Assignment 9

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

Due on 2020-04-01, 23:59 IST.

1) Responsivity of a photodiode changes with

- Wavelength of light
- Optical Power of signal
- Shift of signal
- Junction Capacitance of photodiode

No, the answer is incorrect.
Survey: 0
Accepted Answers: 3.9 µW

2) Calculate the incident optical power required to obtain a photocurrent of 2.5 µA, when the photodiode has a quantum efficiency of 85%, when photons of energy $1.5 \times 10^{-19}$ J are incident on it.

- 5.93 µW
- 3.6 µW
- 2.9 µW
- 1.05 µW

No, the answer is incorrect.
Survey: 0
Accepted Answers: 3.6 µW

3) If the absorption coefficient of silicon is 0.26 µm⁻¹ at 850 nm, find the penetration depth in µm.

No, the answer is incorrect.
Survey: 0
Accepted Answers: 69 µm

4) A silicon photodiode with an area of 1.5 mm² is to be used in conjunction with a load resistor of 100 Ω. If the requirement for this device is a fast response time such that RC time constant is equal to the transit time (measure the thickness of the intrinsic region in µm) that should be provided. It may be assumed that the permittivity for silicon is 1.06 x 10⁻¹² F/m and that the electron saturation velocity is 2x10⁷ cm/s.

No, the answer is incorrect.
Survey: 0
Accepted Answers: 13.2 µm

5) An APD has a quantum efficiency of 75% at 880 nm. When illuminated with radiation of this wavelength it produces an output photocurrent of 30 nA, after avalanche gain with a multiplication factor of 250. Calculate the received optical power to the device in mW.

No, the answer is incorrect.
Survey: 0
Accepted Answers: 12.3 µW

6) A SiGe PIN photodiode has the following parameters at a wavelength of 1550 nm: Iq = 40 µA, g = 0.01, α = 1000 µm, and the surface leakage current is negligible. The incident power is 300 mW (30 dBm), and the receiver bandwidth is 50 MHz. Find the minimum noise current in A at room temperature.

No, the answer is incorrect.
Survey: 0
Accepted Answers: 9 x 10⁻¹⁴ A

7) For question 6, find the minimum thermal noise current in mV at room temperature.

No, the answer is incorrect.
Survey: 0
Accepted Answers: 1 x 10⁻¹⁴ A

8) Suppose an APD has the following parameters: β = 0.85 at wavelength 663 nm, $M_{max} = 100$, $P = M^2$, Receiver Noise Figure (NR): 1, $R_L = 100$ Ω, and bandwidth = 100 MHz. Neglect the dark current. If the input signal power is 80 dBm at room temperature 300 K, what is the SNR in dB?

No, the answer is incorrect.
Survey: 0
Accepted Answers: 0.12

9) For the question 8, at what optical signal power is dBm thermal noise is equal to shot noise?

No, the answer is incorrect.
Survey: 0
Accepted Answers: 0.06 dBm

10) For the question 8, at what value of M does the maximum signal to noise occur?

No, the answer is incorrect.
Survey: 0
Accepted Answers: 183.17