

Sardar Patel Institute of Technology Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India

(Autonomous Institute Affiliated to University of Mumbai)

Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned			
		L	Т	P	L	Т	Р	Total
EXC7054	Optical Fiber Communication	4			4			4
		Examination Scheme						
		ISE		MSE	ESE			
		10		30	100 (60% Weightage)			tage)

Pre-requisite Course Codes		e Codes EXC503: Electromagnetic Engineering			
-		EXC405: Fundamentals of Communication Engineering			
		EXC505: Digital Communication.			
After successful completion of the course, student will be able to					
Course Outcomes	CO1	Discuss the fundamental principles of optics and light wave			
	CO2	Describe construction and working principle of optical fiber communication			
		system			
	CO3	Outline transmission characteristics of optical fiber			
	CO4	Discuss operational principle optical networks			
	CO5	Calculate link budget parameters and list several optical network			
		management functions			

Module	Unit	Topics		Hrs
No.	No.	Topics		1115.
1		Overview of Optical Fiber Communication		10
	1.1	The evolution of fiber optic systems, elements of an optical fiber	1,2,3	
		transmission link, block diagram, advantages of optical fiber		
		communication, applications		
	1.2	Ray theory transmission, total internal reflection, acceptance angle,		
		numerical aperture and skew rays		
	1.3	Modes, electromagnetic mode theory and propagation, single mode		
		and multimode fibers, linearly polarized modes		
	1.4	Fiber material, fiber cables and fiber fabrication, fiber joints, fiber		
		connectors, splicer		
2		Optical Sources and Detectors		10
	2.1	Coherent and non-coherent sources, quantum efficiency, modulation	1,2,3	
		capability of optical sources		
	2.2	LEDs: Working principle and characteristics		
	2.3	Laser diodes: Working principle and characteristics		
	2.4	Working principle and characteristics of detectors: PIN and APD,		
		noise analysis in detectors, coherent and non-coherent detection,		
		receiver structure, bit error rate of optical receivers, and receiver		
		performance		
3		Components of Optical Fiber Networks		08
	3.1	Overview of fiber optic networks, trans-receiver, semiconductor	1,2,3	
		optical amplifiers		



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	3.2	Couplers/splicer, wavelength division multiplexers and de- multiplexers	1,2,3	
	3.3	Filters, isolators and optical switches	1,2,3	
4		Transmission Characteristic of Optical Fiber		08
	4.1	Attenuation, absorption, linear and nonlinear scattering losses, bending losses, modal dispersion, waveguide dispersion and pulse broadening,	1,2,3	
	4.2	Dispersion shifted and dispersion flattened fibers, and non linear effects		
	4.3	Measurement of optical parameters, attenuation and dispersion, OTDR		
5		Optical Networks		08
	5.1	SONET and SDH standards, architecture of optical transport networks (OTNs), network topologies	1,2,3	
	5.2	Operational principle of WDM, WDM network elements and Architectures, Introduction to DWDM, Solitons.		
6		Network Design and Management		08
	6.1	Point to point links system considerations, link power budget, and rise time budget	1,2,3,4	
	6.2	Transmission system model, power penalty-transmitter, receiver optical amplifiers, crosstalk, dispersion, wavelength stabilization.		
	6.3	Network management functions, configuration management, performance management, fault management, optical safety and service interface		
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References:

[1] John M. Senior, "Optical Fiber Communication", Prentice Hall of India Publication, Chicago, Third Edition.

[2] Gred Keiser, "Optical Fiber Communication", Mc-Graw Hill Publication, Singapore, Fourth Edition.

[3] G Agarwal, "Fiber Optic Communication Systems", John Wiley and Sons, Third Edition.

[4] S.C. Gupta, "Optoelectronic Devices and Systems", Prentice Hall of India Publication, Chicago.