OPTICAL COMMUNICATIONS

Course Code	20EC4601A	Year	III	Semester	II
Course Category	Professional Elective-II	Branch	ECE	Course Type	Theory
Credits	3	L-T-P	3-0-0	Prerequisites	Engineering Physics, Communication Theory
Continuous Internal Evaluation:	30	Semester End Evaluation:	70	Total Marks:	100

Course Outcomes	
Upon successful completion of the course, the student will be able to	
CO1	Illustrate the basic components of Fiber Optic Communication system and its applications (L2).
CO2	Analyze different types of Optical Sources, Optical Amplifiers and Optical Detectors. (L4).
CO3	Apply the concepts of Wavelength Division Multiplexing (L3)
CO4	Analyse the modulation characteristics and causes for signal degradation in fiber communication link (L4).
CO5	Analyze analog and Digital System Design (L4).

Mapping of course outcomes with Program outcomes (CO/ PO/PSO Matrix)

Note: 1- Weak correlation 2-Medium correlation 3-Strong correlation

* - Average value indicates course correlation strength with mapped PO

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2									2		2		2
CO2		2								2				2
CO3	2									2				2
CO4		3								3				3
CO5		2								2				2
Average* (Rounded to nearest integer)	2	2								2				2

Syllabus		
Unit No.	**Contents**	**Mapped CO**
I	**Introduction to Fiber Optic Communications**- Block Diagram, Advantages **Optic Fiber Waveguides:** Ray theory, Step – Index Fiber, Graded – Index Fiber, Attenuation, Pulse Distortion and Information Rate in Optic Fibers.	CO1,CO4
II	**Light Sources and Detectors:** Light-Emitting Diodes-Surface Emitting LEDs, Edge Emitting LEDs, Operating Characteristics, Laser Principles, Laser Diodes, Laser-Diode Operating	CO1,CO2

	Characteristics, Distributed – Feedback Laser Diode, Optical Amplifiers, Principles of Photo detection, Photomultiplier, Semiconductor Photodiode, PIN Photodiode, Avalanche Photodiode	
III	**Couplers and Connectors:** Principles, Fiber end Preparation, Splices, Connectors, Source Coupling, Distribution Networks, Directional Couplers, Star Couplers, Switches, Fiber Optical Isolator, Wavelength- Division Multiplexing.	CO1,CO3
IV	**Modulation, Noise and Detection:** Light-Emitting-Diode Modulation and Circuits, Laser-Diode Modulation and Circuits, Analog-Modulation Formats, Digital-Modulation Formats, Optic Heterodyne Receivers, Thermal and Shot Noise, Signal-to-Noise Ratio, Modal Noise, Amplifier Noise, Laser Noise.	CO1,CO4
V	**System Design and Fiber Optical Applications:** Analog System Design, Digital System Design, Applications of Fiber Optics, Fiberless transmission	CO1,CO5

Learning Resources
Text Books
1. Gerd Keiser Optical Fiber Communication, McGraw Hill. 3rd Ed. , 2003 2. Joseph. C. Palais, Fiber Optic Communications, Pearson Education, Asia, 2002.
Reference Books
1. J.M.Senior, Optical Fiber Communication: Principles and Practice, Pearson Ed., 2nd Ed., 2006. 2. S. C. Gupta, Text Book on Optical Fiber Communication and its Applications, PHI, 2005 3. D. K. Mynbaev, Gupta, Scheiner, Fiber Optic Communications, Pearson Education, 2005 4. Howes M.J., Morgan, D.V, Optical Fiber Communication, John Wiely.1992. 5. John Powers, Fiber Optic Systems, Irwin Publications, 1997.
e- Resources & other digital material
1. http://www.ocw.titech.ac.jp/index.php?module=General&action=T0300&JWC=201806903&lang=EN 2. https://www.ll.mit.edu/r-d/communication-systems/optical-communications-technology

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