

Photonic Devices (RP 4.1.8)

Introduction: Absorption and Emission of light in semiconductors, Heterostructures, Quantum Structures, Materials for working at different wavelengths (2)

LEDs: Review of Principle, basic Structure and performance, Modulation characteristics, Driver circuits, Methods to improve performance, Advanced Structures, SLEDs, White LEDs, Noise, Applications: Display, Communication. (3)

LASERS: Review of Principle, basic Structure and performance of Semiconductor diode lasers, Threshold Current density, Linewidth and Mode Characteristics, Rate Equation, Modulation characteristics, Driver Circuits, Q-switching and mode-locking of laser pulses, Advanced structures and Methods to improve performance, Stripe geometry lasers, DBR lasers, DFB lasers, VCSELs, Fibre lasers, Noise in lasers, Frequency chirping, Applications (Communications, Entertainments, display, etc.) (5)

Photodetectors: Review of Principle, basic Structure and performance of Photoconductors, p-n photodiodes, p-i-n, Schottky, M.S.M., Phototransistors and avalanche photodiode (APD); Responsivity, gain, Bandwidth, Noise performance: Noise current, Detectivity, NEP, Sensitivity; Advanced Structures and Methods to improve performance; Applications: Communication, Entertainment, Medical, Imaging, etc. (7)

Optical Modulators (External): Acousto-optic, Electro-optic, Magneto-optic modulators, Electro-absorption Modulators, QCSE modulators, Mach-Zehnder Modulator (3)
Optical Amplifiers: Erbium-doped Fiber Amplifier, Semiconductor Optical Amplifier, Raman Amplifiers (2)

Other Optical Devices: Optical isolators, Polarization control devices, Optical filters and diffraction gratings, Optical switches. (2)