

UNIVERSITY OF PETROLEUM & ENERGY STUDIES, DEHRADUN

Program: B.Tech	IOT, Block chain, OGI, OSS, CSF, Big Data, AI+ML, Devops	Semester	I
Course	PHYSICS-I	Course Code	PHYS1008
Session	July - Dec , 2019	Topic	LASERS, Holography & Fiber Optics

1. What is the principle of LASER?
2. Explain the terms absorption, spontaneous emission and stimulated emission of radiation. Obtain a relation between transition probabilities of spontaneous and stimulated emission.
3. Explain the term population inversion in connection with the laser. How is it achieved in practice?
4. Discuss the essential requirements for producing laser beam.
5. What are the characteristics of a laser beam? Discuss its important applications.
6. Describe the energy level diagram of a He-Ne LASER. How is it superior to the Ruby LASER?
7. The ruby laser has two states at 27 and 227°C. If it emits radiation of wavelength 7000\AA then calculate the relative population.
8. Distinguish between photography and holography.
9. Discuss various kinds of losses that an optical signal suffer while propagating through fiber. Which is most important one?
10. Calculate the refractive indices of core and cladding materials of an optical fiber if its numerical aperture is 0.22 and relative refractive index difference is 0.012.
11. Derive the expression for Numerical Aperture (NA) of an optical fibre. Also state the physical significance of the NA.