



KAMALDNP

kamaldnp.com • IT Training, Varanasi

PDF created by Raj Kamal using AI

Optical Fiber Communication — Complete Syllabus

BTEUP Diploma in Electronics Engineering • 5th Semester • Session 2026-27
Subject 5.1 (Theory) + 5.5 (Lab) • Total 200 Marks • 7 Credits

About this document: Optical Fiber Communication appears twice in the 5th semester — as a theory paper (5.1) and as a lab (5.5). Both are covered here, completely, in the official order.

Examination Scheme

Code	Paper	Type	L - P	Credits	Internal	External	Total
5.1	Optical Fiber Communication	Theory	4 - 0	4	Theory 40	Theory 60 (3 hrs)	100
5.5	Optical Fiber Communication (Lab)	Practical	0 - 6	3	Practical 60	Practical 40 (3 hrs)	100
Optical Fiber Communication Total				7	100	100	200

What This Subject Aims To Do

To understand and apply the principles of optical communication systems — fibre optic technology being the most economical and efficient medium for wired communication, with lower costs than copper, improved transmission quality and reduced maintenance.

Unit-Wise Complete Topic List

Unit	Topic	Periods	Marks Share
1	Introduction	8	16%
2	Optical Fiber	12	21%
3	Fiber Materials, Connectors, Coupler, Splicer and Losses	12	21%
4	Optical Sources and Detectors	12	21%
5	Optical Amplifiers and Its Type	12	21%

Unit 1 — Introduction (8 Periods, 16%)

Topics: Various wired communication mediums – copper wire and optical fiber cable. Electromagnetic spectrum, optical band and its range, Optical windows. General Block diagram of optical Fiber communication system. Advantages, disadvantages and application of Fiber Optic communication.

In simple words: Why fibre beats copper: the optical band, the parts of a fibre-optic link, and its advantages, disadvantages and applications.

Unit 2 — Optical Fiber (12 Periods, 21%)

Topics: Nature of light, its properties, Definition and concept of Reflection, refraction dispersion, diffraction, absorption, Total internal reflection (TIR) and scattering of light ray. Propagation of light in optical fiber, Ray model, Theoretical approach to Wave model, Snell's law, definition and concept of Critical angle, numerical aperture, acceptance angle and acceptance cone - (Numerical on above concepts).

In simple words: The optics behind fibre: total internal reflection, critical angle, numerical aperture and acceptance cone — with numerical problems.

Unit 3 — Fiber Materials, Connectors, Coupler, Splicer and Losses (12 Periods, 21%)

Topics: Fiber materials, Structure of fiber, Dimension of fiber. Optical fiber classification based on Modes and index profile, Modes of light propagation in fiber. Optical fiber connections: joints and Couplers-Fiber alignment and joint loss, fiber splicing techniques (Mechanical, fusion). fiber connectors, Losses and signal degradation in optical fiber.

In simple words: What fibre is made of, how it is classified by mode and index profile, how fibres are joined and spliced, and where signal is lost.

Unit 4 — Optical Sources and Detectors (12 Periods, 21%)

Topics: Optical sources: LED, LASER, construction and working, Characteristics, specifications & Comparison. Optical detectors: PIN diode, Avalanche photo diode- construction, working, Characteristics, specifications & Comparison.

In simple words: The light sources (LED and laser) and the detectors (PIN and avalanche photodiodes) at the two ends of a fibre link, compared side by side.

Unit 5 — Optical Amplifiers and Its Type (12 Periods, 21%)

Topics: Optical Amplifiers: Types of optical amplifiers, semiconductor & fiber optical amplifiers, principle of operation of SOA, types of SOA. EDFA, Raman amplifiers. Comparison of SOA, EDFA and Raman Amplifiers.

In simple words: Amplifiers that boost light without converting it to electricity: semiconductor, erbium-doped fibre (EDFA) and Raman amplifiers.

Practical Work

- To identify and use various components and tools used in optical fiber communication.
- To view and draw the structure of an optical fiber and cable.
- To observe the Total Internal Reflection (TIR) and Light transmission.
- To calculate NA of given optical fiber.
- To set up fiber optic analog link.
- To set up fiber optic digital link.
- Identify various layers & parts of an optical fiber cable.
- Measure bending losses of the given fiber optic cable.
- Plot the characteristics of optical source & detector.
- To connect a fiber with connector at both ends.
- To observe and measure the splice or connector loss.
- To splice the available optical fiber.
- To measure attenuation in optical fiber.
- To do power budgeting of an optical fiber link.
- To determine the position of fault in optical fiber link.

Reference Books (as listed in the syllabus)

- Fiber Optic Communication Keiser, Gerd McGraw Hill New Delhi.
- Optical Fiber communications principles & Practices Senior, John M. Pearson Education Ltd., New Delhi.
- Govind P. Agrawal, "Fiber Optic Communication Systems", John Wiley, 3rd Edition, 2004.

Source: BTEUP 3rd Year curriculum (folder2627), approved in C.D.C. meeting held on 16.07.2026. Topic lists follow the official syllabus; short explanations are the author's own plain-English summaries, not syllabus text.

Please confirm with your own polytechnic for any local changes.

