

Guided Wave Photonics (RP 4.2.7)

Optical Waveguides : Planar waveguides; Fibres; Rays and modes; Dispersion and birefringence in fibres; Guided wave excitation. (4)

Optical Fibers: Propagation characteristics in Optical fibers, Material Choice, Manufacturing Optical fibers, Multimode and Single-mode, Coupling into and out of a fiber, Attenuation, Group velocity, Dispersion, and Optical Non-linearities, Dispersion Shifted Fibers. (7)

Planar Optical Waveguides and Devices Dielectric Optical Waveguides: Modes of 3-layer slab waveguides,; Universal b-v relationship; Effective index; 3-D waveguides (6)

Passive Guided Wave Devices ; Directional couplers; switches; Power splitters; MZI-based couplers; AWG; Fabry-Perot resonators and filters; Tunable filters; Ring resonators; Bragg gratings. Integrated Optics. (7)

Photonic Crystals : Concept and origin of photonic bandgap; Quantitative description of 1-D structures via coupled mode theory. Derivation of Bragg wavelength and bandwidth, Defects in 1-D structures. Photonic band structure diagrams (Bloch modes), Lattice structure (square, triangular...). Applications and key practical issues, super prisms, compact waveguiding, emissive structures. Passive Guiding, routing, etc.; Active: emitters, density of modes; Emerging topics based on sub-wavelength diffractive structures. (6)