

1. What is the role of an optical resonator in a laser system?
2. Derive an expression for the round-trip gain in a laser cavity.
3. Describe the gain curve of a laser medium. Explain the impact of homogeneous and inhomogeneous broadening on mode selection.
4. A Ti: Sapphire laser has a gain bandwidth of 100 THz.
  - (a) How short can the Gaussian pulse be in a mode-locked configuration?
  - (b) How many comb lines will it generate if the repetition rate is 250 MHz?