

Branch Name:	Signal Processing and Communication
Program Code:	ET214
Course Name:	Optical Networks and Photonic Switching
Course Code:	2ET2140209T
Pre-requisite Course:	Basic Knowledge and Fundamentals of Optical Communication Engineering

Course Objectives:

1. The main purpose of this course is to introduce important areas of communication networks, mainly optical networks and photonic switching.
2. This course will enable the students to acquire a solid understanding of foundations of optical network technologies, systems, network issues as well as economic deployment considerations and also photonic switching.

Teaching and Examination Scheme:

Credit	Teaching Scheme Hours per week				Evaluation Scheme (Marks)								Total (Marks)
					Theory (Marks)				Practical (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 Hours	Weight (%)
1	Introduction to Optical Networks & Propagation of signals in optical fiber: Telecommunication network architecture, services, circuit switching, packet switching, optical networks, the optical layer, transparency and all-optical networks, optical packet switching, light propagation in optical fiber, loss, bandwidth, chromatic dispersion, nonlinear effects	3	5
2	Components: Couplers, Isolators, Circulators, multiplexers, filters, optical amplifiers, transmitters, detectors, switches, wavelength converters.	7	20
3	Client layers of the optical layer: SONET/SDH, ATM, IP Storate-area networks, Gigabit and 10-Gigabit Ethernet	5	15
4	WDM network elements: Optical line terminals, optical line amplifiers, Optical Add/Drop multiplexers, Optical Cross connects	6	15
5	WDM network design: Cost trade-offs, LTD and RWA problems, dimensioning Wavelength-routing networks, statistical dimensioning models, maximum load dimensioning models.	6	15

6	Network Survivability and Access Network: Basic concepts, protection in SONET/SDH, protection in IP networks, Why optical layer protection, optical layer protection scheme, Network architecture overview, enhanced HFC, Fiber to the Curb	7	15
7	Photonic Packet Switching: Optical time division multiplexing, Synchronization, header processing, buffering, burst switching, test beds	5	15
	Total	39	100

List of Text Book:

1. "Optical Network: A practical perspective", Rajiv Ramaswami, Kumar N. Sivarajan, second edition, Morgan Kaufmann Publishers, 2002
2. "Optical Network Technology", D.W. Smith, Chapman and Hall, London, 1995
3. "Optical Communication Network", Biswanath Mukherjee, McGraw-Hill, 1997

List of Reference Books:

1. "Handbook of Photonics", Mool C. Gupta, CRC Press, 1997

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

CLO	Description	Bloom's Taxonomy Level
CLO1	Understand the various components of optical networks.	1 Remembering 2 Understanding
CLO2	Acquire a solid foundation of design issues of the optical network as well photonic switching.	2 Understanding 5. Evaluate 3 Applying
CLO3	Understand interpret and analyze Optical components and photonic packet switching.	4 Analyze 2 Understanding

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				L	M							H	M	L	
CLO2	H		M	M	L					L		H		M	L	
CLO3		M	H		L									H		L

H: High, M: Medium, L: Low