

Tutorial Sheet-7

[Laser Technology and Applications, 16B1NPH533, Odd Semester 2020]

1. What are modes? Explain different types of modes? Describe a technique for obtaining single longitudinal mode.
2. What do you mean by Q-switching? Describe various methods of Q-switching. How it is helpful in generating laser pulse?
3. What is gain bandwidth?
4. In He-Ne laser beam, the two plane mirrors forming the resonant cavity are at a distance of 0.5 m. Find the mode separation of longitudinal cavity in terms of frequency. [Ans: 3×10^8 Hz]
5. Calculate the energy difference in eV between two energy levels of Ne atoms of He-Ne laser, the transitions between which results in the emission of a light of wavelength 632.8 nm. Also, calculate the number of photons emitted per second if optical power output is 1 mW. [Ans: 1.96 eV & 3.183×10^{15}]
6. Find the coherence length of a laser ($\lambda = 115$ nm) if coherence time is 26.7 ns. [Ans: 8 m]
7. Draw stability diagram for a laser resonator and mark the points for confocal, concentric and planer system.
8. State True/false
 - (a) Longitudinal modes are inversely proportional to the length of resonator system.
 - (b) Axial mode separation is directly proportional to the wavelength of light.
9. Write characteristic equation for resonator cavity and discuss the condition for convergence and divergence of beam in cavity.