Assignment - 5

Due on 2019-02-04, 23:59 IST.

The photon creation in the lasing action after $\ldots$ the gain medium through absorption is due to $\ldots$ the light amplification part results from $\ldots$

- (S) Dumpling
- (S) Stimulated emission
- (S) Raman emission
- (S) Spontaneous emission
- (S) Stimulated emission

- (S) Heating
- (S) Stimulated emission

1. For a linear cavity laser having a repetition rate $\ldots$, the repeat frequency of appearance of longitudinal modes of 300-KHz, what is the length of the laser cavity? (S)

- 300 cm
- 300 mm
- 3 m
- 0.33 m

2. The thermal energy of Ni molecules at room temperature (300 K) corresponds to an energy gap $\ldots$ in the order of magnitude of the frequency of the corresponding photon? (S)

- 0.6 eV
- 1 eV
- 1.5 eV
- 2.0 eV

3. Consider a transmit-receive pulsed laser operating at a central wavelength of 800 nm that outputs a pulse with full-width half-maximum of 10$^{-14}$ s, what is the spectral bandwidth of this laser? (S)

- 0.14 nm
- 0.18 nm
- 0.24 nm
- 0.30 nm

4. How can you get a Laser Gain Medium at a temperature of 270 K to have both stimulated and spontaneous emission rate to be equal? (S)

- If the Laser Gain Medium is cooled to 29 K
- If the Laser Gain Medium is pumped randomly at 1 µm wavelength
- If the Laser Gain Medium is pumped uniformly using 1 µm wavelength
- If the Laser Gain Medium is cooled to 100 K

5. What is population inversion? (S)

- The number of electrons is equal in both the ground and excited energy states
- The number of electrons in the lower energy state is more than that in the higher energy state
- The number of electrons in the upper energy state is more than that in the ground state

6. When the number of electrons in the higher energy state is more than ground state (S)

- There is no such process in any given state
- A feeble process
- A forced process
- A feeble process

7. When the number of electrons is equal in both the ground and excited energy states (S)

- A considered feeble process for population inversion to occur in an ideal two-level system, although it is observed in some in more level system. This is
- Because any two-level system is always in the population inversion condition because the thermodynamically unstable sub-zero reaction is not a condition to achieve population inversion
- Because there is no such level two-systems although it is possible to achieve population inversion in two level systems

8. Consider optical pumping at 890 nm of a 7% - 9% crystal placed inside a laser cavity. The laser wavelength is obtained by placing the pump flash-lamp and polarizer. (S)

- 900 K
- 950 K
- 910 K
- 8 W

- 8 W