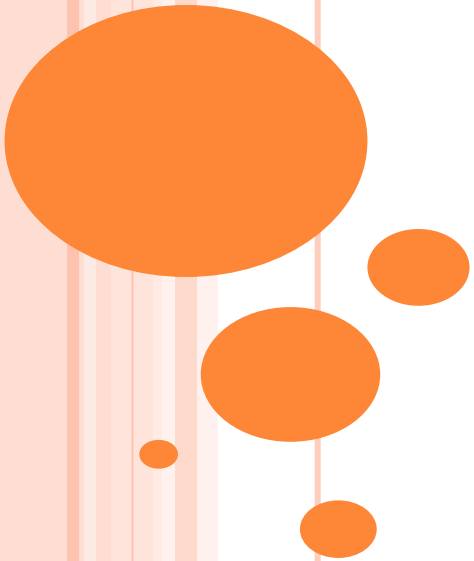
Course: *Optical Communication* (EC317)

Course overview



COURSE OUTCOMES

CO1	Identify and characterize different components of an Optical Fiber Communication link.
CO2	Analyze optical source, Fiber and Detector operational parameters
CO3	Compute optical fiber link design parameters
CO4	Understand WDM, Optical Amplifiers, Optical Switching and networking technology concepts.

Detailed Syllabus

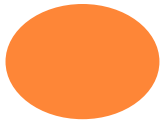
Unit-I

- Motivation for optical communications,
- advantages of optical fibers,
- optical bands, Optical windows,
- key elements of optical fiber communication link
- Standards, optical multiplexing standard,

Detailed Syllabus

Unit-II

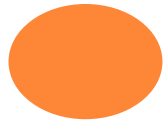
- optical laws, Optical Fiber Modes and Configurations: fiber types, rays and modes, Numerical aperture, optical fiber modes, evanescent tails, mode cutoff condition, wave equation in SI fibers, modes in SI fibers, LP modes, Single mode fibers, graded index fibers.
- Fiber materials, fiber fabrication, Fiber optic cables, exercise problems.
- Attenuation in fibers, absorption and scattering losses, bending losses, chromatic dispersion, modal delay, group delay, material dispersion, signal distortion in SM fibers, cutoff wavelength, mode field diameter, specialty fibers, exercise problems.



Detailed Syllabus

Unit-III

- LED structures, light source materials, quantum efficiency and LED power, modulation of LED, exercise problems.
- Laser diode, structure, modes and threshold conditions, single mode lasers, modulation of laser diodes, external modulation, linearity, exercise problems.
- Photo diode principles, Avalanche photodiode, photo detector noise, detector response time, structures for APD, exercise problems.



Detailed Syllabus

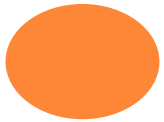
Unit-IV

- Source to fiber power launching, lensing schemes, fiber to fiber joints, fiber splicing, fiber connectors, exercise problems. Optical receiver operation, error sources, digital receiver performance, receiver sensitivity, eye pattern features, coherent detection.
- Digital links, point to point links, link power budget, error control, Analog links, CNR, photo detector and preamplifier noise.

Detailed Syllabus

Unit-V

- WDM overviews, operational principles, WDM standards, optical coupler, star coupler, optical isolator, fiber Bragg grating, tunable optical filters, optical add/drop multiplexers, exercise problems.
- Optical amplifiers, basic operation, amplifier gain, Erbium doped fiber amplifiers, amplification mechanism
- SONET/SDH transmission formats and speeds, optical cross connect switches, overview of traffic grooming in SONET ring.



TEXT BOOKS

- Gerd Keiser, Optical Fiber Communications, TMH India, Fourth Edition, 2010.
- Senior John M., Optical Fiber Communications, Pearson Education India, Third Edition, 2009.
- R.P. Khare, Fiber optics and optoelectronics, Oxford University Press 2004