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Courses » Laser Fundamentals and Applications

Announcements **Course** Ask a Question Progress FAQ



# Unit 3 - Week 2 - Concept of population inversion, 2-level, 3-level, and 4-level systems, Components of LASERS

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**Course outline**

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**Week 1 - Introduction to LASERS**

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**Week 2 - Concept of population inversion, 2-level, 3-level, and 4-level systems, Components of LASERS**

- Lecture 06 - Population inversion, 2-level system and 3-level system
- Lecture 07 - 3-level System and 4-level system
- Lecture 08 - Components of LASERS
- Lecture 09 - Modes of

## Assignment 2

The due date for submitting this assignment has passed. As per our records you have not submitted this assignment. **Due on 2019-02-13, 23:59 IST.**

1) What is the maximum value of  $N_2/N$  for a two level system? ( $N_2$  = Population of the excited state,  $N = N_1 + N_2$  = Total population) **1 point**

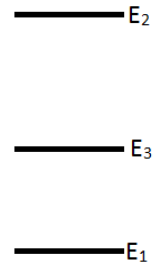
- 1
- 2
- 0.5
- None of the above

**No, the answer is incorrect.**  
**Score: 0**

**Accepted Answers:**  
0.5

2) Which statement is true for a 3-level laser system? **1 point**

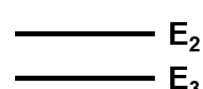
- The state 3 has longer life time than state 2
- The state 2 has longer life time than state 3
- Both have exact equal life times
- None of (a) and (b)



**No, the answer is incorrect.**  
**Score: 0**

**Accepted Answers:**  
*The state 3 has longer life time than state 2*

3) Which of the states are radiatively coupled for a true 4-level laser system? **1 point**



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- Quiz : Assignment 2
- Feedback For Week 2
- Solution for Assignment -2

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- Week 3 - Threshold condition, Unique Properties of LASER, various parameters of a LASER**

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- Week 4 - Pulsing techniques**

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- Week 5 - Mode-Locking technique and types of LASER**

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- Week 6 - Types of LASERs and Non Linear Optics**

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- Week 7 - Applications of Lasers: Non-linear optics, LIDAR, Laser spectroscopy, Isotope enrichment and separation.**

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- Week 8 - Various Applications of Lasers, Laser safety and Summary**

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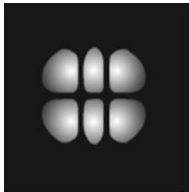
- DOWNLOAD VIDEOS**

**Score: 0**  
**Accepted Answers:**  
*Level 3 and level 4*

4) Assign p and q for following TEM<sub>pq</sub> mode **1 point**

p=2; q=1  
 p=1; q=2  
 p=2; q=3  
 p=3; q=2

**No, the answer is incorrect.**  
**Score: 0**  
**Accepted Answers:**  
*p=2; q=1*



5) Assign p and q for given TEM<sub>pq</sub> mode **1 point**

p=2; q=1  
 p=2; q=2  
 p=3; q=3  
 p=1; q=2

**No, the answer is incorrect.**  
**Score: 0**  
**Accepted Answers:**  
*p=2; q=2*

6) What is the number of node(s) of the mode in the LASER cavity which follows the condition  $5\lambda=2L$ ? (Note:  $\lambda$  = wavelength of light, L = length of cavity) **1 point**

0  
 3  
 4  
 5

**No, the answer is incorrect.**  
**Score: 0**  
**Accepted Answers:**  
*4*

7) Rate of change of intensity of stimulated photons depends on: (Note:  $N_1$ = population of ground state;  $N_2$ = population of excited state) **1 point**

Only  $N_1$   
 Only  $N_2$   
 Both  $N_1$  and  $N_2$   
 None of the above

**No, the answer is incorrect.**  
**Score: 0**  
**Accepted Answers:**  
*Both  $N_1$  and  $N_2$*

8) Calculate the order of the mode (n) for a wavelength 500 nm that can be sustained in a LASER cavity of length (L) 1 mm. **1 point**

4000<sup>th</sup>



- 5000<sup>th</sup>
- 2000<sup>th</sup>
- 1500<sup>th</sup>

No, the answer is incorrect.

Score: 0

Accepted Answers:

4000<sup>th</sup>

9) For a light of wavelength 450 nm, calculate the length of cavity for which 15th order mode can be achieved. **1 point**

- 7.584  $\mu\text{m}$
- 2.866  $\mu\text{m}$
- 3.375  $\mu\text{m}$
- 6.745  $\mu\text{m}$

No, the answer is incorrect.

Score: 0

Accepted Answers:

3.375  $\mu\text{m}$

10) Calculate the wavelength of the light (in nm) that can be sustained in a LASER cavity of length (L) 1.5 mm with order of mode (n)= 5500. **1 point**

- 630.4 nm
- 488.7nm
- 545.4 nm
- 454.5 nm

No, the answer is incorrect.

Score: 0

Accepted Answers:

545.4 nm



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