



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	T	P	L	T	P	Total
ETC703	Optical Communication and Networks	4	--	--	4	--	--	4
		Examination Scheme						
		ISE		MSE		ESE		
		10		30		100 (60% Weightage)		

Pre-requisite Course Codes	ETC404 Wave Theory and Propagation ETC502 Analog Communication ETC601 Digital Communication.
After successful completion of the course, student will be able to	
Course Outcomes	CO1 Apply fundamental principles of optics and light waves to design optical fiber communication systems.
	CO2 Identify structures, functions materials and working principles of optical fibers, light sources, couplers, detectors and multiplexers.
	CO3 Design optical fiber communication links using appropriate optical fiber, light sources, couplers, detectors and multiplexers.
	CO4 Explore concept of designing and operating principles of modern optical communications systems and networks.
	CO5 Apply the knowledge developed in class to contemporary optical fiber communication research and industrial areas.

Module No.	Unit No.	Topics	Ref.	Hrs.
1	Optical Fiber Communication Technology		1,2	10
	1.1	Block diagram, advantages, loss and bandwidth window, ray theory transmission, total internal reflection, acceptance angle, numerical aperture, and skew rays		
	1.2	EM waves, modes in planer guide, phase and group velocities, types of fibers according to refractive index profile and mode transmission.		
	1.3	Fiber material, fiber cables and fiber fabrication, fiber joints, fiber connectors, splices.		
2	Transmission Characteristic of Optical Fiber		1,2	08
	2.1	Attenuation, absorption, linear and nonlinear scattering losses, bending losses, modal dispersion, waveguide dispersion, dispersion and pulse broadening, dispersion shifted and dispersion flattened fibers, and non linear effects		
	2.2	Measurements of attenuation, dispersion and OTDR		
3	Optical Communication Systems		1,2,3	08



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	3.1	Working principle and characteristics of sources (LED, LASER), and optical amplifiers		
	3.2	Working principle and characteristics of detectors (PIN, APD), noise analysis in detectors, coherent and non-coherent detection, receiver structure, bit error rate of optical receivers, and receiver performance.		
	3.3	Point to point links system considerations, link power budget, and rise time budget		
4	Optical Network System Components and Optical Networks		1,4,5	10
	4.1	Couplers, isolators, circulators, multiplexers, filters, fiber gratings, Fabry Perot filters, arrayed waveguide grating, switches and wavelength converters		
	4.2	SONET and SDH standards, architecture of optical transport networks (OTNs), network topologies, protection schemes in SONET/SDH, and wavelength routed architectures.		
	4.3	Operational principle of WDM, WDM network elements and Architectures, Introduction to DWDM, Solitons.		
5	Packet Switching and Access Networks		5	08
	5.1	OTDM, multiplexing and de-multiplexing, synchronization and broadcast OTDM networks.		
	5.2	Network architecture overview, OTDN networks, optical access networks, and future access networks.		
6	Network Design and Management		2,5,6	08
	6.1	Transmission system model, power penalty-transmitter, receiver optical amplifiers, crosstalk, dispersion, wavelength stabilization.		
	6.2	Network management functions, configuration management, performance management, fault management, optical safety, and service interface		
			Total	52

References:

1. John M. Senior, —*Optical Fiber Communication*|| , Prentice Hall of India Publication, Chicago, 3rd Edition, 2013
2. Gred Keiser, —*Optical Fiber Communication*|| , Mc-Graw Hill Publication , Singapore, 4th Edition, 2012
3. G Agrwal, —*Fiber optic communication Systems*|| , John Wiley and Sons, 3rd Edition, New York 2014
4. Rajiv Ramaswami and Kumar N. Sivarajan, —*Optical Networks: A Practical Pererspective*|| , Elsevier Publication Elsevier India Pvt.ltd, 3rd Edition, 2010
5. P.E.Green, —*Optical Networks*|| , Prentice Hall,1994
6. Biswanath Mukherjee, —*Optical Communication Networks*|| , McGraw-Hill, 1997.