1. What does LASER stand for?

A. Light absorption by stimulated emission of radiation

B. Light absorption by spontaneous emission of radiation

C. Light amplification by spontaneous emission radiation

D. Light amplification by stimulated emission of radiation

2. During absorption of radiation, the energy of the absorbed photon is

A. Exactly equal to the energy difference between two energy levels

B. More than the energy difference between two energy levels

C. Less than the energy difference between two energy levels

D. None of the above

3. During spontaneous emission of radiation, the energy of the emitted photon is

A. Less than the energy difference between two energy levels

B. More than the energy difference between two energy levels

C. Exactly equal to the energy difference between two energy levels

D. None of the above

4. During spontaneous emission of radiation, the emitted photons have,

A. Same phase

B. Different phase or random phase

C. Always 90 degree phase difference between each other

D. Always have 45 degree phase difference between each other

5. When an atom jumps from higher energy level to lower energy level naturally, the process is known as,

A. Absorption of radiation

B. Stimulated emission of radiation

C. Spontaneous emission of radiation

D. LASER emission of radiation

6. During stimulated emission of radiation, the number of photons become

A. Triple

B. Double

C. Four times

D. Zero

7. The stimulated emission of radiation

A. Is a natural process, happens all the time in nature

B. Only occurs in stars like sun

C. Never been proved experimentally, only exist in theory

D. Can be achieved by special arrangement such as resonant cavity etc.

8. Which one of the following is not property of LASER

A. Directionality

B. Monochromaticity

C. Coherence

D. Low intensity

9. Optical resonators are used to,

A. Produce multiple color spectrum

B. Produce low intensity light beam

C. Produce amplified light signal

D. Produce diffraction pattern

10. Population inversion is never possible in,

A. Two level system

B. Three level system

C. Four level system

D. None of the above

11. Metastable state lies,

A. At the top of all energy levels

B. At the bottom of all energy levels

C. Such kind of state does not exist

D. Somewhere in between highest excited state and lowest energy state

12. The typical lifetime of any metastable state is,

a. 10^{-10} Second

b. 10^{-5} Second

c. 10^{-8} Second

d. $10^{0.5}$ Second

13. To achieve population inversion,

A. The number of atoms in the lowest energy level must be higher than that of highest excited level
B. The number of atoms in the highest excited level must be higher than that of metastable state
C. The number of atoms in the metastable state must be higher than that of lower energy state (or ground state)
D. The number of atoms in the lowest energy level must be equal to the number of atoms in metastable state

14. Which one of the following is the primary condition for LASER emission?

A. Stimulated Emission and existence of metastable state
B. Spontaneous Emission
C. Absorption of radiation
D. Gas as an active medium

15. In thermal pumping, the population inversion is achieved by,

A. External light source
B. Chemical reaction
C. Electric discharge of gases
D. Heating the LASER medium

16. A three-level LASER emits a light of wavelength 5500 angstrom. What is the energy difference between the lasing energy levels (metastable state and lower energy state)?

1 angstrom= 1 X 10^{-10} m, C=3 X 10^{8} m/sec, h= 6.6 X 10^{-34} J.S

a. 0.36 X 10^{-18} J

b. 0.36 X 10^{-22} J

c. 0.36 X 10^{-14} J

d. 0.36 X 10^{-10} J

17. Spontaneous emission from higher energy level to lower energy level in a laser system could be,

A. Radiative transition only
B. Non-radiative transition only
C. Both radiative and non-radiative transition, depending on the active material used
D. None of the above

18. In a four level system if, τ_{ms} and τ_l are the life time of metastable state and life time of lower lasing level state respectively. Which one of the following is correct,

a. $\tau_{ms} \ll \tau_l$

b. $\tau_{ms} \gg \tau_l$

c. $\tau_{ms} = \tau_l$

d. $\tau_{ms} \leq \tau_l$