Unit 11 - Week 8 Lectures

Assignment-8

The due date for submitting this assignment has passed.
As per our records you have not submitted this assignment.

Due on 2019-09-25, 23:59 IST.

1) In a semiconductor material at $T = 100\ K$, assume that the Fermi energy level is 0.1 eV below the conduction band energy (E_c). The probability of a state being occupied by an electron at $E_c + kT$ is — ***0 points***

- 0.38 %
- 2.06 %
- 0.77 %
- 1.00 %

No, the answer is incorrect.
Score: 0
Accepted Answers:
0.77 %

2) In Question 1, if the band gap of the material is 0.5 eV, the material is — ***1 point***

- p-type material
- n-type material
- Intrinsic material
- Cannot be determined.

No, the answer is incorrect.
Score: 0
Accepted Answers:
n-type material

3) In a semiconductor material, as the temperature increases — ***1 point***

- Probability of energy states above Fermi energy level being occupied increases.
- Probability of energy states above Fermi energy level being occupied decreases.
- Probability of energy states below Fermi energy level being occupied increases.
- Probability of energy states above Fermi energy level being occupied remains the same.

No, the answer is incorrect.
Score: 0
Accepted Answers:
Probability of energy states above Fermi energy level being occupied increases.

4) It is important to control temperature of semiconductor laser diodes because — ***1 point***

- As temperature increases, linewidth of the laser decreases.
- As temperature increases, linewidth of the laser increases.

No, the answer is incorrect.
Score: 0
Accepted Answers:
As temperature increases, linewidth of the laser increases.

5) Current supply of 0.4 A is supplied to a semiconductor slab of dimensions $100\mu m \times 50\mu m \times 4\mu m$ and a photon lifetime of 5 ns is observed. The electron density in the semiconductor slab is — ***1 point***

- $0.625 \times 10^{17}\ cm^{-3}$
- $1.6 \times 10^{18}\ cm^{-3}$
- $0.625 \times 10^{18}\ cm^{-3}$
- $1.6 \times 10^{17}\ cm^{-3}$

No, the answer is incorrect.
Score: 0
Accepted Answers:
$0.625 \times 10^{18}\ cm^{-3}$

6) For a semiconductor slab having dimensions $100\mu m \times 10\mu m \times 1\mu m$, if constant of proportionality is $\beta = 2 \times 10^{-10}\ cm^3/s$ and population density of electrons and holes is $5 \times 10^{18}\ cm^{-3}$ each, the current required at steady state to maintain population density is — ***1 point***

- 0.4 A
- 0.12 A
- 0.6 A
- 0.8 A

No, the answer is incorrect.
Score: 0
Accepted Answers:
0.8 A

7) For a certain semiconductor optical amplifier (SOA), the single pass gain is 5.23 and $R = 0.1$, the maximum gain is — ***1 point***

- 12.7 dB
- 18.61 dB
- 25.4 dB
- 30 dB

No, the answer is incorrect.
Score: 0
Accepted Answers:
12.7 dB

8) For the SOA given is Question 7, the minimum gain is — ***1 point***

- 1.82 dB
- 5.23 dB
- 2.61 dB
- 1.30 dB

No, the answer is incorrect.
Score: 0
Accepted Answers:
2.61 dB

9) For the SOA given in Question 7, the gain ripple is — ***1 point***

- 16.79 dB
- 10.08 dB
- 20.17 dB
- 28.70 dB

No, the answer is incorrect.
Score: 0
Accepted Answers:
10.08 dB

10) The condition on the value of R for the SOA given in Question 7 is — ***1 point***

- $R > 0.19$
- $R < 0.19$
- R can have any real value.

No, the answer is incorrect.
Score: 0
Accepted Answers:
$R < 0.19$