EC407: Optical Communication

Details of course:

Course Title	Course Structure			Pre-Requisite
	L	T	P	
Optical Communication	3	0	2	Basics of Electromagnetic Theory

Course Objective:To introduce fundamental and advanced concepts of Optical Communication

Course Outcomes:

CO1: Describe the vector nature of light, and its propagation mechanism inside an optical fiber (ray and mode theory)

CO2: Apply mode theory to differentiate between the different kind of optical fibers based on their light transmission and dispersion characteristics

CO3: Illustrate the working principles of optical sources (LEDs and LASERS)

CO4: Evaluate the performance of different types of photodetectors, optical switches and optical amplifiers

CO5: Design an optical communication system and evaluate its power and time budget

S. No.	Content	Contact Hours
Unit 1	Ray model, Introduction to the vector nature of light, Propagation of light, Wave model, Introduction to Modes, Modal analysis of a step index fiber, Different types of optical fibers	8
Unit 2	Signal degradation: Attenuation, Dispersion, Types of Dispersion: Material, waveguide and modal dispersion, Graded Index Fibers; Manufacturing of optical fibers	6
Unit 3	Optical Sources: LEDs and LASERs, Efficiency, Performance Metrics	6
Unit 4	Photo-detectors: PN, PIN and APD photodetectors Responsivity, Quantum Efficiency, Speed of photodetectors, Noise	6
Unit 5	Optical Receivers: BER Calculation, Quantum limit, Thermal noise and shot noise limit; Optical link design: Power and time budget of an optical link	8
Unit 6	Optical Switches: Types, Performance Metrics, Electro-optic Switch; Optical Amplifiers: Introduction, Comparison of OAs, EDFA; Optical Modulators; Introduction to Non-linearity, Non-linear effects (Second harmonic generation, Cross phase modulation)	8
	Total	42

Books:-

S. No	Name of Books/Authors/Publisher
1	Fibre Optic communication/J.Keiser/ 2nd Edition, McGraw-Hill 1992.
2	Optical communication systems /J.Gowar/ Prentice Hall India1987.
3	Optical Fiber Communication: Principles and Practice/ John M. Senior/2nd Edition 2002