

Branch Name:	Information and Communication Technology
Program Code:	ET107
Semester/Year:	Semester VI/ Third Year
Course Title:	Optical Communication
Course Code:	2ET1070601T
Pre-requisite:	Semiconductor Physics, Electromagnetic, Basics of Communication System

Course Objective:

1. To introduce the students to various optical fiber modes, configurations and various signal degradation factors associated with optical fiber and to study about various optical sources and optical detectors and their use in the optical communication system, optical amplifiers, fiber network elements, basic optical components, and techniques of fiber optic measurement.

Teaching and Examination Scheme:

Credit	Teaching Scheme Hours per week				Evaluation Scheme (Marks)								
					Theory (Marks)				Practical (Marks)				Total (Marks)
	L	T	P	Total	SEE		CCA		SEE		CCA		
					Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	
3	3	-	-	3	24	60	16	40	-	-	-	-	100

Subject Contents:

Sr. No.	Topic	Total Hrs.	Weightage %
1	Introduction to optical fiber Communication: Basic network information rates, Evolution of fiber optic systems, Elements of an optical fiber transmission link, Advantages and disadvantages of optical fiber system, fiber optic cables, Fundamentals of Light Propagation in Optical Fiber, Numerical aperture, Multimode Fibers, Single Mode Fibers, Step Index and Graded Index (GI) fibers, Attenuation and Dispersion.	10	22
2	Optical Sources and Photo Detectors: Light emitting diode (LEDs) - Structures, Materials, Characteristics & Modulation, Laser Diodes -Modes & threshold condition, Structures, Single mode lasers. Photo Detectors Principles of operation, types, characteristics, figure of merits of detectors photodiode materials, photo detector noise, detector response time, temperature effects on gain, comparison of photo detectors.	10	20
3	Optical Amplifiers: Semiconductor optical Amplifier, EDFA, Raman Amplifier, Wide band Optical Amplifiers.	6	12
4	Overview of Optical Components: Optical couplers, Tunable sources and Filters, optical MUX/DEMUX, Arrayed waveguide rating, optical add drop multiplexer (OADM), optical circulators, attenuators, optical cross connects, wavelength converter, Mach-Zender Interferometer.	9	18

5	Advances in Optical Fiber Systems: Principles of WDM, DWDM, Telecommunications & broadband application, SONET/SDH, MUX, Analog & Digital broadband, optical switching.	7	16
6	Fiber Optical Measurements: Test equipment, OTDR, Set ups for Measurement of Attenuation, Dispersion, NA and EYE pattern.	6	12

List of Reference Books:

1. Optical Fiber Communications by Gerd Keiser, 5th Edition (Mc Graw Hill) 2017.
2. Optical Fiber Communication by John M. Senior (PHI/Pearson) 3rd edition 2010.
3. Fiber optical communication Technology by Djafar Mymbaev & Lowell L. Scheiner. (Pearson) 1st edition 2002.
4. Fiber optic Communication Systems by G. Agrawal (John Wiley and sons) 3rd edition 2015.

e-Resources (If any):

1. <https://nptel.ac.in/courses/108/106/108106167/>

Course Learning Outcomes (CLO): On completion of this course, the students will be able to:

CLO	Description	Bloom's Taxonomy Level
CLO1	Understand and classify the structures of optical fibers.	1 Remembering 2 Understanding
CLO2	Analyze the different optical sources and detectors.	4 Analyze
CLO3	Performance evaluation of optical receiver.	5 Evaluate
CLO4	Design and analyze optical transmission systems.	4 Analyze
CLO5	Identify the various components for optical communication.	2 Understanding 3 Applying
CLO6	Use the various optical measurement techniques.	3 Applying

Mapping of CLOs with POs & PSOs

Course Learning Outcomes	Program Outcomes (POs)												Program Specific Outcomes (PSOs)			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CLO1	H	M	M	L	L	M			L				H	L	M	L
CLO2		L	M	H	L	L					L	L	M	L	M	M
CLO3	L	M	M	L	M	H		M		L			M	L	M	L
CLO4	M	LM	M	L	M	H		M	L				M	L	L	H
CLO5	M	L	L	L	M	H		M		L			H	L	H	H
CLO6	L	M	L	L	M	H		M			L		H	L	H	H

H: High, M: Medium, L: Low