



Course Title: Fibre optics

Credit Units: 4

Course Level: PG

Course Code: TELE605

| L | T | P/S | SW/F W | TOTAL CREDIT UNITS |
|---|---|-----|-----------|--------------------------|
| 3 | 1 | 0 | 0 | 4 |

Course Objectives: To provide the fundamental principles of optical fiber. Course intended to provide both a physical understanding of the underlying principles of optical components & devices, which shall help in design of optical communication system

Pre-requisites: Electro Magnetic Theory, Basic Optics and Mathematics

Course Contents/Syllabus:

| | Weightage (%) |
|---|---------------|
| Module I Optical fibers waveguides | 30 |
| Descriptors/Topics : Historical development of optical communication, general optical system, advantages of optical fiber communication. Total internal reflection, acceptance angle, numerical aperture, skew rays, optical fiber modes and configuration, mode theory for circular waveguide, step index fiber, graded index fiber, multimode fibers, single mode fibers, cutoff wavelength, mode field diameter and spot size, effective refractive index, group delay and mode delay factor. | |
| Module II Signal degradation in optical fibers | 30 |
| Descriptors/Topics : Attenuation: attenuation unit, material absorption loss in silica fibers, linear scattering loss, nonlinear scattering loss, fiber bend loss, core and cladding loss. Dispersion: Intramodal dispersion, intermodal dispersion, modal noise, polarization mode dispersion, birefringent fibers, overall fiber dispersion, dispersion modified single mode fibers, dispersion shifted fibers, dispersion flattened fibers, dispersion compensating fibers | |
| Module III Fiber fabrication and connections | 20 |
| Descriptors/Topics : Preparation of optical fibers, fiber materials, liquid-phase techniques, vapour-phase deposition techniques, double-crucible method, mechanical properties of fibers, stability of the fiber transmission characteristics, | |

| | |
|---|-----------|
| cable design. Fiber alignment and joint loss, fiber splices, fiber connectors, fiber couplers. | |
| Module IV: Fiber characterization | 20 |
| Descriptors/Topics : Measurement standards and test procedures, test equipment, attenuation measurement, dispersion measurement, refractive index profile measurement, OTDR field application, Eye pattern, Optical spectrum analyzer applications | |

Student Learning Outcomes:

After completion of course, students will be able:

- To explain the suitability of optical fiber media with respect to other communication media.
- To explain the different parameters of optical fiber.
- To explain the cause of signal degradation in optical fiber.
- To describe the fabrication techniques of optical fiber and components.
- To describe the measurement and characterization of optical fiber.

Pedagogy for Course Delivery: Class Room Lecture, Tutorial, Group Discussion and Seminar.

Lab/ Practicals details, if applicable: NA

Assessment/ Examination Scheme:

| Theory L/T (%) | Lab/Practical/Studio (%) | Total |
|----------------|--------------------------|-------|
| 100% | NA | 100 |

Theory Assessment (L&T):

| Continuous Assessment/Internal Assessment | | | | | End Term Examination |
|---|------------|-----------------|-------|------------|----------------------|
| Components (Drop down) | Class Test | Home Assignment | S/V/Q | Attendance | End Term Examination |
| Weightage (%) | 10% | 10% | 5% | 5% | 70% |

Text Reading:

- A. H. Cherin, An Introduction to Optical Fibres,(McGraw Hill, 1983).

- John M. Senior, Optical Communications, (PHI).
- G. Kaiser, Optical fibre communication (McGraw Hill, Book Company, 1989)