4/4 B.Tech - SEVENTH SEMESTER

EC 7T1 **Optical Communications** **Credits: 4**

Lecture : 4 periods/week **Internal assessment: 30 marks**
Tutorial: 1 period /week **Semester end examination: 70 marks** -------
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Course Objectives:

- To introduce the students to various optical fiber modes, configurations and various signal degradation factors associated with optical fiber.
- To study about various optical sources and optical detectors and their use in the optical communication system.
- To study about optical transmitter circuits & receiver circuits and digital optical syatem.
- To familiar how to measure Attenuation, Dispersion, Refractive Index.

Learning Outcomes:

- The student will be able to Design an optical fiber communication link.
- To Measure the characteristics of LED,LASER source and Photo detectors
- To Measure dispersion and attenuation in OFC.

UNIT- I

Introduction: Historical Development, General System, Advantages of Optical Fibers, Applications of Optical Fiber Communication.

UNIT-II

Optical Fiber Waveguides: Ray Theory Transmission, Electromagnetic Mode Theory for Optical Propagation, Cylindrical Fibers, Single Mode Fibers.

UNIT- III

Transmission Characteristics of Optical Fibers: Introduction, Attenuation, Material Absorption Losses In Silicon Glass Fibers, Linear Scattering Losses, Non Linear Scattering Losses Fiber Bend Loss.

UNIT- IV

Dispersion: Intramodel Dispersion, Intermodal Dispersion, Dispersion in Single Mode Fibers. Fiber Optic Components: Fiber Alignment & Joint Loss, Fiber Splices, Fiber Connectors.

UNIT- V

Optical Sources:-LED: Introduction, LED Power & Efficiency, LED Structures, LED Characteristics, LASER Basic Concepts, Optical Emission from Semiconductors, Semi- Conductor Injection Laser, Laser Structures, Single Frequency Injection Lasers.

UNIT- VI

Detectors: Introduction, Optical Detection Principles, Absorption, Quantum Efficiency, Responsitivity, Semi- Conductor Photo Diode with Internal Gain, Semi-Conductor Photo Diode Without Internal Gain.

UNIT- VII

Optical Fiber Systems: Optical Transmitter Circuits, Optical Receiver Circuits, Digital Systems, Digital System Planning Considerations.

UNIT- VIII.

Optical Fiber Measurements: Introduction, Attenuation Measurement, Dispersion Measurement, Refractive Index, Optical Time Domain Reflectometry (OTDR)

Learning Resources

Text Books:

1. Optical Fiber Communications: Principles and Practice, John M Senior, PHI, 2nd Edition, 2002
2. Fiber Optic Communication Technology, Djafar K Mynbaev and Lowell L. Scheiner, Pearson Education, 2006

References:

1. Optical fiber Communication, Gerd Keiser, Mc Graw Hill. 3rd Edition , 2003
2. Fiber Optics Communication, Kolimbiris, McGraw Hill. , 1st Edition, 2003,
3. Fiber Optic Communication Technology, Djafar K Mynbaev and Lowell L. Scheiner, Pearson Education, 2006