

## **Advances in Optical Communication (RP 4.2.24)**

Introduction: Intensity modulation.direct Detection systems; Phase modulated optical communication: PSK, DPSK; WDM systems. (2)

Digital Modulation of optical carriers: Basic modulation formats; Semiconductor Diode Lasers: rate equations; Laser noise; External modulators; Generation of RZ-DPSK signals; Direct Frequency modulation of diode lasers (4)

Coherent Optical Receivers and Their Performance: Basic coherent receiver structures; SNR; Performance of synchronous receivers: ASK, PSK, FSK; Performance of asynchronous receivers: ASK, DPSK, CPFSK systems; Frequency discriminators; Performance of DD receivers; Phase diversity receivers; Polarization diversity receivers; Comparison of optical receivers. (6)

Impairment to optical signals: RIN; Phase error; Laser phase noise; Dispersion: chromatic and polarization mode. (3)

Nonlinear Phase Noise: Contribution due to SPM, XPM; Calculation of error probability; Compensation techniques: Electronic, linear MMSE, and nonlinear techniques. (3)

Wavelength Division Multiplexed DPSK signals : WDM based optical networking; Crosstalk issues; XPM induced nonlinear phase noise. (3)

Multilevel Signalling: Generation of multilevel signals: QAM, 16-QAM; transmitter of (D)QPSK signals. Synchronous detection of multilevel signals : M-ary PSK, QAM; Direct detection of DQPSK signals (6)

Optical Orthogonal Frequency Division Multiplexing: Basic principle; transmission, and detection schemes; Optical spectral efficiency; Channel model; Problems and prospects. (4)

Radio Over Fibre: Advantages; schemes; application areas. Prospects for THz communication (2)