Course Number and Name

BEC701 - FIBER OPTIC COMMUNICATION

Credits and Contact Hours

3 and 45

Course Coordinator's Name

Ms Saravana

Text Books and References

- 1. Gerd Keiser, —Optical Fiber Communications Tata McGraw– Hill education private Limited, NewDelhi, fifthEdition, 2008, Reprint 2009.
- 2. J.Senior,—Optical Communication, Principles and Practice, Prentice Hall of India, third Edition, 2004.
- 3. J.Gower, Optical Communication System, Prentice Hall ofIndia, 2001
- 4. Yarvi.A. QuantumEletronics ,JohnWiley4thedition,1995
- 5. https://books.google.co.in/books?isbn=9380156693

Course Description

- To learn the basic elements of optical fiber transmission link, fiber modes configurations and structures.
- To understand the different kind of losses, signal distortion, SM fibers.
- To learn the various optical sources, materials and fiber splicing
- To learn the fiber optical receivers and noise performance in photo detector.
- To learn link budget, WDM, solitons and SONET/SDH network.

Prerequisites	Co-requisites							
Electromagnetic Fields and waves.	Nil							
required, elective, or selected elective (as per Table 5-1)								
Required								

Course Outcomes (COs)

CO1 Demonstrate an understanding of optical fiber communication link, structure, propagation and transmission properties of an optical fiber.

CO2 Estimate the losses and analyze the propagation characteristics of an optical signal in different types of fibers

CO3 Describe the principles of optical sources and power launching-coupling methods.

CO4 Compare the characteristics of fiber optic receivers

CO5 Design a fiber optic link based on budgets

CO6 To assess the different techniques to improve the capacity of the system.

Student Outcomes (SOs) from Criterion 3 covered by this Course

COs/SOs	а	b	С	d	е	f	g	h	i	j	k
CO1	Н		Μ			Μ		Н			
CO2	Μ	L	Н				Н		L	Н	
CO3	Μ	Н		Н		Μ	L				Н
CO4	Μ	Н		Н					Μ		Μ
CO5		L			Μ	М	Μ		L		Μ
CO6				М		Н	Μ				

List of Topics Covered

UNIT I INTRODUCTION TO OPTICAL FIBER

Evolution of fiber Optic system – Element of an Optical Fiber Transmission link – Ray Optics – Optical Fiber Modes and Configurations – Mode theory of Circular Wave guides – Overview of Modes – Key Modal concepts – Linearly Polarized Modes – Single Mode Fibers – Graded Index fiber structure.

UNIT II SIGNAL DEGRADATION IN OPTICAL FIBER

Attenuation – Absorption losses, Scattering losses, Bending Losses, Core and Cladding losses, Signal Distortion in Optical Wave guides – Information Capacity determination – Group Delay – Material Dispersion, Wave guide Dispersion, Signal distortion in SM fibers – Polarization Mode dispersion, Intermodal dispersion, Pulse Broadening in GI fibers – Mode Coupling – Design Optimization of SM fibers – RI profile and cut-off wavelength.

UNIT III FIBER OPTICAL SOURCES

Direct and indirect Band gap materials – LED structures – Light source materials – Quantum efficiency and LED power, Modulation of a LED, Laser Diodes – Modes and Threshold condition – Rate equations – External Quantum efficiency – Resonant frequencies – Laser Diodes structures and radiation patterns – Single Mode lasers – Modulation of Laser Diodes, Temperature effects, Introduction to Quantum laser, Fiber amplifiers.

UNIT IV FIBER OPTICAL RECEIVERS

PIN and APD diodes – Photo detector noise, SNR, Detector Response time, Avalanche multiplication Noise – Comparison of Photo detectors – Fundamental Receiver Operation – preamplifiers - Error Sources – Receiver Configuration – Probability of Error – The Quantum Limit.

UNIT V DIGITAL TRANMISSION SYSTEM

Point-to-Point links – System considerations – Fiber Splicing and connectors – Link Power budget – Rise-time budget – Noise Effects on System Performance – Operational Principals of WDM, Solutions.

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