

Unit 9 - Week 8

Course outline

How does an NPTEL online course work?

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Week 2

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Week 8

Optical Sources and Detectors - IV

Optical Sources and Detectors - V

System Design Aspects

Optical Fiber Measurements

Summary and Recent Advances

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Solution : Assignment 8

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FEEDBACK

Assignment 8

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

Due on 2020-03-25, 23:59 IST.

1) Consider a cavity consisting of two plane mirrors separated by a distance 31 cm in air. Calculate the mode number corresponding to the wavelength $\lambda = 1550$ nm? **1 point**

- 2×10^5
- 4×10^5
- 2×10^6
- 4×10^6

No, the answer is incorrect.

Score: 0

Accepted Answers:
 4×10^5

2) Consider a GaAs laser with cavity length 0.5 mm and the plane mirrors of reflectivity 0.4. Estimate the threshold gain coefficient (in mm^{-1}). (Given: Loss coefficient $(\alpha) = 5 mm^{-1}$) **1 point**

- 3.4
- 5.0
- 6.8
- 9.8

No, the answer is incorrect.

Score: 0

Accepted Answers:
6.8

3) In a laser with $\frac{v}{n} \frac{dn}{dv} = 0.38$ and $n = 3.6$, the spacing between the adjacent longitudinal modes is 120 GHz. the cavity length of the laser is **1 point**

- 251 mm
- 150 mm
- 150 μm
- 251 μm

No, the answer is incorrect.

Score: 0

Accepted Answers:
251 μm

4) At what wavelength a photo detector with responsivity 0.72 A/W has 65% quantum efficiency? **1 point**

- 4.4 μm
- 3.4 μm
- 2.4 μm
- 1.4 μm

No, the answer is incorrect.

Score: 0

Accepted Answers:
1.4 μm

5) An APD has a quantum efficiency of 75% at wavelength of 500 nm in the absence of multiplication. Calculate the incident optical power if the photocurrent of the APD is 1.5 μA . **1 point**

- 3 mW
- 2 mW
- 2 μW
- 5 μW

No, the answer is incorrect.

Score: 0

Accepted Answers:
5 μW

6) Consider a 40 km link with 0.5 dB/km loss, 4 splices with 0.5 dB loss each, and 5 connectors with 1 dB loss each. If the source power is 0.25 mW and power margin is 7 dB, what should be the sensitivity of the detector? **1 point**

- 10 dBm
- 20 dBm
- 30 dBm
- 40 dBm

No, the answer is incorrect.

Score: 0

Accepted Answers:
-40 dBm

7) For a p-i-n photodiode, $i_p = 1.46 \mu A$ and SNR is 1517. Neglecting the surface leakage current, calculate the total noise in the signal. **1 point**

- $14 \times 10^{-16} A^2$
- $16 \times 10^{-16} A^2$
- $16 \times 10^{-15} A^2$
- $12 \times 10^{-15} A^2$

No, the answer is incorrect.

Score: 0

Accepted Answers:
 $14 \times 10^{-16} A^2$

8) For an ideal detector, average no. of photons per bit is 20. So bit error rate (BER) would be **1 point**

- 10^{-6}
- 10^{-4}
- 10^{-9}
- 10^{-7}

No, the answer is incorrect.

Score: 0

Accepted Answers:
 10^{-9}

9) For a dispersion attenuated system with $\Delta\lambda_0 = 2$ nm and $D = 21.7$ ps/(km-nm), calculate the bit rate (B) for a $L_{max} = 40$ km link of the fiber. **1 point**

- 0.14 Gb/s
- 1.24 Gb/s
- 1.15 Mb/s
- 2.25 Mb/s

No, the answer is incorrect.

Score: 0

Accepted Answers:
0.14 Gb/s

10) For a Gaussian field, calculate the wavelength for which mode field diameter is 6 μm with $\theta_f = 5^\circ$. **1 point**

- 0.2 μm
- 0.4 μm
- 0.6 μm
- 0.8 μm

No, the answer is incorrect.

Score: 0

Accepted Answers:
0.8 μm