

Musical Sound

By Dr. Usha Kumari

A sound which produces a pleasant effect on our mind is called a musical sound. Like singing of songs, sound produced by musical instruments, etc.

Noise

A sound which produces an unpleasant (boiling or jarring) effect on our mind is called noise. For example Thumping of desk, barking of a dog, roaring of a lion etc.

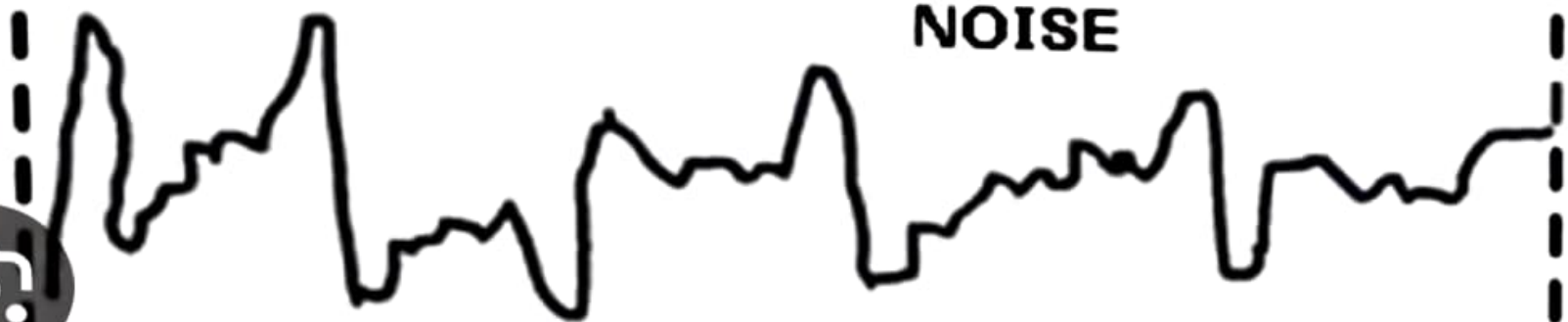
Difference betⁿ Musical & Noise

<u>Musical</u>	<u>Noise</u>
1. It produce a pleasant effect on our mind	1. It produces an unpleasant effect on our mind.
2. It consists of a series of sound pulses which follow one another regularly	2. Irregular
3. The frequency usually high	3. The frequency low
4. There is no sudden change in loudness	4. Usually sudden changes in loudness found.

MUSIC



NOISE



Major Course II (MJC-2)

Unit :- IV

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CHARACTERISTICS OF MUSICAL SOUND

All musical sounds have three characteristics :-

1. Intensity or Loudness.
2. pitch or frequency.
3. Quality or timbre.

1. Intensity or loudness :-

Intensity of sound at any point in space is ~~depend~~ defined as the amount of vibrational energy passing per unit time per unit area around that point in a direction perpendicular to the area. It is ~~an~~ purely physical quantity & can be measured easily.

The sensation produced in the ear which enables us to distinguish betⁿ a loud and a faint sound is called loudness.

Loudness depends upon two factors

(i) Intensity of sound

(ii) Sensitiveness of the ear.

(1) Intensity depends on:

① $I \propto A^2$

② $I \propto a$

③ $I \propto \rho$

④ $I \propto \nu^2$

⑤ $I \propto v$

⑥ $I \propto \frac{1}{r^2}$

where

I = Intensity of sound

A = Amplitude " "

a = area.

ρ = Density of the medium.

ν = frequency

v = velocity of sound.

(7) presence of resonant bodies near the source.

note:- Relation betⁿ Intensity & Loudness

According to Weber Fechner law, the Loudness of sound (L) is directly proportional to the logarithm of Intensity (I)

$$L \propto \log_e I$$

$$\Rightarrow L = k \log_e I$$

where k = const. of proportionality

The value of k changes slowly with frequency.

Thus two sound of equal intensity but different frequency may not

appear to be equally loud even to the same listener. This is because sensitivity of ear is different for different frequencies.

Units of Intensity & loudness.

The SI unit is Watt m^{-2} or Bel. & smaller unit is decibel.

2// Pitch :-

pitch is that characteristic of musical sound, which distinguishes a sharp sound from a dull sound.

pitch depends on :-

- (i) frequency of the source
- (ii) Relative motion betⁿ the source of sound & the ~~the~~ listener. (or Doppler's effect).

ex:- ladies' voice is usually higher than that of gents. That is why ladies' voice is always sharper than gents' voice.

The buzzing of bee or humming of mosquito has high pitch, but low intensity, while the roar of a lion has high intensity (loudness) but low pitch.

3. Quality :- Quality is the characteristic of musical sound which enables us to distinguish between sounds produced by two sources, even when they are of same intensity and same pitch.

For example :-

We can recognize our friends from their voices on the basis of quality of their sound. Voices of two singers etc. But sometime it becomes difficult to recognize a person by ~~the~~ listening to his voice on telephone or a tape. This is said to be due to poor quality of sound.

————— x ————— The end —————