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NPTEL

Courses » Semiconductors Optoelectronics

Announcements   **Course**   Ask a Question   Progress   FAQ

Unit 4 - Week 2

Register for Certification exam

Course outline

How to access the portal

Self-assessment before course start

Week 1

Week 2

● Occupation Probability & Carrier Concentration

● Carrier Concentration & Fermi Level

● Quasi Fermi Levels

○ Quiz : Assessment 2

○ Solutions of Assessment 2

Week 3

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Assessment 2

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

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_e = 9.11 x 10^{-31} kg; h = 6.627 x 10^{-34} Js; e = 1.602 x 10^{-19} C; k_B = 1.38 x 10^{-23} J/K
Also, assume $k_B T$ = 0.025 eV at room temperature.

1) The unit of *density of states ρ(E)* is   *1 point*

○ m^{-2}

○ m^{-3}

○ m^{-3} J^{-1}

○ J m^{-3}

No, the answer is incorrect.
Score: 0

Accepted Answers:
m^{-3} J^{-1}

2) The Fermi functions describing the carrier distributions in a particular *1 point*
~~semiconductor at two different temperatures are shown in the figure. Which~~

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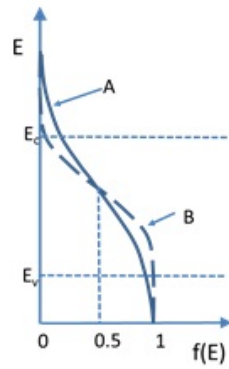
○ $T^A < T^B$

○ $n^A < n^B$

○ $p^A < p^B$

○ $E_f^A = E_f^B$

No, the answer is incorrect.
Score: 0

Accepted Answers:
$E_f^A = E_f^B$

3) Which of the following *can* lead to Quasi Fermi levels in a semiconductor?   *1 point*

○ Changing the temperature

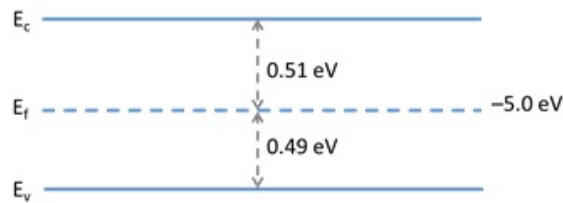○ Irradiating

○ Applying an electric field

○ Doping

No, the answer is incorrect.
Score: 0

Accepted Answers:
Irradiating

4) Energy band diagram of an intrinsic semiconductor is shown below: *1 point*

The ratio (m_C/m_V) is approximately equal to

○ 29:50

○ 17:10

○ 17:5

○ 29:10

No, the answer is incorrect.
Score: 0

Accepted Answers:
17:10

5) The energy band diagram of a particular semiconductor in quasi-equilibrium at room temperature is shown in the following figure. Estimate the occupation probability of electrons and holes at E_2 and E_1, respectively.   *1 point*

E_2 -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- −4.2 eV

E_c ———————————————————— −4.3 eV

E_{fc} -- -- -- -- -- -- -- -- -- -- -- -- -- -- −4.7 eV

E_{fv} -- -- -- -- -- -- -- -- -- -- -- -- -- -- −5.1 eV

E_v ———————————————————— −5.4 eV

E_1 -- -- -- -- -- -- -- -- -- -- -- -- -- -- −5.5 eV

- ○ e^{-12}, e^{-16}
- ○ e^{-4}, e^{-5}
- ○ e^{-20}, e^{-16}
- ○ 0, 0

No, the answer is incorrect.
Score: 0

Accepted Answers:
e^{-20}, e^{-16}

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