NIRMA UNIVERSITY
SCHOOL OF TECHNOLOGY, INSTITUTE OF TECHNOLOGY
B.Tech. Electronics & Communication Engineering
Semester - V
Department Elective I

L	T	P	C
3	-	2	4

Course Code	**2ECDE52**
Course Title	**Fiber Optic Communication**

Course Outcomes (COs):
At the end of the course, the students will be able to
1. Interpret the propagation of light through optical fiber and analyse performance degradation due to signal distortion.
2. Analyze the performance of optical sources and detectors, transmitters and receivers.
3. Comprehend the concept of WDM and SONET/ SDH.
4. Apply techniques for measurement of attenuation, dispersion and numerical aperture.

Syllabus: **Teaching Hours:45**

UNIT I: Propagation through Optical Fibers **12**
Electromagnetic spectrum Evolution of fiber optic system, Elements of an optical fiber transmission link, Optical fiber structures, waveguiding and fabrication, Optical laws and definitions, optical fiber modes and configurations, Mode theory, single-mode and graded-index fibers, fiber materials, fabrication, fiber optic cables, Attenuation, signal distortion in an optical waveguide, pulse broadening in fiber, mode coupling, Free-space optical communication.

UNIT II: Optical Sources
Light-emitting diode (LEDs)-structures, materials, characteristics & Modulation, Laser Diodes -Modes & threshold conditions, resonant frequencies, structures, characteristics, single-mode lasers, Modulation of laser diodes. **05**

UNIT III: Power Launching and Coupling
Source-to fiber power launching, Lensing schemes, fiber-to-fiber joints, LED coupling to single-mode fibers, fiber splicing, and connectors. **04**

UNIT IV: Optical Receivers
Photodetectors - Principles of operation, types, characteristics, Receiver operation, Specifications, Preamplifier types **07**

UNIT V: Transmission Systems
Point–to-point link, system requirements and design of link. **05**

UNIT VI: Advances in Optical Fiber Systems
Principles of WDM, DWDM, Passive Optical Components, Tunable sources and Filters, SONET/SDH, EDFA, Optical switching **08**

UNIT VII: Fiber Optical Measurements
Measurement of Attenuation, Dispersion, NA, OTDR, EYE pattern technique. **04**

Self-Study:
The self-study content will be declared at the commencement of the semester. Around 10% of the questions will be asked from self-study content.

Laboratory Work:
Laboratory work will be based on the above syllabus with a minimum of 10 experiments to be incorporated.

Suggested Readings:

1. Gerd Keiser, Optical Fiber Communication, McGraw Hill
2. Mynbaev and Scheiner, Fiber-Optic Communications Technology, Pearson Education

3. John M. Senior, Optical Fiber Communication, PHI

L = Lecture, T = Tutorial, P = Practical, C = Credit