

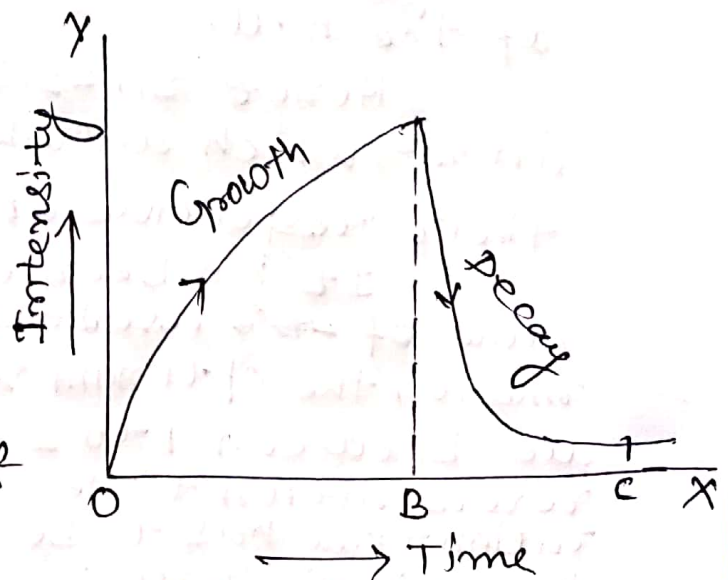
Acoustics Building.

Acoustics of building is a branch of physics which deals with the design of buildings like cinema halls, concert hall, theatres, auditoria etc. in order to provide a pleasant sound system in the building.

Sabine was the first to analyse this aspect of the buildings. He introduced the concept of reverberation of time.

When a sharp sound produced by a source in a room spreads out, it is partially reflected, absorbed and transmitted by the walls, floor, ceiling of the room. With the passage of time, as more and more sound flows from the source, intensity of sound in the room goes on increasing till it becomes maximum at $t = 0B$,

Let the source of sound be switched off at the time. The intensity of the sound in the room falls on account of absorption of sound from the doors,



window, ventilators, walls, floor, ceiling, furniture, audience etc, in the room. The sound continues to be heard till the intensity falls below the zero level of intensity or threshold of hearing. This phenomenon of persistence of sound after the source has actually stopped producing sound is called reverberation of sound. The time for which sound continues to be heard after the source has stopped producing sound is called reverberation time. It is represented by T , time of reverberation is given by $T = BC$.

According to Sabine, the standard reverberation time of a hall is defined as the time taken by a continuous note to fall in intensity to one millionth (10^6 times) the maximum steady value of intensity of the note.

Sabine formula for reverberation time of a hall is

$$T = \frac{0.16V}{\sum aS}$$

where V is volume of the hall in cubic metres and $\sum aS = a_1S_1 + a_2S_2 + a_3S_3 + \dots =$ total absorption of the hall.

Hence S_1, S_2, S_3, \dots are the area of the surface (in m^2) which absorb sound and a_1, a_2, a_3, \dots are their respective absorption coefficients.

It has been established that for speech, optimum value of ~~also~~ reverberation time 0.5 second and for music, the optimum value of reverberation time may lie between 1 to 2 second. A room with zero reverberation time is called dead room. The reverberation time has to be adjusted suitably so that sound heard in the hall is both distinct and pleasant.