

AMTC25 OPTICAL FIBER COMMUNICATION

UNIT-1 ELEMENTARY DISCUSSION OF PROPAGATION IN DIELECTRIC WAVEGUIDES

- 1.1 Introduction, Step-index fibers: numerical aperture and multi path dispersion,
- 1.2 Propagation and multipath dispersion in graded-index fibers, Modes and rays,
- 1.3 The slab waveguide

UNIT-2 MATERIAL DISPERSION

- 2.7 Refractive index: theory, The refractive indices of bulk media: experimental values,
- 2.8 Time dispersion in bulk media, The wavelength of minimum dispersion

UNIT-3 ATTENUATION MECHANISMS IN OPTICAL FIBERS

- 3.1 Introduction, Absorption, Scattering, Other very low-loss materials,
- 3.2 All-plastic and polymer-clad-silica (PCS) fibers, Damage by ionizing radiation

UNIT-4 SYSTEM CONSIDERATIONS

- 4.1 The optimum wavelength for silica fibers, The ultimate bandwidth limitation,
- 4.2 A comparison between optical fibers and conventional electrical transmission lines

UNIT-5 SINGLE-MODE FIBERS

- 5.1 Types of single-mode fiber, Mode spot size, HE₁₁ mode propagation characteristics

UNIT-6 THE FABRICATION OF FIBERS, CABLES AND PASSIVE COMPONENTS

- 6.1 Fiber production methods, Fiber strength, Cables, Splices and connectors

UNIT-7 FIBER PARAMETERS: SPECIFICATION AND MEASUREMENT

- 7.1 The refractive-index profile, near and far-field intensity distributions, Attenuation measurements, Bandwidth measurements, Cutoff wavelength

UNIT-8 THE DESIGN OF LEDs FOR OPTICAL COMMUNICATION

- 8.1 The external quantum efficiency, The Burrus-type double heterostructure surface emitting LED (DH-SLED),
- 8.2 The stripe-geometry, edge-emitting LED (ELED), LED-to-fiber launch efficiency, Lensed LED-to-fiber launch systems, LED designs

UNIT-9 SEMICONDUCTOR

- 9.1 LASERS the theory of laser action in semiconductors, some simplified calculations,
- 9.2 Modulation frequency response, Noise in semiconductor lasers

UNIT-10 SEMICONDUCTOR LASERS FOR OPTICAL FIBER COMMUNICATION SYSTEMS

- 10.1 Methods for obtaining the stripe geometry, Optical and electrical characteristics of Fabry-Perot lasers, Spectral characteristics, Power and voltage characteristics,
10.2 Quantum-well lasers and laser arrays, Single frequency semiconductor lasers,
10.3 The reliability of DH semiconductor LEDs and lasers, The transmitter module

UNIT-11 THE RECEIVER AMPLIFIER

- 11.1 Sources of receiver noise, Circuits, devices and definitions,
11.2 Signal-to-noise ratio in the voltage amplifier circuit,
11.3 Signal-to-noise ratio in the transimpedance feedback amplifier,
11.4 The ideal quantum-limited receiver, Amplifier design examples

UNIT-12 THE REGENERATION OF DIGITAL SIGNALS

- 12.1 Causes of regeneration error, the quantum limit to detection,
12.2 The effect of amplifier noise and thermal noise on the error probability,
12.3 Noise penalties in practical system.

UNIT-13 OPTICAL FIBER COMMUNICATION SYSTEMS

- 13.1 The economic merits of optical fiber systems,
13.2 Digital optical fiber telecommunication systems,
13.3 Data communication networks, Analog systems, The optical ether

Reference Books:

1. Timer, Op Amp, and Optoelectronic Circuits & Projects BY Forrest M. Mims III
2. Singular Optics BY Gregory J. Gbur

