

## PPH448 OPTICAL FIBER COMMUNICATION

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**Course objectives:** The course aims at imparting in-depth knowledge of optical fiber communication

**Optical fibers and fabrication:** Introduction, Light propagation through optical fiber, Fiber materials, Fiber fabrication, Mechanical properties of fibers.

**Signal degradation in optical fibers:** Attenuation, Signal distortion in optical waveguides, Pulse broadening in graded index waveguides, Mode coupling, Design optimization of single-mode fibers.

**Power launching and coupling:** Source-to-fiber launching, fiber-to-fiber joints, LED coupling to single-mode fibers, Fiber splicing, Optical fiber connectors.

**Photodetectors:** The pin photodetector, Avalanche photodiodes, Photodetector noise, Detector response time, Structures for In GaAs APDs, Temperature effect on avalanche gain.

**Optical amplifiers and Optical receiver:** Fundamental receiver operation, Pre-amplifier types, Optical amplifiers, Semiconductor optical amplifiers, Erbium-doped fiber amplifiers, Amplifier noise, System applications.

**Optical networks:** Basic networks, SONET/SDH, WDM Networks, Nonlinear effects on network performance, Performance of WDM + EDFA systems, Solitons, Optical CDMA, Ultrahigh capacity networks.

**Measurements:** Measurement standards, Test equipment, Attenuation measurements, OTDR field applications, Eye patterns, Optical spectrum analyzer applications.

**Course Outcomes:** Students will have achieved the ability to:

1. describe basics of optical fiber, its fabrication and sources of attenuation the requisite inputs for optical fiber communication
2. elaborate the methods of power launching and coupling and working of photodetectors.
3. explain the mechanism and use of optical amplifiers and optical receiver.
4. analyze optical networks and their performance.
5. calculate attenuation and dispersion in optical fibers and identify fiber-fault location.

### Recommended Books

1. Keiser, G., *Optical Fiber Communications*, McGraw-Hill International. (2000).
2. Seniors, J.M., *Optical Fiber Communications – Principles and Practice*, Prentice-Hall of India, (1996).
3. Cherin, A.H., *An Introduction to Optical Fibers*, McGraw Hill Book Company, (1983).
4. Yariv, A., *Quantum Electronics*, Wiley, (1989).

**Evaluation Scheme:**

| <b>Sr. No.</b> | <b>Evaluation Elements</b>                   | <b>Weightage (%)</b> |
|----------------|--|----------------------|
| 1              | MST  | 30                   |
| 2              | EST  | 45                   |
| 3              | Sessionals (May include assignments/quizzes) | 25                   |