NOISE POLLUTION

Dr Indranil Ghosh

DEFINITION OF NOISE

Sound is the form of energy which gives the sensation of hearing and is produced by longitudinal mechanical waves in matter including solid, liquid and gases and transmitted by oscillations of atoms and molecules of matter. Noise is unwanted sound without agreeable musical quality. Therefore, when the effects of sound are undesirable, then it may be termed as “noise”.

DIFFERENT TYPES OF NOISE

- (1) Transport noise
- (2) Occupational noise
- (3) Neighbourhood noise


Noise Pollution
Transportational
Occupational
Neighborhood
Road traffic
Aircraft
Railway

Chart: 6.1

THE DECIBEL (DB)

There are two important parameters of sound or noise which are **sound pressure** and **sound intensity**. They are measured in different units giving varying scale of magnitude. The common scientific acoustic unit is **Decibel (dB).** It is not an absolute physical unit like volt, meter etc., but it is a ratio expressed as logarithmic scale relative to a reference sound pressure level or intensity level.

L_{10} (18 HRS) INDEX

This is used for road traffic noise measurement. The index is expressed in dB A – it is the arithmetic average hourly values of the noise level exceeded for 10% of the time over 18 hrs between 6:00 and 24:00 hrs on any normal week day. It includes peak noise values and fluctuations of noise depending on the type of vehicles and traffic density.

EFFECTIVE PERCEIVED NOISE LEVEL (L_{EPN})

This is recommended for aircraft by the International Civil Aviation Organization (ICAO) as the standard for use in noise evaluation. **Aircraft Noise.**

EQUIVALENT NOISE LEVEL (L_{EQ})

- It is the constant level that would produce the same amount of energy at the measuring point as the actual fluctuating level during the measuring period.
- Noise dose meter are available to check the level of noise received by persons through risk of noise induced hearing loss. These meters give LEQ directly and are reasonably accurate.

NOISE DOSE

In order to determine the damaging power due to exposure to noise, the idea of noise dose has been evolved. (The idea is here that certain amount of sound energy can be tolerated in a working day, but above that amount damage starts). In some country the damage risk level is set at 85 dB (A) for 8 hours, but in relevant legislation in the UK and USA a higher dose is prescribed i.e. 90 dB (A) for 8 hours.

This is called Noise dose.

MECHANISM OF HEARING

- Human ear is sensory organ for sound waves. The ear has three parts.
- 1) Outer ear
- 2) Middle ear
- 3) Inner ear

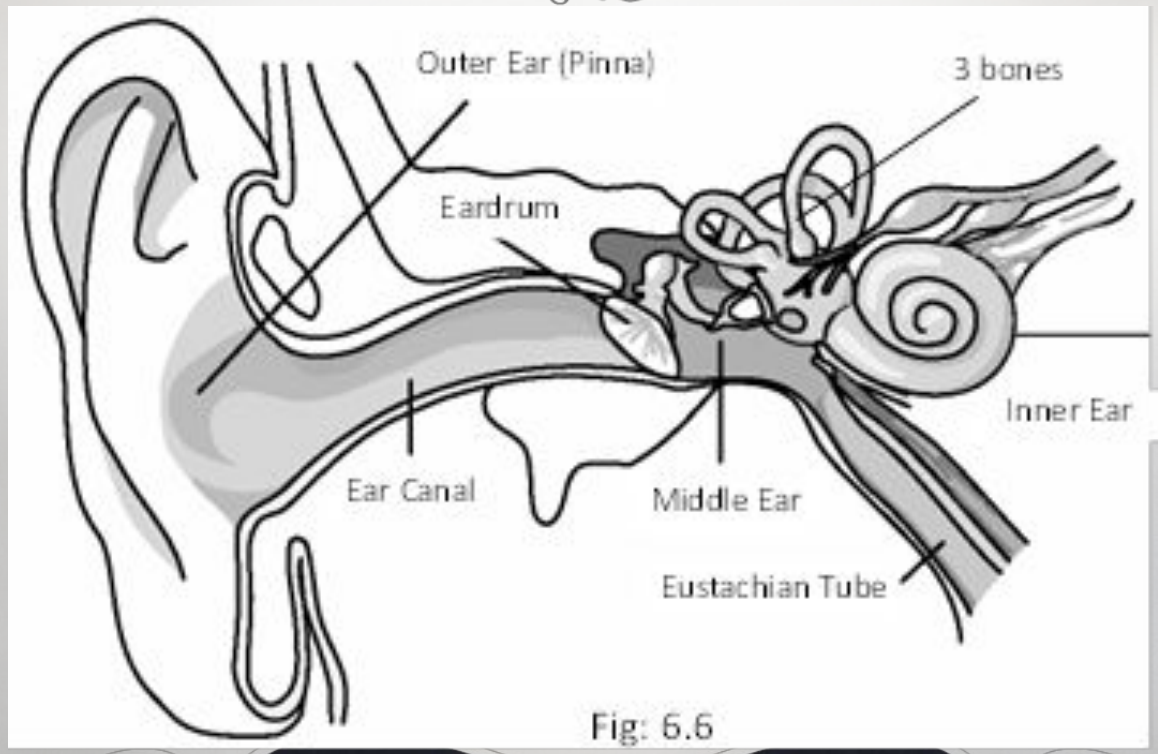
Outer Ear (Pinna)
3 bones
Eardrum
Cochlea
Inner Ear
Ear Canal
Middle Ear
Eustachian Tube

Fig: 6.6

ADVERSE EFFECT OF NOISE

The generation of unwanted sound (noise) within the environment is regarded as pollution because it lowers the quality of life. There are several specific ways in which excessive noise can affect people adversely. Noise has been found to interfere with our activities of three levels –

(1) Audiological level – reference with satisfactory performance of hearing mechanism.

(2) Biological level – interfering with biological functioning of our body.

(3) Behavioral level – affecting the sociological behaviour of the subject.

NOISE CONTROL

1) Noise control of source.

2) Noise control along the path to receiver

3) Noise control at the receiver which includes his acoustic environment.

NOISE CONTROL AT SOURCE

(a) Proper design:

(b) Proper Operation:

(c) Proper maintenance:

NOISE CONTROL AT PATH

1) *Multiple layers*
2) *Sound absorbing material:*
3) *Design of building*
4) *Installation of panels or enclosures*
5) *Green belt development*

NOISE CONTROL AT RECEIVER

Permissible noise level

Personal hearing protection

By rotating the job

Administrative technique

Zones	Day	Night
Industrial	75 dB (A)	70 dB (A)
Commercial	65 dB (A)	55 dB (A)
Residential	55 dB (A)	45 dB (A)
Sensitive zone upto 100 mt. Around hospitals, educational institution etc.	50 dB (A)	40 dB (A)