

LASERS

1. Define laser.
2. What is the full form of laser?
3. What is the principle on which laser is based?
4. What are the characteristics properties of laser light?
5. Why laser beam diverges?
6. Differentiate spontaneous and stimulated emission.
7. Is stimulated emission a must condition for laser action to take place? Justify your answer.
8. What is population inversion?
9. How population inversion can be achieved?
10. What conditions are required for laser action to take place?
11. Define: Lifetime of a energy state.
12. Differentiate Normal Excited state and Metastable state.
13. What is pump? How many types of pump can be there?
14. What is optical pumping?
15. Why we use optical pumping for solid state lasers and electric discharge pumping for gaseous state lasers?
16. Comment on the following statements:
 - i. Laser is a non equilibrium device.
 - ii. Laser is a device with negative absorption coefficient.
 - iii. Laser is a negative temperature device.
 - iv. Gaseous state lasers are better than solid state lasers.
17. Explain the working of three level laser.
18. Explain the working of four level laser.
19. Why four level laser is better than three level laser, although its efficiency is least?
20. What is optical resonator?
21. What is the function of optical resonator?
22. In word LASER, letter A should be replaced by letter O. Comment.
23. Explain spiking in Ruby laser.
24. Why He and Ne gases are mixed together in He-Ne laser?
25. What is the basic difference between He-Ne laser and CO₂ laser?
(in terms of energy levels and output).
26. What is the role of He atoms in CO₂ laser?
27. Write the wavelengths obtained in the following lasers:
 - i. Ruby laser
 - ii. He-Ne laser

- iii. CO₂ laser
 - iv. Diode laser
28. Why diode laser is preferred for communication purposes?
 29. Write applications of lasers.
 30. Write applications of lasers in engineering.
 31. Define coherence. Name its types.
 32. Explain different types of coherence.
 33. What is the significance of temporal coherence?
 34. What is the significance of spatial coherence?
 35. Discuss the principle, theory, construction and working of Ruby laser.
 36. Discuss the principle, theory, construction and working of He-Ne laser.
 37. Discuss the principle, theory, construction and working of CO₂ laser.
 38. Write short note on diode laser.
 39. Discuss in detail the applications of CO₂ laser.
 40. Derive the relationship amongst various Einstein Coefficients and discuss the result obtained.
 41. Define various Einstein Coefficients. Give their units and significance. Discuss Einstein Theory of matter and radiation. What are the conditions for lasing action to take place?