



# SNS COLLEGE OF ENGINEERING

Kurumbapalayam (Po), Coimbatore – 641 107

**AN AUTONOMOUS INSTITUTION**



Approved by AICTE, New Delhi and Affiliated to Anna University, Chennai.

## **UNIT – II WAVES AND OPTICS**

### **TOPIC – X QUESTIONS DISCUSSION**

1. Derive expression for the Einstein Coefficient of spontaneous and stimulated emission  
(or) Derive the relation between the probabilities of spontaneous and stimulated emission in terms of Einstein coefficients (or) For atomic transitions, derive Einstein relations and hence deduce the expressions for the ratio of spontaneous emission rate to the stimulated emission rate (JUNE 2011, JUNE 2010, JAN 2010).
2. Discuss the Einstein theory of stimulated absorption, spontaneous and stimulated emission of radiation. What are the conditions for light amplification (DEC 2010, DEC 2011).
3. i. Distinguish between spontaneous and stimulated emission of radiation (JAN 2012, DEC 2011).  
ii. Why population inversion is necessary for laser action? (JAN 2012, DEC 2011)  
iii. What are different pumping mechanisms used in lasers? Give an example for each (JAN 2012, DEC 2011).
4. i. Describe the construction and working of Nd –YAG laser (JAN 2012).  
ii. What are its advantages? (JAN 2012).  
iii. Explain any two industrial application of laser? (JAN 2012).
5. i. Describe Vibrational Modes of CO<sub>2</sub> molecule (DEC 2011).  
ii. Describe the construction and working of CO<sub>2</sub> Laser with neat diagram (JAN 2009, JAN 2007, MAY 2007, JUNE2010, DEC 2011, JAN 2013).  
iii. For a semiconductor laser, the band gap is 0.8eV. What is the wavelength of light emitted from it (DEC 2011).
6. Describe the construction and working of homo junction and heterojunction semiconductor laser (JUNE 2011).
7. Mention four application of laser in material processing (JUNE2010).

8. Obtain expression for numerical aperture acceptance angle of an optical fiber.(or) Explain the basic structure of optical fiber and discuss the principle of transition of light through optical fiber (JAN 2010, DEC 2010, JUNE 2011, JUNE2010, DEC 2010).
9. i. Explain total internal reflection with suitable diagrams. Define acceptance angle and numerical aperture. Derive expression for them. (JAN 2012).  
ii. How are optical fibers classified based on modes and refractive index profile? How are signals transmitted through them? (JAN 2012, JAN 2013).
10. How are fibers classified? Explain the classification in detail (or) Discuss about the various types of optical fiber (JAN 2010, JAN 2013).
11. Describe the optical fiber communication with a neat block diagram (JUNE 2011, JAN 2013).
12. Given an elaborate account on losses in optical fiber (JUNE2010).
13. What is mean by attenuation? Discuss the different mechanisms which are responsible for attenuation in optical fiber (JAN 2012).
14. Write short note on temperature and displacement sensor (or) Explain the concept of optical fiber sensors and describe in detail about two sensors (JAN 2010, JUNE 2011, DEC 2010).
15. Write a neat diagram given an account on displacement sensor (JUNE 2010, JAN 2012).
16. Explain the construction and working of fiber-optic medical endoscope (JAN 2010).