Nokia

4A0-205
Nokia Optical Networking Fundamentals

Product Version

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Latest Version: 6.0

Question: 1

What is the definition of OSNR?

A. The OSNR is defined as the ratio between the transmitted optical power and the received optical power over 1 km of fiber including both signal and optical noise.
B. The OSNR is the ratio between the optical output signal power and the optical input signal power of the device being analyzed.
C. The OSNR is defined as the ratio between the average optical signal power and the average optical noise power over a specific spectral bandwidth.
D. The OSNR is defined as the ratio between the optical signal power (including noise) and the optical noise power over a specific spectral bandwidth.

Answer: C

Explanation:
The OSNR is defined as the ratio between the average optical signal power and the average optical noise power over a specific spectral bandwidth. This is also known as the signal-to-noise ratio (SNR), and it is a measure of how much signal is present in the optical signal compared to the noise, usually expressed in decibels (dB).

Question: 2

Which of the following are the main reasons for fiber attenuation?

A. Refraction and reflection
B. Scattering and absorption
C. Chromatic dispersion (CD) and polarization mode dispersion
D. Small channel spacing

Answer: B

Explanation:
Scattering and absorption are the main reasons for fiber attenuation. Scattering occurs when light bounces off the sides of the fiber, while absorption happens when light is absorbed by the glass or other materials that make up the fiber. Chromatic dispersion (CD) and polarization mode dispersion (PMD) are also factors that can cause attenuation, but they are not the main causes. Small channel spacing can also cause attenuation, but it is a secondary factor and is only significant in certain cases.

Question: 3

What is the meaning of first, second, and third window in the optical fiber propagation context?

A. These windows correspond to three different minimum and maximum optical power levels used for optical transmission.
B. These windows are three different wavelength intervals where the WDM optical transmission occurs.
C. These three windows are three different angles of incidence of the light injected by the laser into the fiber.
D. Different optical transmission windows correspond to different safety requirements and rules for the related lasers operating with these windows.

Answer: B

Explanation:
In optical fiber propagation context, the first, second, and third window refer to different wavelength intervals where the WDM (Wavelength Division Multiplexing) optical transmission occurs.
The first window is the lowest loss window and is typically in the range of 1300-1324nm. This is the most commonly used window for long-haul communications.
The second window is the 1550 nm window and is the most widely used window for long-haul and ultralong- haul communications. This window has a lower attenuation than the first window, but it also has more dispersion, which can limit the maximum transmission distance.
The third window is the range of 1625-1675 nm, it is also called the L-band window. This window has lower attenuation than the first and second window but its usage is limited due to the high cost of equipment and lack of commercial devices.
These windows are used in WDM systems to increase the capacity of the fiber by transmitting multiple channels of data at different wavelengths on the same fiber.
A,C,D are not correct as they are not related to the meaning of first, second, and third window in the optical fiber propagation context.
Reference:
Nokia Optical Networking Fundamentals, Nokia Press (ISBN:978-1-4822-8109-4)
https://www.nokia.com/networks/solutions/optical-networking/
https://en.wikipedia.org/wiki/Wavelength-division_multiplexing

Question: 4

In which window(s) does the attenuation reach its minimum peak?

A. First window (850 nm)
B. Second window (1300 nm)
C. Third window (1550 nm)
D. Both first and second windows

Answer: C

Explanation:
The third window (1550 nm) is where the attenuation reaches its minimum peak. This is because the materials used in fiber optic cables have minimal absorption in this wavelength range. The first and second windows (850 nm and 1300 nm respectively) have higher attenuation due to the materials used in the fiber optic cables.

Question: 5

Which of the following statements is true about chromatic dispersion (CD)?

A. Different channels have different bandwidth and this causes different CD performances.
B. The fiber attenuation changes along the fiber, and when the light crosses these differences the CD takes place.
C. Different wavelengths propagate at different speeds within the same media and therefore different colors travel in the fiber with different speed.
D. The fiber attenuation introduces inter-channel interference.

Answer: C

Explanation:
Different wavelengths propagate at different speeds within the same media and therefore different colors travel in the fiber with different speed. This phenomenon is known as chromatic dispersion and causes light to spread out as it travels through the fiber over distance, leading to signal attenuation and distortion. The fiber attenuation does not introduce inter-channel interference, but it can cause attenuation of the signal. Different channels have different bandwidths, but this does not affect CD performance.