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Courses » Semiconductors Optoelectronics

Announcements **Course** Ask a Question Progress FAQ

## Unit 12 - Week 10

Register for  
Certification exam

### Course outline

How to access  
the portal

Self-assessment  
before course  
start

Week 1

Week 2

Week 3

Week 4

Week 5

Week 6

Week 7

Week 8

Week 9

Week 10

- Semiconductor Laser - III: Single Frequency Lasers
- Vertical Cavity Surface

## Assessment 10

The due date for submitting this assignment has passed.

As per our records you have not submitted this assignment. **Due on 2019-04-10, 23:59 IST.**

### Instructions:

1. Answer **all** questions; all questions carry equal mark.
2. All symbols have their usual meanings.
3. Only one of the options is correct
4. The 5th question is a "fill in the blank" type of question. You are supposed to enter a numerical answer to fill the blank as given in the question. Your answer must be correct upto two decimal places (unless it is an integer).
5. You can see the correct answers after the last date of submission.

### Note:

Marks obtained in this quiz will be counted towards your final score. You can take the quiz and submit it any number of times, and the latest submitted answers will be taken as your final submission.

### Physical Constants:

$m_0 = 9.11 \times 10^{-31}$  kg;  $h = 6.627 \times 10^{-34}$  J.s;  $e = 1.602 \times 10^{-19}$  C;  $k_B = 1.38 \times 10^{-23}$  J/K

1) Which one of the following relationship regarding the typical linewidths ( $\Delta\nu$ ) of an LED, a Fabry-Perot laser diode (FP) and a DFB laser is correct? **1 point**

- $\Delta\nu_{LED} < \Delta\nu_{FP} < \Delta\nu_{DFB}$
- $\Delta\nu_{FP} < \Delta\nu_{LED} < \Delta\nu_{DFB}$
- $\Delta\nu_{FP} < \Delta\nu_{DFB} < \Delta\nu_{LED}$
- $\Delta\nu_{DFB} < \Delta\nu_{FP} < \Delta\nu_{LED}$

**No, the answer is incorrect.**

Score: 0

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- Quiz :  
Assessment 10
- Solutions of  
Assessment 10

Week 11

Week 12

Exam  
Instructions

Lecture  
Transcripts

$n_L$  and the period the same)

- Decreasing the number of layers in the Bragg stacks (keeping  $n_H$ ,  $n_L$  and the period the same)
- By using materials with lower  $n_H$  and  $n_L$  in the Bragg stacks (keeping the period the same)
- Increasing the thickness of the layers in the Bragg stacks (keeping  $n_H$  and  $n_L$  the same)

No, the answer is incorrect.

Score: 0

Accepted Answers:

By using materials with lower  $n_H$  and  $n_L$  in the Bragg stacks (keeping the period the same)

3) Which one of the following statements related to handling of lasers is **1 point** TRUE:

- Class IV lasers can be handled safely with minimum precautions.
- Proper handling of Class I lasers requires avoidance of direct exposure to any part of the body.
- 'Eye-safe lasers' have wavelength around 1.5  $\mu\text{m}$ .
- Laser diodes are insensitive to Electro Static Discharge.

No, the answer is incorrect.

Score: 0

Accepted Answers:

'Eye-safe lasers' have wavelength around 1.5  $\mu\text{m}$ .

4) State whether the following statement is TRUE or FALSE: **1 point**

Quantum well lasers have lower threshold current as compared to that of double heterostructure lasers because quantum well lasers have higher values for the *confinement factor*.

- TRUE
- FALSE

No, the answer is incorrect.

Score: 0

Accepted Answers:

FALSE

5) A laser diode, which is operating just at the threshold, has a length of 1000  $\mu\text{m}$  and cleaved end-facets of reflectivity 30% each. If the end facets are now coated with reflective films, so that the reflectivity is increased to 90% (each), the minimum length of the laser necessary in order to operate at the threshold is \_\_\_\_\_  $\mu\text{m}$ .

No, the answer is incorrect.

Score: 0

Accepted Answers:

(Type: Range) 85,90

**1 point**

