

SYLLABUS :-

Prerequisites: None

Optical properties of semiconductors: absorption & emission processes; Kramers-Kronig and Van Roosbroeck-Shockley relations; radiative & non-radiative transitions, Photoluminescence and UV-VIS-NIR Spectroscopy. Photoconducting and non-photoconducting materials. Growth of III-V, II-VI and IV-VI semiconductors and nanostructures for optoelectronic applications--- MOVPE and MBE technology. Photo-detectors: photoconducting, photovoltaic, PIN, APD, gain-bandwidth criteria. Optical emission from semiconductors: LED physics and technology, conditions for laser action, DH, DFB & DBR lasers. Quantum Confinement: 2-D, 1-D and 0-D systems, Quantum well and quantum dot lasers, Quantum Cascade Laser (QCL), Quantum Well Infrared Photodetectors (QWIP). Photonic crystals. Non-linear optic materials and their applications, fibre-optic systems, IR focal plane arrays and remote sensing. Solar cell: Device physics, p-n junction, polycrystalline and amorphous Si, CdS/CdTe, CIGS, Ge/GaAs/InGaP tandem structure, multi-exciton generation, quantum dot solar cell, anti-reflection coating. Organic optoelectronic materials and devices.