Subject Code : RN3V11C

FIBRE OPTICS AND OPTICAL COMMUNICATION

UNIT – I

Introduction: The Fiber Optics Revolution – Basics Characteristic of the Index and Graded – Index Optical Fibers – Wave Guide dispression and design considerations – Sources for Optical fiber communications – Directors for optical fiber communication 7.

UNIT – II

Signal Degradation Optical Fibers: Pulse Dispersion in Step Index and Graded Index Optical Fibers; Material Dispersion – Waveguide Dispersion and Design Considerations – Losses in Optical Fibers; Absorption and Scattering Losses – Bending Losses, Waveguide Structure Losses.

UNIT – III

Power Launching and Coupling: Optical coupling into multi-mode glass fibers: Power transfer between emitting and receiving surfaces, Geometric characteristics of Opto-Electronic sources. Acceptance angle of the Fibre – Lensing scheme for coupling Improvement – LED coupling to single –Mode Fibers, Fiber – to – fiber joints – Splicing Techniques –Optical Fiber Connectors.

UNIT – IV

Optical Sources and Detectors: Introduction, Communication requirements, Laser fundamentals, Semiconductor Laser basics – Laser Diode Characteristics; Laser Threshold – Output Spectrum, Radiation Pattern, Modulation, Frequency Chirping, LED Characteristics. Detectors for Optical Fiber Communication, PIN Photodiode, Avalanche Photodiode – Response Characteristics, Photo detector noise.

UNIT – V

Design Consideration of Fiber Optic System: Introduction, Analog and Digital Modulations, Noise in Detection Process, Bit Error Rate, System Design Design –Power and Rise Time Budgeting, Maximum Transmission distance due to Attenuation and Dispersion, Optical fiber amplifiers.

Text Books:

1. For Units – I & V : A.Ghatak & K.Thygarajan, “Introduction to Fiber optics”, Cambridge University Press, 1999. (Chapter 1, 2, 3, 8, 9, 10, 11, 12, 13, 14).
2. For Units – II, III & IV : G.Keiser, “Optical Fiber Communications”, “McGraw Hill, 2nd Edition, (Chapter 3, 4, 5, 6).

Reference Books:

1. M.K.Barnoski, “Fundamentals of Optical Fiber Communications, Academic Press, 2nd Edition.
2. T.Okoshi, “Optical Fibers”, Academic Press.
3. P.K.Cheo, “Fiber Optics and Optoelectronics, Prentice Hall Edition.