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NPTEL

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Courses » Semiconductors Optoelectronics

Announcements **Course** Ask a Question Progress FAQ

Unit 9 - Week 7

Register for Certification exam

Course outline

Assessment 7

The due date for submitting this assignment has passed.
As per our records you have not submitted this assignment. **Due on 2019-03-20, 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. 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 x 10^{-31} kg; h = 6.627 x 10^{-34}J.s; e = 1.602 x 10^{-19} C; k_B = 1.38 x 10^{-23} J/K

1) Light of photon energy hv < E_g (= 1 eV) is absorbed by a semiconductor sample. Which one of the following transitions *would not* have taken place in this absorption? ***1 point***

- Intraband free carrier transition
- Phonon transition
- Interband transition
- Excitonic transition

No, the answer is incorrect.
Score: 0

Accepted Answers:
Interband transition

2) Which one of the following statements regarding excitons ***1 point***

No, the answer is incorrect.
Score: 0

Accepted Answers:
Exciton effectively increases the bandgap energy

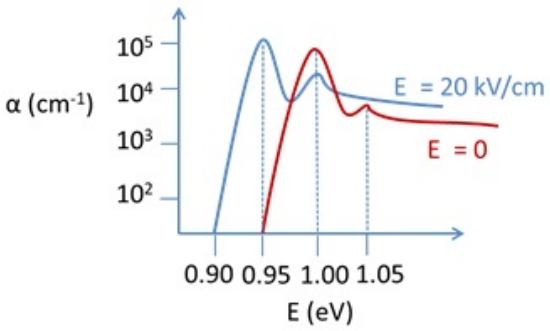
3) In the presence of an applied electric field, the band-edge wavelength λ_g of a semiconductor effectively **1 point**

- Increases with increasing electric field, and decreases with decreasing temperature
- Decreases with increasing electric field, and decreases with decreasing temperature
- Decreases with increasing electric field, and increases with decreasing temperature
- Increases with increasing electric field, and increases with decreasing temperature

No, the answer is incorrect.
Score: 0

Accepted Answers:
Increases with increasing electric field, and decreases with decreasing temperature

4) The absorption spectrum of a semiconductor quantum well device, in the presence, and the absence of applied electric field, is shown in the figure. What would be a suitable wavelength of operation if the device is to be used as an efficient electro-absorption modulator? **1 point**



- 1180 nm
- 1240 nm
- 1310 nm
- 1370 nm

No, the answer is incorrect.
Score: 0

Accepted Answers:
1310 nm

5) Consider the propagation of a beam of light through a MQW structure comprising of 50 quantum wells, each of thickness 10 nm, and of absorption coefficient 10^4 cm^{-1}. Assume that there is no absorption in the barrier layers. The ratio of output light intensity to the intensity of light incident on the MQW structure is **1 point**

- 0.021
- 0.135
- 0.368
- 0.606

No, the answer is incorrect.
Score: 0

Accepted Answers:
0.606

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