Course Code	Course Name	Teaching Scheme			Credits Assigned			
		Theory	Practical	Tutorial	Theory	Practical	Tutorial	Total
ETC703	Optical Communication and Networks	04	--	--	04	--	--	04

Course Code	Course Name	Examination Scheme							
		Theory Marks				Term Work	Practical	Oral	Total
		Internal assessment			End Sem. Exam				
		Test 1	Test 2	Ave. Of Test 1 and Test 2					
ETC703	Optical Communication and Networks	20	20	20	80	-	-	-	100

Pre requisites:

- ETC404 Wave Theory and Propagation
- ETC502 Analog Communication
- ETC601 Digital Communication.

Course Objective: To teach students

- Optical fiber structures wave guide, fabrication and signal degradation in fiber.
- The characteristics of optical sources and detectors.
- Link budged and optical networks, design and management.
- Study the multiplexing schemes.

Course Outcome: This course enables the students to:

- Apply the fundamental principles of optics and light wave to design optical fiber communication systems.
- Identify structures, functions, materials, and working principle of optical fibers, light sources, couplers, detectors, and multiplexers.
- Design optical fiber communication links using appropriate optical fibers, light sources, couplers, detectors, and multiplexers.
- Explore concepts of designing and operating principles of modern optical communication systems and networks.
- Apply the knowledge developed in-class to contemporary optical fiber communication research and industrial areas.

Module No.		Topics	Hrs.
1.		**Optical Fiber Communication Technology**	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**	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**	08
	3.1	Working principle and **c**haracteristics 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**	10
	4.1	Couplers, isolators, circulators, multiplexers, filters, **f**iber gratings, Fabry Perot filters, **a**rrayed 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**	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**	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**

Recommended Books:

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 Perespective*", 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.
7. Le Nguyen Binh, "*Optical Fiber Communication System: Theory and Practice with MATLAB and Simulink*", CRC Press, 2010

Internal Assessment (IA):
Two tests must be conducted which should cover at least 80% of syllabus. The average marks of both the test will be considered as final IA marks

End Semester Examination:
1. Question paper will comprise of 6 questions, each of 20 marks.
2. Total 4 questions need to be solved.
3. Question No.1 will be compulsory and based on entire syllabus wherein sub questions of 2 to 5 marks will be asked.
4. Remaining questions will be selected from all the modules