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1. Intrinsically _____ are a very linear device.
a) Injection lasers
b) DH lasers
c) Gain-guided
d) LEDs
View Answer

Answer: d
Explanation: The ideal light output power against current characteristics for an LED linear. This tends to be more suitable for analog transmission where several constraints are put in linearity of optical source.

2. Linearizing circuit techniques are used for LEDs. State whether the given statement is true or false.
a) True
b) False
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Answer: a
Explanation: In practice, LEDs exhibit nonlinearities depending on configuration used. Thus, to allow its used in high quality analog transmission system and to ensure linear performance of device, linearizing circuit techniques is used.

3. The internal quantum efficiency of LEDs decreasing _____ with _____ temperature.
a) Exponentially, decreasing
b) Exponentially, increasing
c) Linearly, increasing
d) Linearly, decreasing
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Answer: b
Explanation: The light emitted from LEDs decreases. This is due to increase in p-n junction temperature. Thus, this results in exponentially decreasing internal quantum efficiency with temperature increment.

4. To utilize _____ of SLDs at elevated temperatures, the use of thermoelectric coolers is important.
a) Low-internal efficiency
b) High-internal efficiency
c) High-power potential
d) Low-power potential
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Answer: c
Explanation: The output characteristics of SLDs are typically of nonlinear in nature. This is observed with a knee becoming apparent at an operating temperature around 20 degree c.

Thus, to utilize high-power potential of these devices at elevated temperature, thermoelectric coolers are necessarily used.

5. For particular materials with smaller bandgap energies operating in _____ wavelength, the linewidth tends to _____
a) 2.1 to 2.75 μm, increase
b) 1.1 to 1.7 μm, increase
c) 2.1 to 3.6 μm, decrease
d) 3.5 to 6 μm, decrease
View Answer

Answer: b
Explanation: For materials with smaller bandgap, linewidth increases to 50 to 160 nm. This increases in band gap is due to increased doping levels and formation of bandtail states.

7. In optical fiber communication, the electrical signal dropping to half its constant value due to modulated portion of optical signal corresponds to _____
a) 6 dB
b) 3 dB
c) 4 dB
d) 5 db
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Answer: b
Explanation: Modulation bandwidth in optical communication is often defined in electrical/optical terms. So when considering electrical circuitry in optical fiber system, electrical 3 dB point or frequency at which output electrical power is reduced by 3 dB bandwidth with respect to input electrical power.

8. The optical 3 dB point occurs when currents ratio is equal to
a) ⅝
b) ⅔
c) ½
d) ¾
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Answer: c
Explanation: In optical regime, the bandwidth is defined by frequency at which output current has dropped to ½ output input current system.

9. The optical bandwidth is _____ the electrical bandwidth.
a) Smaller
b) Greater
c) Same as
d) Zero with respect to
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Answer: b
Explanation: The difference between optical and electrical bandwidth In terms of frequency depends on the shape of the frequency response of the system. If the system response is

assumed to be Gaussian, then optical bandwidth is a factor of √2 greater than electrical bandwidth.

10. When a constant d.c. drive current is applied to device, the optical o/p power is 320 μm. Determine optical o/p power when device is modulated at frequency 30 MHz with minority carrier recombination lifetime of LED i.e. 5ns.
a) $4.49*10^{-12}$
b) $6.84*10^{-9}$
c) $1.29*10^{-6}$
d) $2.29*10^{-4}$
View Answer

Answer: d
Explanation: The output o/p at 30 MHz is
$Pc(30\ MHz) = Pdc/ (1+(w\Gamma i)^2)^{1/2}$
$= 320*10^{-6}/(1+(2\pi*30*10^{-6}*5*10^{-9})^2)^{1/2}$
$= 2.29*10^{-4}W$.