

Acoustics of Building

Promita Ghosh

Editorial Member – T.E.M.S Journal

Abstract:-

This article is about different acoustic requirements for different types of buildings.

The subject of acoustics of buildings is concerned with the proper scientific design of buildings such that the optimum listening conditions are obtained. This is particularly important in the design of cinema and theatre halls, radio and TV studios, lecture halls conference rooms excetra. Professor Sabine first put the subject on a scientific footing. Clarity, loudness and uniform distribution throughout the auditorium are the principal requirements and reverberation, interference and resonance are the principal controlling factors in the scientific design of an auditorium.

Requirements of a Good Auditorium:-

- A good Auditorium should possess the following properties.

- It separates speech syllable should cause a sufficient intensity.
- There should be no interference are overlapping between success is syllable.
- Curved surfaces be absent as they tend to focus sound in an objectionable manner.
- Interference effect producing alternate regions of maximum and minimum sound must be absent.
- Resonance section of was sound board extra should be as small as possible.

In short a good Auditorium must ensure clarity and loudness of IIT syllabus and the uniform distribution of sound energy throughout the auditorium.

Reverberation and optimum reverberation.

In a large hall Auditorium When the source of sound is certainly cut off is found that the sound does not deserve you instantly but continuous for some time due to repeated reflections from the walls. Search prolongation of Sound By repeated reflections is known as reverberation.

When a source of sound operates continuously in a room the immediate sound waves are reflected repeatedly from the walls and in each reflection some amount of energy is absorbed. As a result the intensity of sound increases and ultimately it reaches a steady value when the rate of energy produced by the source equals the rate of energy absorbed. Now if the source of sound is cut off suddenly the intensity as heard by the listener decays gradually due to the absorption. A measure of the rate of fall of intensity is given by the reverberation time. According to Prof Sabine, the reverberation time T of a room is defined as the time required to reduce the sound intensity from its initial value to $1/10^6$ of that value. It corresponds to a 60 dB drop in intensity level.

The reverberation time is found to depend on the volume of the room and its capacity of absorbing sound energy. In order to get clarity of speech, the reverberation time should be small. In this case absorption is high, there is very little reflection from walls. The speaker gets no stimulating effect from the walls. The speaker gets no stimulating effect from the wall. The situation is same as if he is

speaking in an open space. Such a room is said to be acoustically dead. It affects the loudness of sound. On the other hand, if the reverberation time is long, the speaker gets a stimulating effect on account of good reflection from the walls. In this case a little effort on the part of the speaker can produce sufficient loudness level. Such a room is said to be acoustically alive. It affects the clarity of sound.

Thus in order to get both clarity and loudness we have to make a compromise between the two. By adjusting the absorption in the room we can adjust the reverberation time to a desired value which makes the room neither too reverberant nor too dead and ensure the clarity and loudness. This is known as optimum reverberation. The value of optimum reverberation time depends on the volume of the room and the purpose for which the room is designed.

Reference:-

General properties of matter:- DP Roychowdhary