherence (Spatial and Temporal), Principle of Superposition, Young's double slit experiment, Interference by wave front division and by amplitude division and examples. • Diffraction- Fresnel and Fraunhofer diffraction, Fraunhofer diffraction due to double slit. Diffraction grating and its applications. • Polarization- Introduction, Malus' law, Polarization by reflection and Brewster's law and applications. **Module 2:** Laser Basics (L8+T3) • Laser operation, Absorption, Spontaneous Emission and Stimulated Emission, Population & Inversion, Three- and FourLevel Laser Systems, Laser Characteristics- Types of Lasers: Solid-State Lasers, Gas Lasers, Semiconductor Lasers. **Module 3:** Applications (L16+T3) • Interferometers: Michelson interferometer, Fabry-Perot interferometer, Mach-Zehnder interferometer, Sagnac interferometer. • Fiber optics: Fermat's principle and Snell's law, optical fiber: principle and construction, acceptance cone, numerical aperture, types of fibers, Applications.					
Essential Reading	1. Eugene Hecht, Optics (5th edition), Pearson (2019). 2. A. Ghatak, Optics (4th edition), Tata Mcgraw Hill (2009).					
Supplementary Reading	1. William T. Silfvast, Laser Fundamentals, Cambridge University Press (2004). 2. John Crisp and Barry Elliott, Introduction to Fiber Optics, Elsevier (2005). 3. Warren J. Smith, Modern Optical Engineering, McGraw-Hill (2007).					