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ACOUSTIC QUALITY OF BUILDINGS

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There are certain types of buildings whose acoustic qualities assume great importance. Some examples are: auditoria, concert halls, recording studios, and lecture theatres etc. In the design of such buildings careful attention has to be paid to achieving superior acoustic qualities. This study was aimed at exploring the available design practices with respect to acoustic quality and also at investigating the methods for the assessment of acoustic quality in buildings after construction.

The acoustic requirements of different types of buildings are different. Rooms meant for speech such as lecture theatres should ensure that every member of the audience hears the speaker clearly. A concert hall needs to ensure that the music lingers on for a short time without dying down too rapidly. A recording studio for speech should minimize the reverberations. The most important parameter that governs the acoustic quality of such a room is the *reverberation time*. It is defined as the time taken for a sound to decay by 60 db. In addition, the sound level distribution within a room also is an important consideration. Both these depend on the geometric shape and the dimensions of the room, and the acoustic properties of the materials used in the construction of the room including the furniture.

Some guidelines are available for the design of buildings with good acoustic qualities. For example, there are recommended values for reverberation time, volume per seat, ratios of room dimensions etc. There are recommendations regarding the shapes of rooms, roofs, ceilings etc. These guidelines were compiled as the first step in the present study. In order to investigate their effectiveness two lecture rooms in the Faculty of Engineering – viz. room no. 9 (considered to have poor acoustic qualities) and room no. 2 (thought to have good acoustic qualities) – were selected for experimental testing. The dimensions of these rooms were compared against the recommendations. The reverberation times of each of these two lecture rooms were first computed using analytical methods. Then they were measured experimentally and the values were compared with the recommended values. In addition the sound level distributions within each room were studied to see whether there were any areas of poor reception. Based on the results the following conclusions were drawn:

- (a) The guidelines given in literature for good acoustic design of buildings do in fact help to produce good results.
- (b) The analytical procedures available for the calculation of reverberation times are capable of yielding satisfactory estimates and the reverberation time is a good measure of the acoustic quality of a room.
- (c) Proper design procedures which pay adequate attention to guidelines regarding acoustics can improve the acoustic quality of buildings a great deal.