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1.) How can a composite signal be decomposed into it's individual frequency?

→ A composite signal can be decomposed by using the Fourier Analysis into its individual frequencies. Fourier Analysis is a tool which changes a time-domain signal into a frequency-domain signal and vice-versa.

2.) Name three types of transmission impairment.

→ There are three types of transmission impairments:

1. Attenuation : Loss of signal strength in networking cables or connections.
2. Delay Distortion : It is a guided transmission media phenomenon where network data signals are transmitted via a medium at a certain freq. and speed.
3. Noise : Unwanted disturbance in an electrical signal.

3.) Distinguish b/w baseband transmission and broadband transmission.

→ The prior difference b/w baseband transmission and broadband transmission is that the baseband transmission is the whole bandwidth of the cable is utilized by a single signal. Conversely, in the broadband transmission, multiple signals are sent on multiple freq. simultaneously using a single channel.

4.) What does the Nyquist theorm have to do with communications?

→ The Nyquist theorm states that an analog signal waveform can be converted to digital format and can be reconstructed without error from samples taken at equal time intervals. if the sampling rate is equal to, or greater than, twice the higest frequency component in the analog signal. This Nyquist theorm forms the basis for pulse code modulation (PCM), the fundamental method for converting analog voice to digital format.

5.) What does the Shannon capacity have to do with communication?

→ Shannon capacity Information capacity C has long been used as a measure of the goodness of electronic communication channels. It specifiees the maximum rate at which data can be transmitted without error if an appropriate code is used

6.) Is the frequency domain plot of a voise signal discrete or continous?

→ The frequency domain of a voise signal is continous. A plot is ~~not~~ discrete or continous depending upon how its been measured. If it's measured with a continous freqeuney measurment process, such as freqeuney sweep, then it's a continous plot.

7.) We send a voise signal from a microphone to a recorder. Is this baseband or broadband?

→ When we send a voise signal from a microphone to a recorder, here no modulation is involved. That means this is a baseband transmission.

8.) We send a digital signal from one station on a LAN to another station. Is this baseband or broad band transmission?

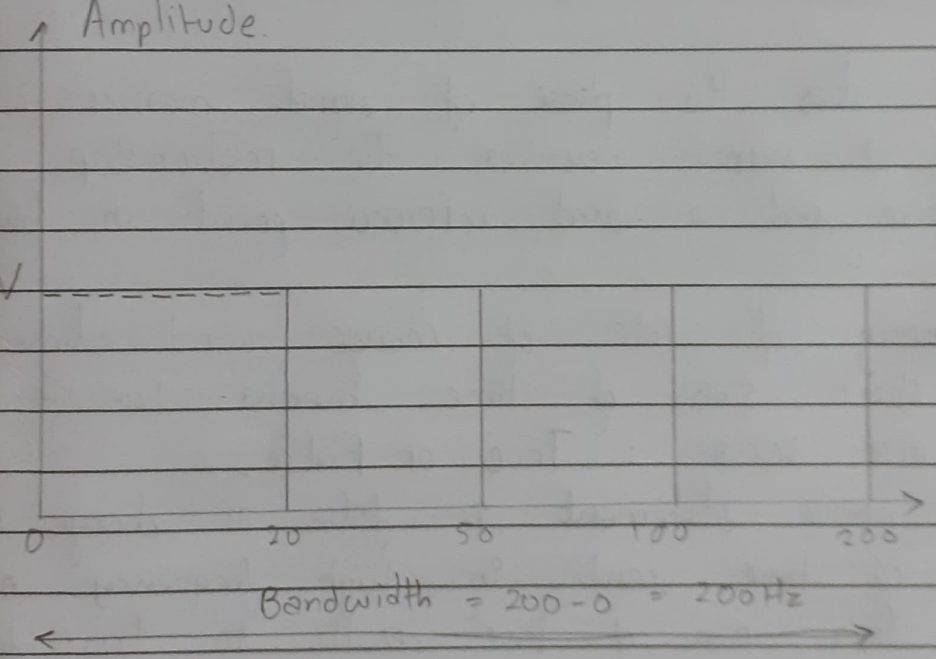
→ When we send a digital signal from one station on a LAN to another station, — — Here no modulation is involved.
That means this is a baseband transmission.

9.) We modulate several voice signals and send them through the air. Is this baseband or broadband transmission?

→ This is broadband transmission because it involves modulation.
In broadband transmission, composite signals travels through the medium.
Here voise is a analog signal and broadband deals with such signals. Hence this is the broadband transmission.

10.) What is the bandwidth of a signal that can be decomposed into five sine waves with frequencies of 0, 20, 50, 100 and 200 Hz? All peak amplitudes are the same.
Draw the spectrum.

→ Given frequencies are :
0, 20, 50, 100 and 200 Hz
Let f_h be the highest frequency, f_l be the lowest frequency and B is the bandwidth.
Then from given data,
$f_h = 200$ $f_l = 0$
Bandwidth : $B = f_h - f_l$
$= 200 - 0$
$= 200$ Hz.
∴ Bandwidth is 200 Hz.



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1.) What is the relationship b/w period & frequency?

→ Time period is the inverse of frequency and vice-versa. i.e. $T = 1/f$.

2.) What does the amplitude of the signal measure?

→ The amplitude of the signal measures value of signal at any point

3.) What does the frequency of signal measure?

→ The frequency of signal measures the no. of cycles completed in a unit time.

4.) What does the phase of signal measures?

→ Phase of signal describes the relationship b/w a waveform and a fixed reference point in time.

5.) Frequency of rate of change w.r.t time change. in short span of time means low frequency & vice versa : : True or False.

→ The above statement is false. as change in short span of time results in high frequency and change in long span of time results in low frequency.

6.) Assume a case where there is no rate of change at all i.e. A signal maintains a const. voltage level the entire time it is active. what will be the freq. in this case?

→ Since there is no rate of change, so the frequency is zero.

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ii.) Now, What if signal changes instantaneously than what will be its frequency?
→ It will be Infinite.

7.) The power we used by one of the applications has a frequency of 32 kHz
The Period of the same is : _____ (microseconds)
→ Period $T = 1/f = 1/(32 \times 10^3) =$ _____

$= 3.125 \times 10^{-5}$ seconds
$= 3.125 \times 10^{-5} \times 10^6$ microseconds
$= 31.25$ microseconds

8.) Sine wave is offset 1/3 cycle w.r.t. time 0
What is it's phase in degrees & radians.
→ Degree : 120°, (∵ $1/3 \times 360 = 120°$)
Radians $= \frac{120\pi}{180} = \frac{2\pi}{3} = 2.09$

$= 120 \times \frac{2\pi}{360}$

9.) The period of a signal is 100 ms. What is its freq. in kilo hertz?
→ $f = \frac{1}{T} = \frac{1}{100 \times 10^{-3}} = 10$ Hz $= 10^{-2}$ kHz

$= 0.01$ kHz

10.) Represent 100 ms in terms of seconds, microseconds, nanoseconds & pico-seconds.
Represent 14 MHz in Hz, kHz, GHz & THz

→ for 100 ms : 10^{-1} second
10^{5} microsecond
10^{8} nanoseconds
10^{11} pico-seconds

14 MHz = 1.4×10^{7} Hz
1.4×10^{4} kHz
1.4×10^{-2} GHz
1.4×10^{-5} THz