

Unit 8 - Week 7

Course outline

How does an NPTEL online course work?

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Week 2

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Week 6

Week 7

Optical Fiber Components and Devices - IV

Optical Fiber Components and Devices - V

Optical Sources and Detectors - I

Optical Sources and Detectors - II

Optical Sources and Detectors - III

Quiz : Assignment 7

Solution : Assignment 7

Week 8

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Assignment 7

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

Due on 2020-03-18, 23:59 IST.

1) An LED gives maximum power at $0.88 \mu\text{m}$ wavelength at 50°C temperature. The linewidth of emitted radiation is approximately **1 point**

- 11 nm
 21 nm
 31 nm
 41 nm

No, the answer is incorrect.

Score: 0

Accepted Answers: 31 nm

2) Calculate the approximate value of Fermi energy E_F if Fermi function $f(E)$ is 4×10^{-3} at 6.5 eV and $T = 600 \text{ K}$. **1 point**

- 3.4 eV
 4.2 eV
 5.2 eV
 6.2 eV

No, the answer is incorrect.

Score: 0

Accepted Answers: 6.2 eV

3) Consider the fabrication of an FBG by holographic technique in a single mode fiber with $n_{\text{eff}} = 1.4450$. If the wavelength of UV beam used for fabrication is 250 nm and the angle between the beams is 25° , then calculate the Bragg wavelength? **1 point**

- 1395 nm
 1450 nm
 1669 nm
 2000 nm

No, the answer is incorrect.

Score: 0

Accepted Answers: 1669 nm

4) Consider a long period grating with grating period $100 \mu\text{m}$. The effective indices of core and cladding modes are 1.4732 and 1.4682 , respectively. Find the wavelength at which the phase matching condition is satisfied. **1 point**

- $0.5 \mu\text{m}$
 $1.5 \mu\text{m}$
 $2.0 \mu\text{m}$
 $3.2 \mu\text{m}$

No, the answer is incorrect.

Score: 0

Accepted Answers: $0.5 \mu\text{m}$

5) An LED at 1310 nm wavelength emits 0.35 mW power when 25 mA current is injected. Another LED having same internal and external quantum efficiencies but different peak wavelength gives 1.5 mW peak emission at 30 mA drive current. Find the peak emission wavelength of 2nd LED. **1 point**

- 720 nm
 367 nm
 212 nm
 120 nm

No, the answer is incorrect.

Score: 0

Accepted Answers: 367 nm

6) If input power $P_{\text{in}} = -30 \text{ dBm}$, $n_{\text{sp}} = 1.58115$ and the optical signal to noise ratio (OSNR) for larger gains is 45 dB . Calculate the optical bandwidth (B_0) at 1310 nm wavelength. **1 point**

- 15 KHz
 35 KHz
 66 GHz
 80 MHz

No, the answer is incorrect.

Score: 0

Accepted Answers: 66 GHz

7) Calculate the approximate wavelength for which the band gap of the GaAs material is 1.42 eV . **1 point**

- $0.87 \mu\text{m}$
 $1.50 \mu\text{m}$
 $3.14 \mu\text{m}$
 $4.20 \mu\text{m}$

No, the answer is incorrect.

Score: 0

Accepted Answers: $0.87 \mu\text{m}$

8) Find the composition of $\text{In}_{1-x}\text{Ga}_x\text{As}_y\text{P}_{1-y}$ for making light sources at $1 \mu\text{m}$. For lattice matching of InGaAsP with InP $x = 0.45y$ and $E_g(y) = 1.35 - 0.72y + 0.12y^2 \text{ eV}$. **1 point**

- $\text{In}_{0.929}\text{Ga}_{0.0706}\text{As}_{0.157}\text{P}_{0.843}$
 $\text{In}_{0.118}\text{Ga}_{0.882}\text{As}_{0.738}\text{P}_{0.262}$
 $\text{In}_{0.789}\text{Ga}_{0.211}\text{As}_{0.422}\text{P}_{0.578}$
 $\text{In}_{0.211}\text{Ga}_{0.789}\text{As}_{0.578}\text{P}_{0.42}$

No, the answer is incorrect.

Score: 0

Accepted Answers: $\text{In}_{0.929}\text{Ga}_{0.0706}\text{As}_{0.157}\text{P}_{0.843}$

9) An LED when operated at $i = 30 \text{ mA}$ gives 1.5 mW output power at certain wavelength. If the internal quantum efficiency $\eta_{\text{int}} = 0.62$ and the refractive index of the material is 2.25 , what is the value of operating wavelength? **1 point**

- $0.15 \mu\text{m}$
 $0.35 \mu\text{m}$
 $0.65 \mu\text{m}$
 $0.85 \mu\text{m}$

No, the answer is incorrect.

Score: 0

Accepted Answers: $0.65 \mu\text{m}$

10) Which of the following semiconductors is suitable for fabrication of light emitting diodes **1 point**

- Si
 Ge
 InP
 GaP

No, the answer is incorrect.

Score: 0

Accepted Answers: InP