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Sec : 1D

1(a)

Periodic analog signals can be classified as simple or composite. A sine wave wave, a simple periodic analog signal cannot be decomposed into simpler signals.

A composite periodic analog signal is composed of multiple sine waves. [16 : 19]

The absolute value of a signals greatest inten intensity, related to the energy it carries, is denoted as its peak amplitude.

1(b)

In communication system anlog signal go throughs transmission media, which tend to deteriorate the quality of anlog signal, signal. bit That means the signal at the beginning of the medium is not the same as the signal at the end of the medium This imperfection causes signal impat impairment.

Causes:

① Attenuation

② Distortion

③ Noise

① Attenuation — It defines loss of energy. The strength of signal decreases with increasing distance which causes loss of resistance of medium.

$$\text{Attenuation (dB)} = 10 \log_{10} (P_2/P_1)$$

$$\text{Attenuation (dB)} = 20 \log_{10} (V_2/V_1)$$

② Distortion: It denotes changes in the form or shape of the signal this is generally seen in composite signals made up with different frequencies. Each frequency components has its own propagation speed travelling through medium, and that's the reason of delay delaying in arriving at he final destination, Every component arrive at different time which leads to distortion.

2(a)

$$C = B \log_2 (1 + SNR)$$

$\Rightarrow \quad 33 \times 10^3 = 5 \times 10^3 \times \log_2 (1 + SNR)$

$\Rightarrow \quad \log_2 (1 + SNR) = \dfrac{33}{5}$

$\Rightarrow \quad 1 + SNR = 97.0058$

So, $\quad SNR = 97.0058 - 1$

$$= 96.0058$$

$$\simeq 96$$

2(b)

bit rate = 72 mbps

$$= 72 \times 10^6 \text{ bps}$$

No of signals = L = 64

bit rate = 2 × Bandwidth × $\log_2 L$

$$\Rightarrow 72 \times 10^6 = 2 \times \text{Bandwidth} \times \log_2 2^6$$

$$\Rightarrow \text{Bandwidth} = \frac{72 \times 10^6}{12}$$

$$\therefore \text{Bandwidth} = 6 \times 10^6$$