Course Code	Course Name	Credits
26PH105	FIBER OPTICAL PHYSICS	04

Course Objectives

- To familiarize students with fiber communication
- To realize the significance of optical fiber communications and to understand the construction and characteristics of optical fiber cable.
- To identify and understand the operation of various optical detectors.
- To under the design of optical systems

Learning Outcomes

Upon successful completion of this course it is intended that a student will be able to:

- Understand the knowledge of communication using optical fibre.
- Gain the knowledge of optical source of data transfer.
- Know how to design various optical systems.

Unit 1 - Optical fibers (12 Hrs.)

Light guidance through optical fibers, the qualitative idea of critical, modes of propagation, propagation mechanism acceptance angle, types of fibers, numerical aperture, V- Number, intermodal & material dispersions in fiber.

Unit 2 – Types and application (12 Hrs.)

Types of optical fibers, Attenuation and Mention of expression for attenuation coefficient. Discussion of block diagram of point to point communication, Optical fiber sensors- Intensity based displacement sensor and Temperature sensor based on phase modulation, Merits and demerits, Numerical problems.

Unit 3 - Sensors (12 Hrs.)

Fiber optic sensors – intensity modulated sensors – phase modulated sensors – Fiber optic Mach- Zehnder interferometric sensor–Fiber based plasmonic sensors.

Unit 4 – Fiber optics in communication system (12 Hrs.)

Introduction – harmonic generation – relationship between refractive index and light intensity in a nonlinear regime – second harmonic generation (SHG) – factors influencing SHG- optical parametric oscillator.

Unit 5 - Optical Communication (12 Hrs.)

Optical fibre waveguide, modes in optical fibres, pulse distortion and information rate in optical fibre, distortion in single mode fibre, fibre losses, connector principle, lateral and angular misalignment, end separation, splices, dispersion characteristics: intra and inter modal dispersion, dispersion modified fibre, coupling of source with fibre, modulation, PCM, multiplexing, WDM, TDM, solitons.

Reference Books:

1. Fiber Optics and Optoelectronics, R. P. Khare, OXFORD University Press.
2. R. P. Khare, “Fiber Optics and Optoelectronics”, OXFORD University Press.
3. Introduction to Fiber Optics, A. Ghatak& K. Thyagarajan, Cambridge University

Websites and eLearning Sources:

1. https://onlinecourses.nptel.ac.in/noc20_ph07/preview
2. https://youtu.be/q37CpocWZyw?si=f_pxToApaCm28ALb
3. https://youtu.be/-dV9o-O9Dqs?si=yZPGt8BPe-Iw47ZW

COs and Bloom's Taxonomy Mapping – 26PH105		
Course Outcomes	**On successful completion of this course, students will be able to**	**BTL**
CO1	Rememberand understand the key concepts of optical fibers, including light propagation, critical angles, types of fibers, and dispersion mechanisms.	K1, K2
CO2	Apply theoretical concepts and mathematical techniques to solve problems related to optical fiber communications and sensors, demonstrating their ability to use formulas and models effectively.	K3
CO3	Analyze experimental data from fiber optic sensors to identify patterns and correlations, as well as evaluate the performance of different types of sensors.	K4
CO4	Evaluate different optical communication techniques and fiber optic sensors critically, discussing their merits, demerits, and applicability in real-world scenarios.	K5
CO5	Createindependent research proposals related to optical fibers, formulating hypotheses and developing innovative solutions for problems in optical communication and sensing technologies.	K6

BTL (Bloom's Taxonomy Level) - K1 – Remembering, K2 – Understanding, K3- Applying, K4 – Analyse, K5- Evaluate and K6 - Create

Relationship Matrix – 26PH105													
Course Outcomes	**Programme Outcomes (POs)**						**Programme Specific Outcomes (PSOs)**						**Mean Score of Cos**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	**PSO6**	
CO1	3	2	2	1	1	1	3	2	2	1	1	1	1.67
CO2	2	3	3	1	1	1	2	3	3	1	1	1	1.83
CO3	2	2	3	2	1	1	2	2	3	2	1	1	1.83
CO4	2	2	2	3	2	2	1	2	2	3	2	2	2.17
CO5	1	2	2	3	3	3	1	2	2	3	3	3	2.33
												Total	1.97

Mean Score: 3- High, 2- Medium/Moderate, 1-Low