

SYLLABUS :-

Laser Engineering Introduction to Lasers: Basic principle of lasers, optical cavities: gain and losses in optical cavities, optical amplification and oscillations, properties of laser beam, laser applications. Optical resonator: Stable and unstable resonator, Longitudinal and transverse modes, Gaussian beam propagation, design of optical resonators. Modes of laser operation: continuous wave, relaxation oscillation, Q-switching, cavity dumping, mode locking, ultra-short pulse generation. Laser pumping: Optical- flash lamp and diode laser pumping, Electrical discharge-DC, RF and pulsed excitation, and current injection; design aspects of various pumping sources. Laser intracavity components-multilayer dielectric coated mirrors, electro-optic and acousto-optic modulators. Specific laser systems: Solid state lasers, Semiconductor diode lasers, Fiber laser, He-Ne, Ar , CO₂ and Cu vapour lasers, Excimer lasers, Ti-sapphire laser and Free- electron laser; Engineering design of a generic laser system, laser beam transport and delivery systems. Laser detectors, Laser safety and engineering control measures.