Study Material

For Semester – IV

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Subject: Environmental Science (Hons.)

Sl. No.	Paper	Unit	Topic	Sub-topic	Sources
1.	**CC-10 (T)**	**Unit 5**	**Noise Pollution**	Noise pollution: • Sources	1. K. Pandey, J. P. Shukla & S. P. Trivedi. 2011. Fundamentals of Toxicology (3rd Reprint). New Central Book Agency (P) Ltd.
2.				• Frequency • Intensity and • Permissible ambient noise levels.	
3.				• Effect on communication, • Impacts on life forms and humans - working efficiency, physical and mental health;	
4.				• Control measures.	

❖ **Semester: IV**

- Paper: CC-10 (T), Unit 5
  - **Topic: Noise Pollution**

Sub-topics: Noise pollution: Sources, Frequency Intensity and Permissible ambient noise levels, Effect on communication, Impacts on life forms and humans - working efficiency, physical and mental health; Control Measures

Noise Pollution

9

Noise Pollution

SYNOPSIS

Introduction, Definition of noise and noise pollution, Sources, Principal types of noise, Measurement of noise — unit of sound, Sound level of different sources, Adverse effects of noise on human being, Ambient noise standards, Prevention and control of noise pollution.

Introduction

Just like chemical waste or smoke, noise has also been considered an important environmental pollutant and has penetrated almost every aspect of modern life. It is potentially a serious signal and a grave threat to the environmental health. The word "noise" is derived from the Latin "*nausea*" meaning disgust or a feeling of sickness of the stomach with an urge to vomit. The obiquity of noise has made many people apprehensive about its possible adverse effects on health. In general, noise is any unwanted sound occurring in the wrong place and time. Noise, though undesired, could be meaningful or meaningless. Meaningful noise such as a baby crying or a person screaming acts as a stimulus on the body, it helps to convey a message and receives one's attention or a response in turn. But meaningless noise is disturbing, destructive and annoying. The noise arising from industrial and transportation process can sometimes be so high as to impair hearing power. The problems caused by such unwanted sounds is *noise pollution*. There has been a considerable increase in noise from man-made sources during the last 100 years which is now doubling every decade.

It is interesting to mention here that plants too wish to grasp melodious sound. In an experiment shown on TV by Walter Cronkite, on October 26, 1970 at Temple Buell College in Denver healthy flowers were put in three separate glass cases. Acid rock music was piped into one case, soft Indian Sitar music was piped into the second case, and the third had no music. A CBS camera crew recorded the experiment using time-lapse photography. At the end of two weeks, flowers exposed to the rock music were dead, the group with no music was growing normally and the third ones that heard the sitar music had turned into beautiful blooms with stems and flowers reaching towards the source of the sitar sound. It may be inferred from W. Cronkite's experiment that plants too have an intelligence and prefer soft melodious sound.

Definition of Noise

Noise may be defined in a number of ways. For example

1. Noise is a sound* without value.
2. Noise is unwanted, unpleasant or disagreeable sound that causes discomfort.
3. Noise is that sound which is undesired by the recipient.
4. Noise is the wrong sound in the wrong place at the wrong time.

*Sound consists of wave motion caused by the vibration of molecules. Sound travels in pressure waves.

Noise Pollution: Sources

5. Noise is the loud voice.
6. Actually noise is the 'inferno' (hell) created by 'bel'.
7. When the sound waves are non-periodic, irregular and of short duration they produce an irritation effect and such a sound is called noise.

Definition of Noise Pollution

Noise pollution may also be defined in a number of ways. For example :

1. Hell created by undesirable sound may be referred to as *noise pollution*.
2. Noise pollution is the unwanted sound dumped into the environment.
3. Any unwanted sound signal that produces displeasing effect and interferes with human comfort, communication and health.

Sources of Noise Pollution

Noise may be either *natural* such as thunder, or *man-made*. The main sources of man-made noise in developed urban areas are scooters, motor bikes, cars, tempos, buses, trucks, tractors, loudspeakers, loud pop music, machines of factories, mills, industries, generators, trains, aircraft, supersonic aircraft, social gatherings etc.

Principal Types of Noise

Broadly, noise may be grouped into three :

(I) Industrial noise (II) Transportation noise (III) Neighbourhood noise

(I) Industrial Noise

High intensity sound or noise pollution caused mainly by the industrial processes has received much attention over the past century. The workers usually experience industrial noise created by the manufacturing units. Hearing impairment in certain occupations is well known (e.g., heavy industrial blowers). The hearing loss is related not only to the intensity of sound but also to the duration of exposure. For example, in the steel industry, the workers hearing the heavy industrial blowers are exposed to 112 dB for eight hours and suffer from the occupational pollution.

(II) Transportation Noise

Transportation noise is more important since it probably has an impact on the general public. Transportation noise could either be due to aircraft or motor vehicles and trains. The number of road vehicles like motors, scooters, buses, trucks, motor bikes, and, particularly, diesel engine vehicles, have increased enormously in the past years. That is why this form of pollution is gaining importance, particularly in large and over-crowded towns and cities.

Transportation noise can be grouped into three : (a) Aircraft noise (b) Vehicular noise, and (c) Neighbourhood noise.

(a) Aircraft Noise

Aircraft noise is causing much more discomfort than that from road transport noise. Loud noise produced by high speed jet aircraft is not only disturbing human communication, comfort and health, but can also damage hearing permanently.

Whenever a solid body travels at a speed in excess of the speed of sound (330m/1,070 ft per second = 1,220 kph/760 mph), the sonic boom produced can be heard up to 80 km.

Sonic boom is an important aspect of aeroplane noise. The sonic boom occurs when an aircraft like *Concorde* flies supersonically overhead. The sonic boom, besides annoyance, causes damage to property as well as fright to animals. Sometimes it also creates mental anguish.

Fortunately, aircraft noise in India is not a serious problem, probably due to the limited number of flights per day at most of her airports. India has about 85 airports including four international airports — Palam in New Delhi, Meenambakam in Chennai, Dum-Dum in Kolkata and Santa-Cruz in Mumbai. Proper zonal planning keeps people in residential areas safe and undisturbed.

(b) Vehicular Noise

Vehicular noise is probably the most significant of all types of noise. Year by year the general noise levels in towns and cities increase mainly due to the increasing traffic. For example, the average noise level in North America doubles every ten years. The situation in India is not very different. For example, the number of motor vehicles in New Delhi alone has increased from 20,000 in 1950 to over

Frequency and Intensity of Noise

300,000 in 2001. The number of scooters, motor cycles and tempos increased from 2,500 to over 400,000 in the same period. In U.P., Kanpur tops in noise pollution, but conditions in other industrial towns are fast becoming intolerable. In general, noise pollution varies from place to place.

A survey conducted in metropolitan cities has revealed that noise level in Delhi, Mumbai and Kolkata is as high as 90 dB. Inhabitants of cities are subjected to this most annoying form of vehicular noise, which gradually deafen them.

(III) Neighbourhood Noise

This type of noise includes both i.e., indoor noise as well as outdoor noise. Indoor noise is created in the adjacent room or in the same room where noise is noticed. Examples of indoor noise are crying of babies, TV, transistor, banging of doors, conversation of the occupants etc. The outdoor noise is created from nearby streets. The largest source of outdoor noise is automobile traffic. Other examples are aeroplanes, social gatherings, loudspeaker etc.

In general, neighbourhood includes disturbances from household gadgets and community. Common noisemakers are TV, VCR, radio, transistor, musical instruments, washing machines, vacuum cleaners, mixers, coolers, loudspeakers etc.

It shall not be out of place to mention that Indians are religious minded and their every occasion, function and sentiment is manifested in a noisy manner. Thus the variety of sources of noise (e.g., loudspeaker at place of worship or marriage and birthday parties etc.) may cause disturbance and annoyance to the public.

Measurement of Noise — Unit of Sound

Actually the unit of noise is Bel, but it is comparatively large. In practice the sound intensity is usually measured in 'decibel' (dB) which is equal to 1/10th of Bel. Deci means 10, a reference to the basis of common logarithms and Bel (named after Alexander Graham Bell) and is defined as the ratio of the loudness of one sound to another. One dB is equal to the faintest sound a human ear can hear. The decibel is not an absolute physical measurement like gram, meter or volt but is rather a ratio expressed as the logarithmic scale relative to a reference sound pressure level.

The dB is thus expressed as :

$$\text{Sound Intensity Level} = 10 \log_{10} \frac{\text{Intensity Measured (I)}}{\text{Reference Intensity } (I_0)}$$

$$\text{or } dB = 10 \log_{10} \frac{I}{I_0}$$

Loudness is also expressed in sones.

One sone is equal to the loudness of 40 dB sound pressures at 1,000 hz. It is notable here that at a distance of 7 m away, this sound pressure is 78 dB; and at 14 m it is 75 dB, but at 28 m it is 72 dB.

Human ear is known to be sensitive to extremely wide range intensity from zero to 140 dB. Here zero dB is the threshold of hearing while 140 dB is the threshold of pain. By threshold it implies the lowest intensity at which stimulus gets perceptible. Some people feel discomfort even with sound of 85 dB whereas some do not feel discomfort even with sound of 115 dB. Pain is usually felt at 140 dB. A normal conversation is done at 60 dB levels while noise produced by a jet plane at take-off may exceed 160 dB. The effect on man depends upon the frequency or pitch duration of the sound. The sound pressure level has been regarded to be of greater loudness for higher pitched than for the lower pitched sound.

Sound beyond 80 dB harms hearing system and so it can be safely regarded as pollutant. The loudest noise a man can hear without much discomfort is thus about 80 dB. According to WHO, 45 dB is the safe noise level for a city. A noise of over 90 dB, heard for more than 10 millisecond, causes tympanic membrane to contract, because of aural reflex action. A noise of over 140 dB causes the middle ear muscles to change the direction of movement of ear ossicles, which makes a sudden decrease in the noise intensity reaching the inner ear. Such protective reflex actions, however, exist only for a short duration against loud noise. Thus a noise level up to 65 dB has been considered tolerable for hospital zones in international standards.

Noise levels in the four metropolitan cities of India (New Delhi, Mumbai, Kolkata and Chennai) are generally more than 90 dB.

Experience has revealed that the following environmental noise levels will be satisfactory for most people :

(I) Close to hospitals, old people's homes etc. 35 dB at night 45 dB during day Peak noise 55 dB

Effect on communication, Impacts on life forms and humans - working efficiency, physical and mental health

(II) Residential zones
45 dB at night 55 dB during day Peak noise 70 dB

(III) Commercial areas
60 dB average peak noise 75 dB

(IV) Industrial areas
65 dB average peak noise 80 dB

Various useful situations and their corresponding decibel levels are listed in Table 9.1 :

Table 9.1 : Sound Levels of Different Sources

Sl. No	Sound Level in dB	Sources
1.	Zero	Threshold of hearing
2.	2	Dropping of a pin on the floor
3.	10	Normal breathing
4.	30	A room in a quiet house at night
5.	40	Public library, hospitals, and hotels
6.	40-60	Quiet speech
7.	50-55	Business office
8.	40-60	Normal conversation at 1 meter
9.	60	Busy shop
10.	70	Vacuum cleaner
11.	72-82	Market noise
12.	75	Diesel concrete mixer at 15 m
13.	80	Printing press, alarm clock and marriage procession
14.	85-90	Public meeting
15.	87	Rock drill at 15 m
16.	90	Truck sound
17.	70-100	Loudspeaker and generators
18.	90-100	Food blender at 0.6 m distance
19.	90-95	Motor cycles
20.	100	Large factory and sirens
21.	110	Train whistle at 15 m
22.	120	Boiler factory and thunderclap
23.	130	Aeroplane noise
24.	150	Jet plane's take-off
25.	170	Space rocket launching
26.	180-200	Rocket engine

Hearing threshold is zero dB. In general, the sound may be grouped into :

1. Audible 0 - 10 dB
2. Very quiet 11 - 30 dB
3. Quiet 31 - 50 dB
4. Moderately loud 51 - 75 dB
5. Very loud 76 - 100 dB
6. Uncomfortably loud 101 - 125 dB
7. Painful 126 - 150 dB
8. Instantaneous damage Above 150 dB

The maximum level of noise, which neither irritates the occupants nor damages the acoustics of the building, is known as acceptable noise level inside the building.

Adverse Effects of Noise on Human beings

WHO has recommended 75 dB as the explosive limit for industrial noise. The Bureau of Indian Standards (BIS) has recommended acceptable noise level in an industrial area between 45 dB and 60 dB. The threshold limit universally accepted under the Occupation Safety and Health Act is 90 dB for 9.0 hours, 95 dB for 4.0 hours, 100 dB for 2.0 hours and 115 dB for 15 minutes per day. Above 115 dB, it crosses the threshold of pain.

In general, adverse effects of noise (unwanted sound) on health are physiological, psychological, sociological and psycho-acoustical. Continued exposure of high levels of noise may cause interference, fatigue, and temporary shift of hearing, which may lead to permanent loss of hearing.

To understand hearing loss due to noise, it is important to understand the general structure of ear and how it functions.

The ear consists of the outer, middle and the inner ear. The outer and middle ear convert sound pressures to vibrations. The eardrum is housed in the middle ear (Fig. 9.1). It behaves like the diaphragm on a microphone. Sound waves make the eardrum vibrate. The vibrations of the eardrum set vibrations in a chain of three small bones. The bones are arranged in a lever-like manner so that the vibrations in the third bone (the stapes), are greater than the vibrations set up in the eardrum.

The auditory receptors are housed in the cochlea of the inner ear. This is a coiled tube filled with fluid. The membrane makes the fluid vibrate. Inside it are cells which are sensitive to vibrations. They respond to the vibrations by setting up tiny electrical signals, which travel along the auditory nerve to the brain. The brain interprets these signals as sound.

The ear of young, audiometrically healthy adult male respond to sound waves in the frequency range of 20-16,000 Hz. Young children and women often

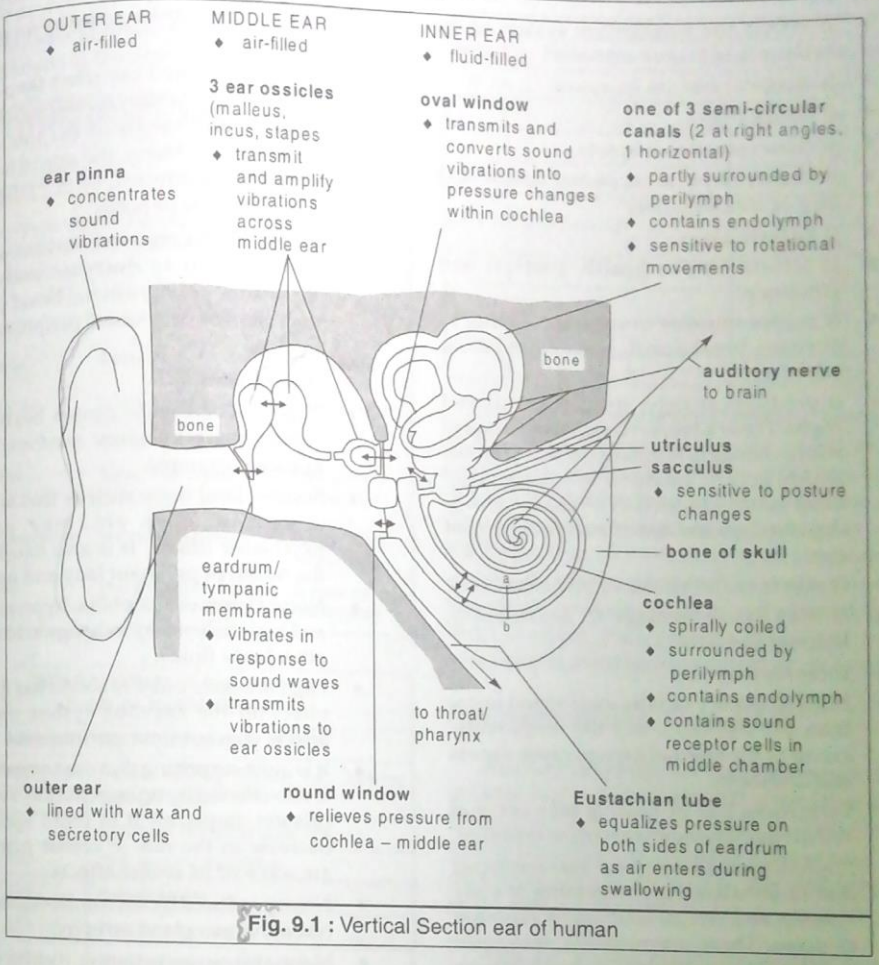

Fig. 9.1 : Vertical Section ear of human

have the capacity to respond to frequencies up to 20,000 Hz. The speech zone lies in the frequency range of 500-2,000 Hz. The ear is most sensitive in the frequency range from 2,000-5,000 Hz.

Sound beyond 80 dB actually harms the hearing and so can be safely regarded as a pollutant. A man can hear at about 75-80 dB without much discomfort. According to WHO, 45 dB is the safe noise level for a city. A noise of over 90 dB heard for more than 10 milliseconds causes the middle ear muscles to change the direction of movements of ear ossicles, which leads to a sudden decrease in the noise intensity reaching the inner ear. Such protective reflex action, however, exists only for a short duration against loud noise. Thus a noise level up to 65 dB has been considered tolerable for hospital zones internationally. The outer and middle ears ars rarely damaged by intense noise. However, explosive sounds can rupture the tympanic membrane or dislocate the ossicular chain. The permanent hearing loss that results from very brief exposure to a very loud noise is termed *acoustic trauma*. Damage to the outer and middle ear may or may not accompany *acoustic trauma*.

The most immediate and acute effect of noise pollution is impairment of hearing. A sudden loud noise can cause severe damage to eardrum. Long exposure to loud noise can cause some hearing loss that may become permanent.

Overall effects of intense noise are :

- It interferes with the communication system.

- It affects the equilibrium system of the body.
- It causes stress.
- It causes fright.
- It causes emotional upsets.
- It causes physical or mental fatigue and lack of concentration.
- It disturbs sleep.
- It affects human health, comfort and efficiency.
- It causes muscles to contract leading to nervous breakdown, tension and even insanity.
- It produces anxiety, stress reactions and fright. These adverse reactions are coupled with a change in hormone content of blood, which, in turn, produces increased rate of heart beat, constriction of blood vessels, digestive spasms and dilatation of pupil of eye.
- It affects health efficiency and behaviour.
- It may cause damage to heart, brain, kidneys and liver.
- It causes deafness.
- High frequency or ultrasonic sound (more than 150 dB) can affect the semicircular canals of the internal ear and cause nausea and dizziness.
- Permanent loss of hearing may occur at 100 dB due to continuous noise exposure.
- Physiological disorders are also developed due to imbalance in functioning of body systems and due to continuous exposure to noise. These are neurosis, insomnia, hypertension, increase in sweating, hepatic diseases, giddiness, peptic ulcers, undesirable change in gastro-intestinal activities, behavioural and emotional stresses.
- Low frequency noise of 50-60 dB affects the higher centres of brain and causes an alteration in the normal sleep pattern and prevents sound sleep.
- Constant noise and physical vibrations emitting from handheld tools may cause severe effects often described as *white fingers*, dead hands or Reynaud's phenomenon, or pneumatic drill disease. Pain, cyanosis (blue colouration) and numbness of finger result from moderate vibrations while damage to bones and joints in the hands while swelling and stiffness can be caused by severely high vibrations.
- Ultrasonic sound can affect the digestive, respiratory, cardiovascular systems and semicircular canals of the internal ear. According to Merry, the rate of heart beat may also be affected, (+ or −) depending upon the type of noise.
- Kryter (1970) reported that noise causes heart output to decrease and creates fluctuations in the arterial blood pressure and vasoconstriction of peripheral blood vessels.
- It causes headache.
- High pitched noise causes hearing loss *"Boiler-maker's deafness syndrome"* is the apparent example.
- Sudden loud noise such as that of jet and aeroplane noise etc. may produce psychiatric illness. It is also injurious for the health of pregnant lady and fetus.
- Noise causes eosinophilia, hyperglycemia and hypokalemia by a change in blood and other body fluids.
- High intensity pulse of sound has its worst effect on the nervous system and also affects psychomotor performance.
- It is quite surprising that our *'optical system'* is also affected by noise pollution. Pupillary dilation, impairment of night vision and decrease in the rate of colour perception are some of its severe effects.
- Noise produced by siren or jet engines may cause thymus gland atrophy.
- Noise also causes irritation, disinterest and affects work performance. It may accelerate or diminish work efficiency, depending upon its intensity, duration and frequency distribution etc.
- Noxious noise has been known to cause nervous disorder, headache, high B.P. and short memory.
- Effects of noise on the fetus are not fully known. However, medical scientists have found that an unborn child moves and kicks about when there is loud noise.
- Noise not only affects the biological system but also affects adversely non-living things. For example, buildings undergo physical damage by cracks, broken windows, doors and glasses etc. by sudden explosive sounds.

Permissible ambient noise levels and Control measures

Overall salient effects of noise on human beings is summarized in the flow chart and Table 9.2 :

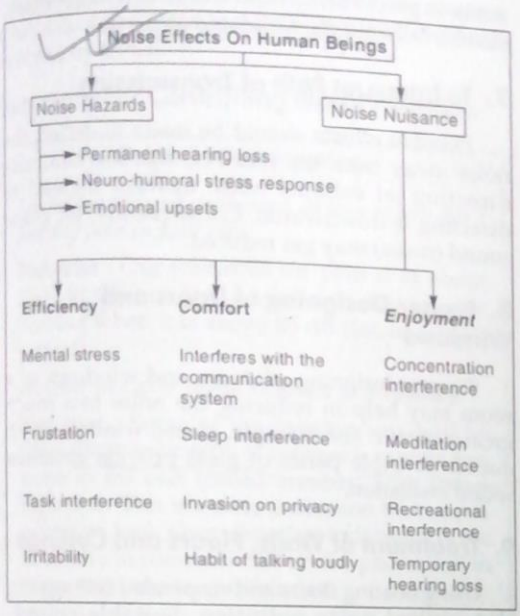

Table 9.2 : Effects of High Intensity Noise on Human Beings

Sl. No.	Noise (dB)	Observed Effects
1.	above 80	Harms hearing system i.e., hearing damage begins
2.	105	Significant change in pulse rate
3.	110	Skin receptor stimulation
4.	120	Pain threshold
5.	130-135	Nausea, vomiting, dizziness
6.	140	Increased ear trouble with pain
7.	140-145	Extreme limit of human noise tolerance
8.	150	Prolonged exposure causing burning of the skin
9.	160	Deafness and minor permanent damage if prolonged
10.	190	Major permanent damage in a short time. Suddenly evoked noise may bring death through cardiac failure.

Steady noises do not interfere with human performances unless the noise level exceeds 90 dB. Sound levels of irregular peaks — even when below 90 dB — interfere with the performance.

Effects of noise on human health depends upon its intensely as well as exposure duration. Permissible noise exposures at their specific noise intensities have been tabulated in Table 9.3 :

Table 9.3 : Permissible Noise Exposures (if unavoidable)

Sl. No.	Duration per day-hrs.	Sound level in dB
1.	8	90
2.	6	92
3.	4	95
4.	3	97
5.	2	100
6.	1 ½	102
7.	1	105
8.	½	110
9.	¼	115

The sounds that are generated and transmitted in air directly to human ears are called *air-borne sounds*. They possess less power, continues for long duration and is confined to places near the origin. The sounds that originate and progress on the buildings structure are known as *structure-borne sounds* or *impact sounds*. They are powerful, propagate over long distances and persist for a very short duration. Such noise is developed in solid structures and is then transmitted as *air-borne noise*.

Ambient Noise Standard

Ambient air quality standard in respect of noise in India, as given in Schedule III of the Environment (Protection) Rule, 1986, is given in Table 9.4. For industrial workers, permissible noise exposure is 90 dB for 8hr/day, 00 dB for 1hr/day and may go up to 114 dB for 2 min/day :

Table 9.4 : Ambient Sound Level Standard in India

Area	Sound level in dB	
	Day (6 am to 9 pm)	Night (9 pm to 6 am)
Industrial area	75	70
Commercial area	65	55
Residential area	55	45
Silence zone	50	40

Prevention and Control of Noise Pollution

According to a WHO report to the UN Conference on Environment : *"of all environmental problems noise is the easiest to control"*. But the question of control arises only after an awareness has been

developed among the people that the noise is a public nuisance and a danger to physical and mental health and, therefore, its control is necessary.

Following measures may be taken for an effective control of noise pollution :

1. Using Ear Protective Aids

The workers working in factories having noisy machinery should be provided with the ear protection aids such as soft plastic and rubber ear-plugs, headphones etc.

2. Improving working methods

The best method of controlling noise pollution is to reduce or suppress noise at the source itself. Procedures should be planned in such a manner that it creates minimum possible noise (40-60 dB). For example, welding should be given preference to riveting. The noisy machines should be provided with such construction that they create minimum possible noise. This can be done by enclosing the noisy machines in a box-like structure having sound-absorbing materials on its surface.

3. Providing Enclosures

Providing enclosures, shields and barriers proves to be an effective and efficient method of reducing noise pollution because these can cut off the sound waves from propagating. The enclosures can be constructed from most common materials. Lead materials are good for controlling noise pollution.

4. To form Silent Zones

Prescribing noise limits for vehicular traffic can reduce noise. Formation of silent zones — especially near hospitals and schools — would be an effective measure.

5. To Plant Noise-Absorbing Trees

It has been found that plantation of trees like Neem, Coconut, Ashok, Tamarind etc. near schools, hospitals, public offices, libraries etc. can reduce the noise to the extent of about 6-10 dB.

6. Town Planning

A rational town planning can help in reducing outdoor noise pollution from factories, road traffic, heavy machinery, aeroplanes, railways etc. because vibrations from these external sources create what is known as *structure-borne* sound. The town or city can be divided into suitable zones and residential zones in places away from workshops, main roads, streets, railways, factories and airports.

7. To Interrupt Path of Transmission

Possible efforts should be made to deflect the noise away from the receiver, e.g., mechanically directing jet exhaust noise upward instead of directing it downwards. Consequently, jet plane sound (noise) may get reduced.

8. Proper Designing of Doors and Windows

Proper designing of doors and windows of a room may help in reducing the noise to a much greater extent. For example, glazed windows with double or triple panes of glass provide excellent sound insulation.

9. Treatment of Walls, Floors and Ceilings

Using floating floors and suspended ceilings can also control noise pollution. Suitable sound-absorbing materials such as acoustical tiles, perforated plywood and various porous materials are available to be fixed on walls, floors and ceilings in order to minimize the noise level.

10. To Create Awareness in Public

Educating the masses through radio, TV, newspaper and newsreel in cinema halls about the adverse effects of noise pollution will go a long way in creating awareness among the people of the need to control noise pollution.

11. To Impose Legal Restrictions

Legislative measure, especially taken during the marriage and festival functions, can prevent noise pollution.

Central Pollution Control Board (CPCB) have conducted noise pollution surveys in Delhi, Chennai, Kolkata, Mumbai, Bangalore, Hyderabad, Jaipur and Kanpur in 1989 and found that the noise levels in all these eight big cities in residential, commercial and silence zones are much above the prescribed standards — both during day as well as night.

The Govt. of India prescribed (1991-1992) noise limits for automobiles, domestic appliances and construction equipment to be adopted at the manufacturing stage.

Under the Environmental Protection Act, 1986, ambient air quality standard in respect of noise of different categories of area have been notified. Codes of practice for controlling noise from sources other than automobiles and industries have also been evolved by CPCB.

Summary For Controlling Noise Pollution

General Misconceptions

Lound sound is not dangerous, as long as you don't feel any pain in your ears.

Not true : Our threshold for pain is at about 120-140 dB, but sound begins to damage our hearing when it is above 85 dB (for an 8 hour period).

Hearing loss after sound exposure is temporary.

Not true : Some of the hearing loss will be permanent. Indication of damage is ringing and noise in the ears (called tinnitus) after sound exposure. This is a clear indication that sound exposure took place. Another indication is the difficulty to communicate on the phone and in noisy restaurants or cafetarias.

If you have a hearing loss already, you don't have to protect your hearing any more.

Not true : Hearing loss accumulates. More exposure to loud sounds leads to more hearing loss.

Hearing loss is mostly caused by ageing.

Not true : Research shows that accumulative exposure to loud sounds, not age, is the major cause of hearing loss.

Hearing loss can be repaired by medicine, surgery or hearing aids.

Not true : Certain improvements can be obtained by the use of hearing aids, however, in the case of hearing losses inflicted due to noise exposure, the resulting quality of hearing will be far from normal. So far no drug or therapy can correct noise-induced hearing loss.

Loud sound damages only your hearing.

Not true : Loud sound can change your heart rate, vision and reaction time. It may make you more aggressive and, in general, negatively affect you.

Sound systems have built-in safety features.

Not true : Most sound systems are tremendously powerful and are capable of producing sounds much louder than adjusted levels. However, these systems have no built-in protection against surges in sound due to feedback or accidents.

Revision Questions

A. Long-Answer Questions

1. Write an essay on noise pollution.
2. Define 'noise'. How is it controlled?
3. Define noise pollution. What are its adverse effects?

B. Short-Answer Questions

1. *Define noise and noise pollution.*
2. *What are the following? Describe in 50-60 words :*
   (a) Industrial noise
   (b) Transport noise
   (c) Neighbourhood noise.
3. *What is the difference between noise and air pollution?*
4. *Write short notes on :*
   (i) Decibel
   (ii) Sound level of 10 important sources
   (iii) Adverse effects of noise
   (iv) Ambient noise standards
   (v) Noise-absorbing plants.