UNIT 4
Safety in Transportation and Traffic Regulation

4.0 Unit overview and description

This unit gives information about role of safety in transportation and lists steps that are taken in case of accidents.

This Unit will impart following Knowledge and skill:

- The aspects of safety in Transportation
- Develop awareness on the different types accidents and their causes
- Understand the impact of these accidents
- Knowledge about the ways to act quickly in case of accidents.
- Application of the knowledge to prevent future accidents.

Resource Material:

1. Report on Road accidents: Ministry of Road Transport, Govt of India

2. Air accidents, Aviation accidents and incidents: Wikipedia
3. Flying Magazine: Causes of Air accidents
4. en.vionto.com/show/me/Peruman+railway+accident
5. www.hindu.com/2001/07/24/stories/13240012.htm
6. en.wikipedia.org/wiki/Peruman_railway_accident
7. www.indianrailways.gov.in/railwayboard/uploads/.../DM_Plan.pdf
8. en.wikipedia.org/wiki/Category:Aircraft_landing_systems
9. instrument.landing-system.com/
10. Convention on International Aviation: Wikipedia
11. www.onsafelines.com/aim-home-page.html - United Kingdom
12. File:Em cycle.png: Wikipedia: Safe Landing Systems.
13. http://43blogtips.com/2011/08/worst-train-accidents-in-india/.
14. http://www.docstoc.com/docs/54648855/CH-4-ILS-Presentation.
15. http://www.truckinglawcenter.com/cdl-manual/trucking-laws/cargo-securement/.
16. Regulations for Transport of Hazardous Goods (Rule 129)

Duration: **Total Hours 30 (Theory 15 hrs Practical 15 hrs)**

Unit-IV:	Safety in Transportation	Outcomes
4.2	Safety in Transportation	• Explain the importance of safety in transportation
4.3	Accidents in the air	• List factors responsible for air accidents • Identify the equipment used in navigation & their significance • Identify various landing categories.
4.4	Railway accident & Disaster Management	• Explain the impact of railway accidents • Identify the classification of accidents • Identify the causes of accidents in general • List causes of derailments • Explain safety measures to be adopted& method of accident management
4.5	Road accidents	• Discuss the causes of road accidents. • Identify steps to be taken in case of accidents

4.6.	Safe cargo movement practice & safety Storage	• Demonstrate how cargo can be shifted safely? • Practices of safe storage
4.7	Disaster Management	• Explain four phases of disaster management
4.8	Accident Management	• Discuss what all things are to be taken care of in the event of an accident
4.9	Traffic Management and regulations	• Explain rules and regulations for the safe uses of road • Discuss rules to be observed by the pedestrians, cyclists, two wheelers and four wheelers

Unit-IV	Topic	Assessment Method	Time Plan	Remarks
4.2	Safety in Transportation	Activity Exercise: Questions & Answers		
4.3	Accidents in the air	Exercise: Question and answers Activity: Field trip, Seminar, Group Discussion		
4.4	Railway accident & Disaster Management	Role Play, field trip, group discussion /seminar		
4.5	Road accidents	Traffic signs and symbols Observe-Traffic awareness week		
4.6	Safe cargo movement practice and Safety Storage	Visiting the school store or any store Where goods are stored		
4.7	Disaster Management	Exercise: Question & Answer Group Discussion Role play		
4.8	Accident Management	PPT Seminar		
4.9	Traffic Management and regulations	Role play in the assembly		

4.1 Introduction:

Speed is the hall mark of the modern life .Things move about "faster than fairies"; and people move around "busier than bees". Fashions, customs, habits, tastes, preferences, all change in no time. Naturally one is forced to speed up everything. People go for fast food, fast music, fast games, fast track of everything. Fast, faster, and the fastest of everything is every one's aim and motto.

Transport services are called as the growth engines of an economy. The prosperity brigades of a nation comprises of three things.1) An intelligentsia with sensible future plans, 2) A skilled labour force to implement these dreams 3) A well-developed infra-structure to help the implementation of these plans. The famous quote **"All the roads lead to Rome" says why Roman empire expanded and flourished in**

the olden days .The British laid the railway line to transport goods to and fro Europe. The long spanning railways do two great things. (1) Cultural integration of the nation (2) Transportation of Goods and services to different parts. India has Inland connectivity through the various types of roads. We have fast expanding airways. The historical sea routes are world famous. In spite of the laurels, the by-products of the transportation are pollution and accidents.

4.2: Safety in Transportation:

Our prime concern today is to have accident free transportation facilities. As per data registered by the World Health organization, nearly 12 lakh people are known to die each year in road accidents globally. More than 83,000 people are killed in India. Roughly 5 times of this number ie about 4 lakh are seriously injured. It means, we kill about 230 people and injure about 1100 every day on Indian roads alone.

Exercise:

1. The number of road accident deaths globally is ----------
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2. Name the prosperity brigades of a Nation ----------
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3. Write any two benefits of India Railways ----------

4.3 Accidents in the air:

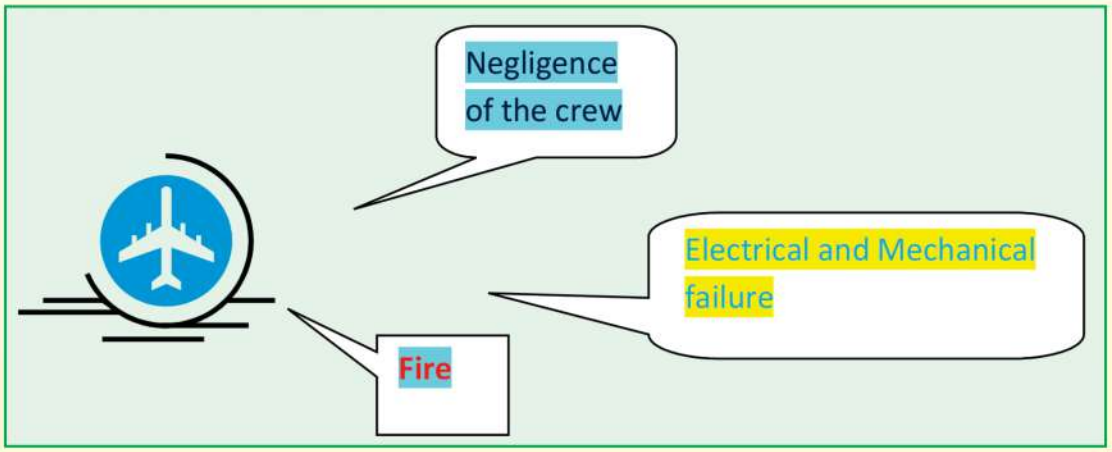

Fig 4.1 Causes of air accidents

An air accident (aviation accident) is defined as an occurrence associated with the operation of an aircraft in which a person is seriously injured. In this case the aircraft sustains damage or structural failure or the aircraft is missing or is completely inaccessible.

4.3.1 Probable Causes of Air Accidents: The following are some causes on account of which air accident tragedies may take place:

Maintenance Negligence: The aviation industry resorts to outsourcing for aircraft maintenance and inspections. Airlines do the minimum to keep planes in the air; as a result, crash victims and their families suffer.

Design defects: Aircrafts must be designed to withstand wind, take off, landing and the stresses of flight. When the aircraft design is inadequate, disasters are possible.

Corporate Negligence: The corporate airline industry is emphasizing timing and profitability over public safety. Pilots and crew are being pushed by corporate policies to make unsafe landings to avoid paperwork, to fly with the minimum amount of fuel, and to make other unsafe judgment calls.

Weather: Poor visibility due to bad weather conditions like mist, rain etc., cause disaster. Some pilots are not equipped to fly at night and find it difficult flying to reach an airport after it gets dark.

Fig.4.2 A plane crash

Mechanical Errors: This can be a failure of a part of the craft during normal service. Most aircraft systems have built-in redundancy so that a failure of one part will not create an unsafe condition. Some mechanical failures are due to bad maintenance.

Pilot Error/ Crew Negligence/Human Factors: Crew negligence often leads to air accidents. So many accidents occur due to poor judgement of the pilot. For example; the weather may be getting bad but the pilot chooses to fly into the storm. Larger passenger airliners have 2 or more flight crew which helps eliminate some human errors. Sometimes the traffic controller gives the "Clear to Take-off" or similar instructions that result in an accident.

Cockpit Management: Airlines now stress that the Pilot in Command should keep control of the situation and accept inputs from his crew without judging them. If the Pilot in Command begins to ignore or misjudge the recommendations of the crew, the crew will not function as a team and someone will over-look something that will lead to an accident.

Starvation: Many a time pilots are forced to land planes due to shortage of fuels in the air craft. M any accidents are pilot errors, in which if the pilot followed procedures the accident would not have happened. Even pre flying inspection is not undertaken some times.

4.3.2 Landing Categories:

Auto landing system: Auto land system was designed to make landing possible when visibility is too poor. They can be used at any level of visibility. They are usually used when visibility is less than 600 meters RVR and/or in adverse weather conditions. They may also include automatic braking to a full stop once the aircraft is on the ground.

Instrument Landing System: An instrument landing system (ILS) is a ground-based instrument approach system. It provides guidance to an aircraft approaching and landing on a runway. There is a combination of radio signals and high-intensity lighting arrays to enable a safe landing.

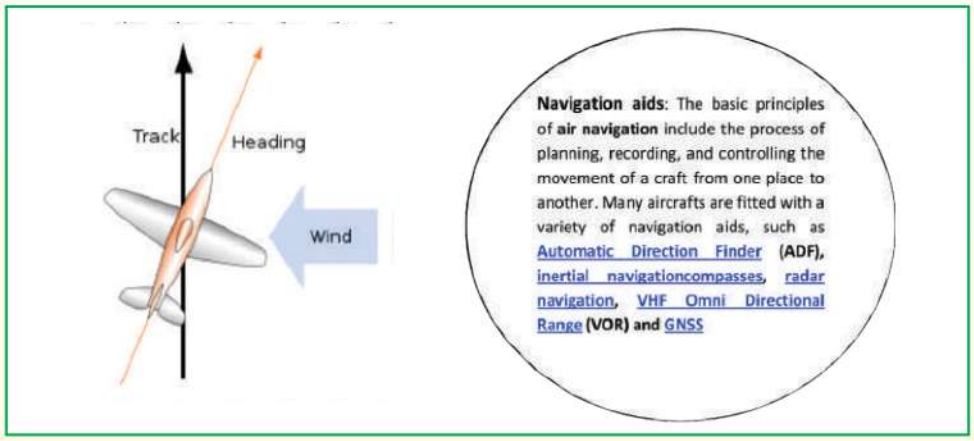

Fig.4.3 A diagram showing wind force on an aeroplane

Joint Precision Landing Approach System: The Joint Precision Approach and Landing System (JPALS) is a military, all-weather landing system based on real-time differential correction of the GPS signal, augmented with a local area correction message..

Fig.4.4 ADF

Fig 4.5 Inertial Navigation Compass

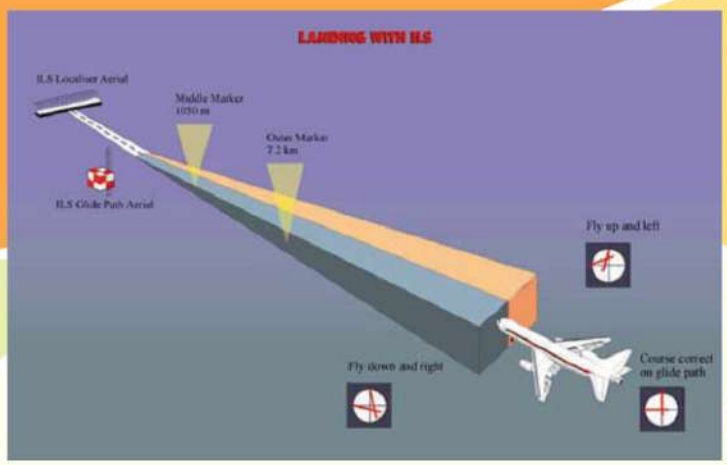

Fig 4.6 Instrument landing System

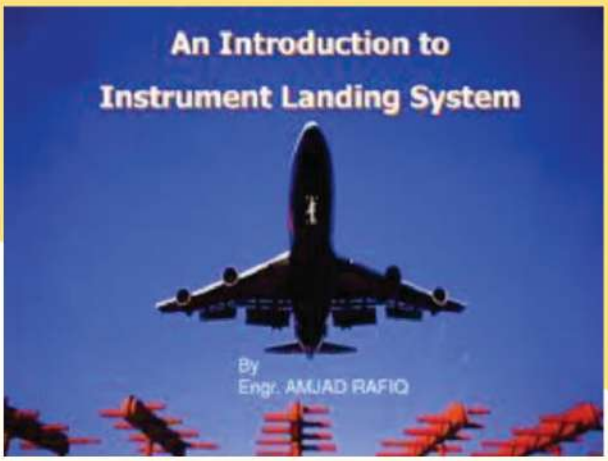

Fig4.7

Instrument Landing System:

Microwave Landing System (MLS): It is an all-weather, precision landing system. MLS has a number of operational advantages, including a wide selection of channels to avoid interference with other nearby airports and excellent performance in all weather.

Precision approach radar (PAR): It is a type of radar guidance system designed to provide lateral and vertical guidance to an aircraft pilot for landing, until the landing gateway is reached. After the aircraft reaches the decision height (DH) or decision altitude (DA), guidance is advisory only.

Transponder Landing System (TLS): It is an all-weather, precision landing system that uses existing airborne transponder and instrument landing system (ILS) equipment to create a precision approach at a location where an ILS would normally not be available.

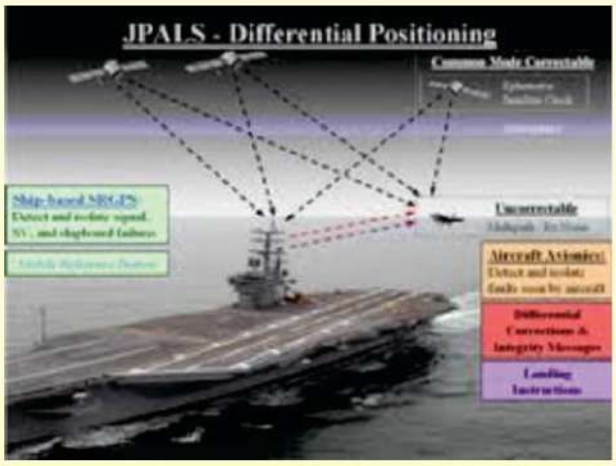

Fig 4.8 JPALS

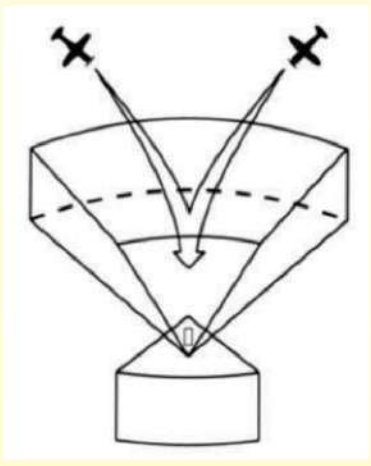

Fig 4.9 Microwave Landing System

Fig.4.10 Precision Approach Radar

Fig 4.11 Transponder Landing System

The Microwave Scanning Beam Landing System (MSBLS): It provides precise elevation, directional and distance data which was used to guide the rockets.

Activity:

1. **Seminar:** Children are divided into different groups and each group will prepare a project of power point presentation about the functioning of different landing systems.
2. **Field Trip:** If possible visit an airport and have firsthand knowledge about the landing systems over there.
3. **Group discussion** on the causes of air disasters after collecting materials about any major air accident.

Exercise:

1. Write any three causes of air accidents

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2. Name three navigational aids and find out how they are used

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3. Explain any two Landing systems

4.4 Railway Accidents and Disaster Management:

Railway accidents are classified as shown here.

Head on collision: It is the collision on a single line railway .It clearly means that at least one of the trains has passed a signal at danger .Or the signal man has made a major error .Head on collisions may occur at major junction due to similar reason.

Rear end collision: A rear-end collision is a rail accident wherein a train crashes into another train in front of it. Usually it is caused by tailgating or sudden stops. This is usually caused by the errors of the signal man or the carelessness of the driver.

*A **railroad engineer, is also called as locomotive engineer, train operator, train driver** or **engine driver***

Collision with buffer stops: A buffer stop or bumper is a device to prevent railway vehicles from going past the end of a physical section of track. The design of the buffer stop is dependent in part upon the kind of couplings that the railway uses.

Derailment: A derailment is an incident on a railway or tramway in which one or more rail vehicles leave the tracks on which it is, or they are, travelling.

Errors of the driver & Signal man: Negligence from the part of the engine driver and the signal man is another classification of accident

Causes of derailment: There are several causes of derailment: 1) broken or misaligned rails, 2) excessive speed (especially on curves),3) faults in the train and its wheels, 4) faults in sets of points. 5) Derailment as a result of a collision.

Rail breakages

There are many reasons for rail break. Wheel burns occur when high temperatures are generated if a driven axle rotates with little forward movement. This changes the metallurgy of a rail, and will easily be broken.

Rail breaks at rail joints

In jointed track, rails are usually connected with bolted fishplates. The web of the rail experiences large shear forces and this is increased around the bolt hole. This leads to star cracking from the bolthole. This can lead to a triangular piece of rail at the joint becoming separated.

Manufacturing defects in rail: For durability manufacturers make harder rail steel. This has the effect of reducing the rate of surface wear. As a result micro-cracking develops .This leads to catastrophic fatigue cracking.

Fig 4.12 A Buffer stop

Fig.4.13 Derailment

Wheel burn-related rail breaks

Sometimes a locomotive wheel spins without moving the train forward (also known as slipping). The small section of rail directly under the wheel is heated by the forces of friction between the wheel and itself. The wheel rests on an area of rail about two centimetres long, so the heating effect is much localized and occurs very quickly. The heated spot is cooled down very quickly, resulting in undesirable changes to the steel metallurgy.

Fig 4.14 Fishplate bolted joint

Fig 4.15 A rail break

Wheel flat-related rail breaks

If the brakes are dragging or the axle stops to move on a rail vehicle while the train is in motion, the wheel will be dragged along the head of the rail. This causes to develop a 'flat spot' on the wheel surface where it contacts the rail. When the brakes are subsequently released, the wheel will continue to roll around with the flat spot, causing a banging noise with each rotation. This condition is known as a wheel flat. This causes a rail break.

Safety Measures:

Improve the railway traffic environment: To ensure safety of railway traffic, good quality railway tracks and operational safety facilities are needed.

Fig 4.16 &17 Scenes from a railway accident site called Peruman in Kerala

Checking and improving railway facilities: Improvement in railway track protection equipment, maintenance and repair of railway structures, etc must be strictly done occasionally. Due consideration to the safe use of railway stations by elderly and disabled people must be given.

Improving Education for railway crews and safety personnel: The education and training programs for railway crews and safety personnel must be regular, systematic and up to date. The operators may be encouraged to carry out regular scientific aptitude tests in order to secure the competencies of railway crews and safety personnel.

Increasing the visibility and audibility of trains, improving rail level crossing infrastructure, promotion of public confidence in the safety of transport of passengers or freight by rail, investigating rail safety incidents ,spreading of knowledge about railway traffic safety, implementing safety audits of railway operators, improving weather information, strengthening investigation systems of railway accidents, improving technical safety standards for construction and equipment of railway vehicles, improving railway vehicle inspections, enhancing rescue and emergency services systems are to be taken care of.

4.4.1 Disaster Management in Railways:

Railway has a Contingency Disaster Management plan under the Commercial Department. Commercial Control office in Head quarters is monitored by officers on round the clock basis. They collect information of the time and place of accident, number of people injured/ dead, details of special trains to the accident site etc. Reservation chart or passenger reservation slips, telephone number or fax number of the control room, hospitals nearby etc will also be prepared. .

(1) Divisional office will set up a Control office at the site with telephone, FAX and Public Announcement System (PAS). Announcement may be made for registering the names of injured passengers, and the list will be verified by doctors to be given to the Control offices at the divisions and head quarters, separately indicating the extent of injury -Trivial, simple & serious.

(2) The site Control office will maintain a log book. Flow of information both incoming and outgoing will be recorded. All necessary arrangements for refund as per rules will be made.

(3) A manual/ guide will be made available to train crew like; TTEs, AC Coach Attendants, AC Pantry Car Staff, which will include DOs & DONTs for them in case of accidents.

(4) Commercial Control will ensure that at stations where trains are Delayed, Diverted, or Terminated, additional alphabetical list of passengers on board with their current status must be available and displayed at enquiry counters for quicker dissemination of information. It will be ensured by CCM/IT, Divisional Control and Divisional Commercial Officers.

Duties of ticket checking staff on board will be:

(1) Collect Railway staff, Doctors and volunteers on the train or near the accident site for obtaining assistance. (ii) Provide assistance to Guard in making quick assessment of assistance required. (iii) To carry out the duties assigned to them by Guard/Senior official present at the site of the accident.(iv) Take action to save lives and render First Aid and organize relief operations with the available assistance.

Exercise

1. Match the following:

i.	Rear end Collision	(a)	One train collides at the backside of the other
ii.	Head on collision	(b)	An end of a rail way line to stop the movement of a bogie or train
iii.	Buffer strop	(c)	A railway engine driver
iv.	Rail road engineer	(d)	A man who gives signal for a train to pass by
v.	Signal man	(e)	Two trains collide face on face

2. Group Discussion: What are the causes of railway accidents .List any five causes?

3. Suggest six ways by which the standard of Railway service can be improved.

Activity

1. Activity: Children will visit a railway track/Railway station –to see rail breaks, buffer stop meter gauge, narrow gauge, broad gauge etc

2. Prepare a list of the major railway accidents in India and Abroad in Chronological way

3. Role play: Children are divided in to groups and they will display the functions of each group in case of a railway accident

4.5 Road Transportation and Safety Concerns:

Urbanization caused an increase in road network and number of vehicles .As a result the number of road accidents also increased. Road traffic injuries (RTIs) and fatalities have emerged as a major public health concern. During the year 2010, there were around 5 lakh road accidents in India, which resulted in deaths of 134,513 people. More than 5 lakh persons were injured. There occurs 1 road accident every minute, and 1 road accident death every four minutes .Out of this, about 25-30% are pedestrians, 15-20% children under 15 years of age. In India, the total cost of losses due to road accidents is in the range of Rs. 400- 500 crore a day.

Causes of Great Concern: Road accidents happen due to various factors. The length of road network, vehicle population, human population and unwillingness of the people to obey to the road safety regulations, etc. are the causes. Pedestrians, bicyclists and two-wheelers, who comprise the most unprotected road users account for around 40% of all fatality.

Over Speed "Speed thrills, but kills".The craze for a mad chase is the first and foremost reason for most of the accidents. While driving one must bear in mind that you are not the only driver on the road and you are not the only person who has busy schedules.

Fig. 18&19 Ordinary scenes of road accidents due to carelessness & over speed

Mobile phones: A Mobile is a bane for a driver rather than a boon while driving .Many an accident takes place due to its use while the vehicle is on the run. A common sight along the Indian roads is the use of mobile while driving. It is often alarming to see that the bikers use mobile phone and ride free hand.

Drunk driving. It continues to be the major cause for road accidents and fatalities. Driving under influence of alcohol took 10,553 lives in 2011.

Fatigue and Tediousness of the driver: Many of the trucks /Lorries and long trip buses do the service day in and out. The employees do not get adequate rest and ample sleep .Naturally they are prone to 'nods' and 'naps' at night while driving. Some are inclined to take drugs and drinks, too. This is one of the major causes of accidents in the National High Ways

Fault of pedestrians: Pedestrians become impatient to cross the roads even amidst the heavy traffic. While crossing the roads they will have to look either sides of the road and ensure their safety .They are either ignorant or conveniently neglect the traffic rules and the signals.

Fault of cyclist: Cyclists move as a stumbling block along the busy streets and even along the national High ways. They are reluctant to show signs while riding or crossing. At times they try to compete with the motor vehicles .The result often becomes disastrous.

Two Wheelers: Two wheelers often intrude in to all the gaps filling the lanes, clustering and making the movement almost impossible .All of them are in hurry. They stop so packed at the signals that forward movement often becomes difficult.

Defect in road conditions: The pot holes and manholes of the roads too fatally stand on the way of safe journey .Two wheelers occasionally and four wheelers too rarely fall prey to this trap.

Defect of motor vehicle: Time to time servicing, repair and maintenance of the vehicle are the other areas of concern. Without this accidents are quite possible.

Weather condition: Weather can be exclusively blamed for certain accidents .Incessant rains, heavy mist or fog, extreme cold climate, extreme hot conditions, cyclone, storm etc prove to be fatal, sometimes.

Other causes: Overcrowded carriages, natural calamities like, earthquakes, Tsunami, etc are unwelcome and unpredicted causes of accidents. Excellent roads like that of Gujarat also have proved accident prone.

4.5.1 Measures to Prevent Accidents and Improve Road Safety:

Widening of roads on highways and within the cities, allocation of more funds for improvement of roads, construction of dividers, declaration of 'NO PARKING' zones, increase in traffic police personnel and intensive patrolling, installation of traffic lights at important junctions, construction of subways at important places, display of important road signs at different places, are some of the urgent measures required to reduce accidents.

Policy measures: Establishment of road safety departments by the governments to build capacity at national and local levels to monitor road traffic collisions and injuries is highly essential .Setting up of safety standards for motor vehicles are also desirable .

Law and enforcement:

Compulsory use of seat belt by car users, making children sit in back seats, compulsory use of helmet by two-wheelers, daytime head lamp use by motor cyclists etc may be implemented. Now, class VIII is the minimum qualification required to obtain a driving licence.

Environment change: Designing roads and highways with special attention to the needs of vulnerable road users and promotion of traffic calming techniques may reduce accidents.. Marking separate lanes for bicyclists, construction of flyovers ,subways, and metro rail ways , use of conspicuous colors (yellow) and reflectors by bicycles and other small and slow vehicles, designing of special Dividers (using Rubber etc) may be put in to practice.

Education: Pedestrians need to be educated to walk facing traffic in the absence of sidewalks, making road safety an integral part of course curriculum at least up to 10th etc., are also needed.The United Nations has rightly proclaimed 2011-20 as the decade of road safety. All countries are expected to prepare a decadal action plan to reduce accidents.

Exercise

1. Activities: Prepare and fix Traffic Signs and Symbols in different parts of the School.
2. Arrange programs like "Road Traffic Awareness week"
3. Collect information regarding the road accidents in your locality, with relevant statistics and photos, if possible
4. Prepare a posture showing the rules which must be followed by the cyclists.
5. Prepare a chart of the traffic rules.
6. Draw the chart of traffic signs and symbols.
7. Explain four causes of the road accidents

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8. Explain two policy measures which may reduce traffic accidents.

4.6 Safety Cargo Movement Practice:

Proper packing is essential for a safe and secure cargo distribution. The size, weight, climate, storage and general handling are also very important. It includes multiple vehicles to deliver your goods safely to its final destination. Cargo Movement offers local, regional and nationwide indirect and direct distribution services for bags, boxes, crates, containers, pallets, etc. Cargo Movement needs professional and efficient packaging and direct distribution services to meet the needs of individual business. Articles of cargo that are likely to roll must be restrained by chocks, wedges etc to prevent rolling. The cargo must not unintentionally unfastened or loosened while the vehicle is in transit.

a) Cargo Securement Devices and Systems:

When an article of cargo is not blocked or positioned to prevent movement in the forward direction, the number of tie downs needed depends on the length and weight of the articles. There must be - one tie down for articles 5 ft or less in length, and 1,100 lbs or less in weight;.

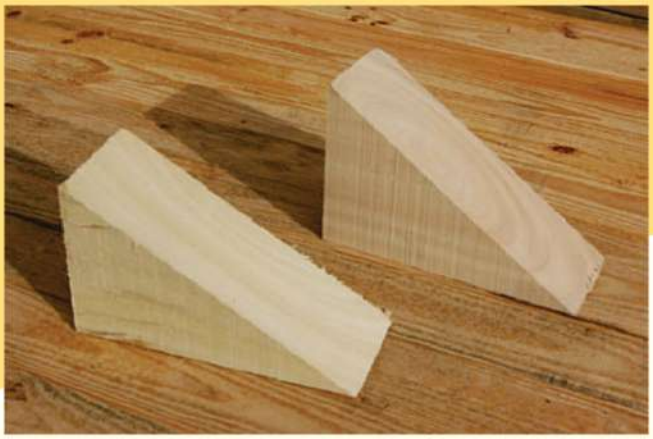

Fig 4.20 Wedges

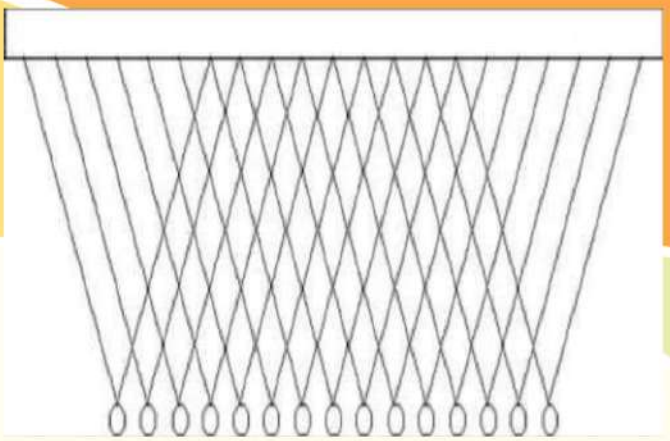

Fig 4.21 Transverse tie down

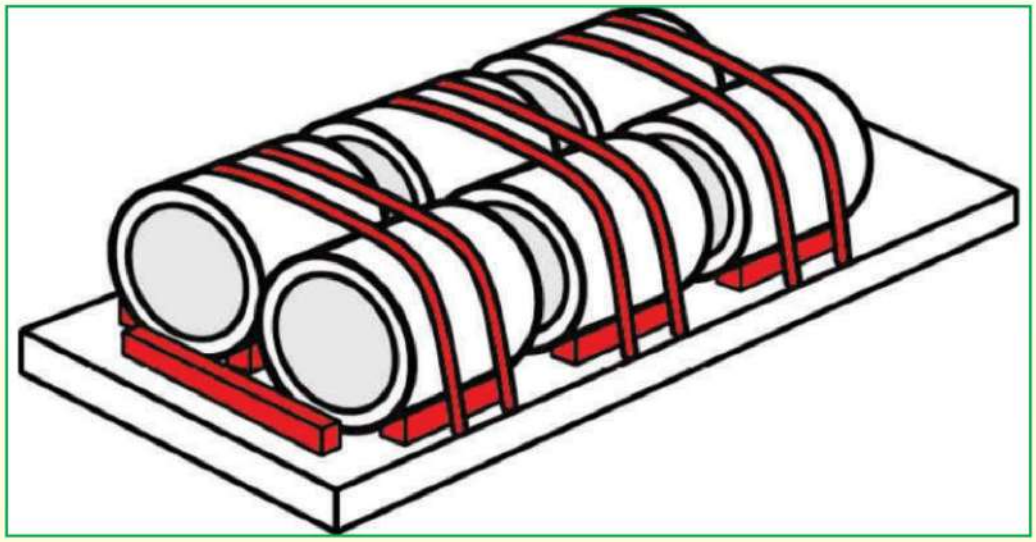

Fig 4.22 A secure tie down

Transit: While the load is with the driver(s), many important practices must be followed. Team drivers should be assigned to a high-value load. If a solo driver is assigned, he/she will likely have to make routine stops along the way. He/she should stick to a pre-planned route that offers opportunities to stop at secure lots and facilities owned by the carrier .They should park in a well-lit area and back against a building or pole to prevent rear doors from being opened At each stop, the driver should communicate with dispatch and inspect the equipment to confirm that the load has not been compromised.

Vehicle structure: It should include a) Floors b) Walls c) Decks d) Tie down anchor points e) Headboards f) Bulkheads g) Stakes h) Posts i) Anchor points. All elements of the vehicle structure and anchor points must be strong enough to withstand the forces.

- Forward force: 0.8 g (80%)

- Rearward force: 0.5.g (50%)
- Sideways force: 0.5 g (50%)
- Upward force: 0.2 g (20%)

All elements of the vehicle structure and anchor points must be in good working order. When using tie downs, the minimum number of tie downs required to secure an article(s) depends on the length and weight of the article(s) being secured. When an article is not blocked or positioned by a header board, bulkhead, other cargo or appropriate blocking devices, it must be secured correctly.

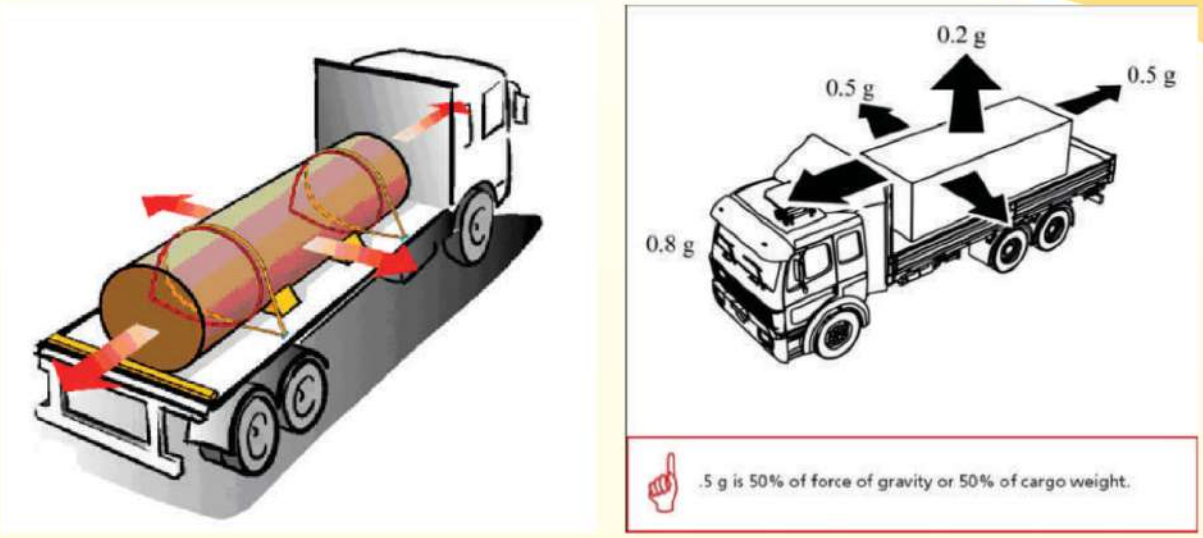

Fig 4.23 The arrows show the main forces the cargo securing must withstand

b) Tilting and Tipping:

Even if the cargo is prevented from sliding by blocking, additional restraining methods may be necessary to avoid tilting. When calculating the risk of tipping, the height (H), the width (W) and the length (L) are used (picture 4 above). Beware if the centre of gravity is not at the centre.

Sliding: Friction alone cannot be relied upon to prevent unsecured cargo from sliding. When the vehicle is moving, vertical movements caused by bumps and vibrations from the road will reduce the restraining force due to friction. Friction can even be reduced to zero if the load momentarily leaves the bed of the truck.

c) Cargo placement and Restraint:

Metals, coils, liquids etc must be securely transported to make High way more safe and to reduce damage to the cargo: Cargo must be contained or secured to avoid spill, leak, blow, fall from, fall through, become dislodged, swing or shift making the vehicle unstable . Any lapse can lead to accidents, financial loss, delay in transportation, increase in insurance cost, and civil and criminal cases.

Theft and pilferage: Securing cargo in transit from theft or pilferage is a challenge. Proper securing will reduce theft, fall off and other losses while in transport.

Fig.4.24 Tipping

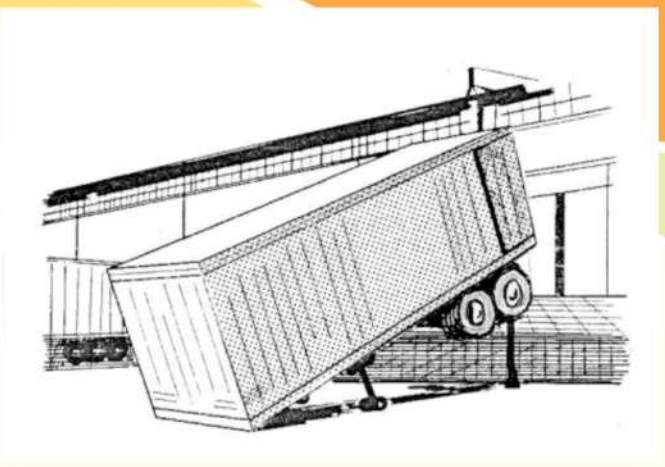

Fig4.25 Tilting

d) Transportation of Goods of Dangerous or Hazardous Nature.

- Every goods carriage carrying dangerous or hazardous goods shall display a distinct mark of the class label appropriate to the type of dangerous or hazardous goods.
- Every package containing dangerous or hazardous goods shall display the distinct class labels appropriate to the type of dangerous or hazardous goods.
- In the case of packages containing goods which represent more than one hazard, such packages shall display distinct labels to indicate the hazards.
- Every goods carriage carrying goods of dangerous or hazardous nature shall be fitted with a techograph, an instrument to record the lapse of running time of the motor vehicle; time speed maintained, acceleration and declaration etc., and a spark (as per Rule 129) arrester.

Ten Tips on Cargo Storage & Securing in a Container:

1. Know the forces that will be exerted on your cargo.
2. Establish if climate conditions will change during your product's journey.
3. Plan your cargo storage.
4. Inspect the container before loading.
5. Upon loading ensure that the point of gravity of the cargo is at or near the longitudinal centre line of the transport unit.
6. Prevent sliding & tipping of the cargo by proper blocking & bracing the cargo using polyester strapping.
7. Use friction increasing anti-slip mats to prevent cargo movement.

8. Prevent 'fall out at doorway' on arrival at destination.
9. Do not assume that heavy cargos don't move.
10. Make sure that your cargo securers are trained in line with the latest IMO/ILO/UN ECE guidelines.

Fig.4.26 Uneven Load distribution

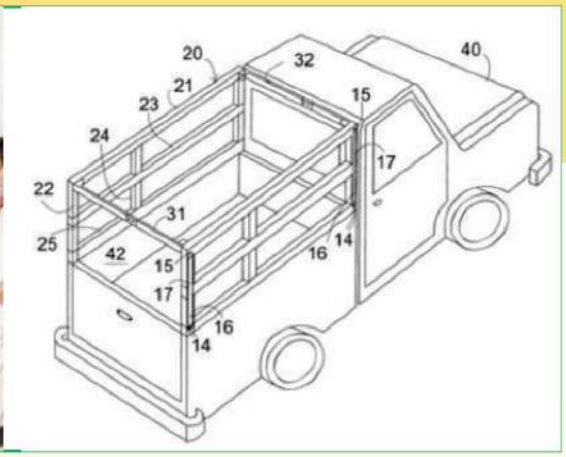

Fig 4.27 Structure of Cargo carrier

Activity

1. Children are divided in to groups and they practise various knots for tying the cargo .They can tie the cargo in a minivan. They discuss about various securing systems and learn how cargo can be secured from tilting or tipping.

Exercise:

1. Name the different parts of a cargo transport vehicle.

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2. Suggest two ways to avoid the theft of the cargo .

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3. What happens if the cargo is not secured correctly?

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4. Suggest any four precautionary tips for securing and storage of the cargo.

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4.7 Safety Storage:

The storage facility should be at an area acccessible to the mode of taransportation facility desirable for the transportation .The storage building should not be located in an area that is prone to earthquakes, hurricanes, windstorms, floods or other potentially-catastrophic natural events. The building should be in good structural condition. It should be inspected regularly and properly maintained. Warehouse, loading docks, office space and break rooms etc., should be designed for its size and occupancy – specifically for the type of cargo stored. There should be adequate water supply. Sprinklers should be provided with a water-flow alarm. The central-alarm station should monitor the building against fire or leakage.

Water control valve(s) should be secured in an open position and equipped with a tamper alarm. Sprinkler system should be inspected/tested on a regular basis and maintained. Inspections should include an annual water-flow and water-flow alarm test, and a drain test. "No Smoking" signs should be posted throughout cargo-storage areas, and strictly followed."Hot-work" (welding, cutting, brazing, etc.) done in the building should abide by proper procedures. Management should have a documented hot-work permit program defining what hot-work entails, who authorizes hot-work and procedures, including any controls, such as a fire-watch, equipment, etc. The warehouse should practice good house-keeping, clearing the building of all debris. Fuel for vehicles and cargo handling-equipment should be separated from cargo-storage and high-traffic areas, protected from contact/damage. A fire department should be nearby with the equipment necessary to respond to an incident.

Activity :

1. Children can visit the School Store room and find out how securely goods are stored there and write suggestions for improvement

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2. Write any for precautions to be taken regarding the choice of the storage room.

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4.8 Disaster Management:

Disasters are events distinguished from everyday emergencies. It causes destruction to the life and property of people. The disaster management process is divided into four fields. 1) Risk reduction 2) Preparing resources to respond to the hazard 3) Responding to the actual damage caused by the hazard and limiting further damage (e.g., emergency evacuation, ,mass decontamination, etc. 4) Returning as close as possible to the situation before the incident. A comprehensive Disaster Management requires an integrated approach that pays attention to the following phases.

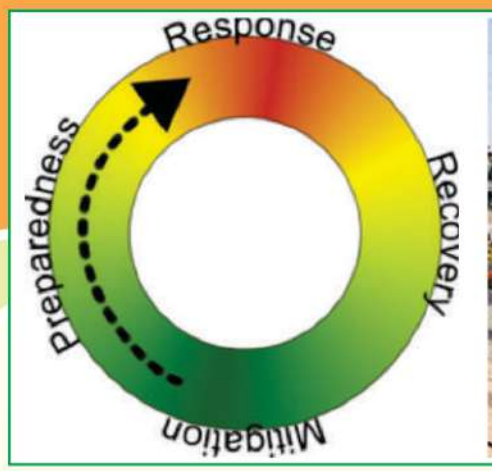

Fig.4.28 Disaster Management Process

Fig 4.29. A Disaster Management scene

Mitigation : Mitigation efforts are attempts to prevent hazards from developing into disasters altogether or to reduce the effects of disasters.. This is achieved through risk analysis; It gives information that provides a foundation for mitigation activities that reduce risk, and encourages insurance that protects financial investment. Mitigation measures can be structural or non-structural. Structural measures use technological solutions like flood levees and buildings fit to withstand earthquakes. Non-structural measures include legislation, land-use planning (e.g. the designation of non-essential land like parks to be used as flood zones), and insurance. Mitigation also includes providing regulations regarding evacuation.

Preparedness : Preparedness is the attempt to limit the impact of disaster events on people. It includes planning, managing, organizing, training, equipping, exercising, creating, evaluating, monitoring and improving activities to ensure effective coordination before and after disasters. It includes Communication plans with easily understandable words and methods, proper maintenance and training of emergency services, development and exercise of emergency shelters and plans. Maintaining an emergency communication system, stockpiling, preparation of inventory, foods supplies, etc. is also its parts. Development of organizations of trained volunteers among civilian population will be an added asset.

Response : The response phase includes the mobilization of the necessary emergency services and first responders in the disaster area. This is likely to include a first wave of core emergency services, such as fire fighters, police and ambulance crews. When conducted as a military operation, it is termed **Disaster Relief Operation (DRO**). They may be supported by a number of secondary emergency services, such as specialist rescue teams. A well rehearsed emergency plan developed as part of the preparedness phase enables efficient coordination of rescue.

Recovery: The recovery phase starts after the immediate threat to human life has subsided. The aim of the recovery phase is to restore the affected area to its previous state. Efforts should be made to "build back better". Citizens of the affected area are more likely to accept more mitigative changes when a recent disaster is in fresh memory.

Activity:

1. **Role Play:** Children are divided in to groups and each group can organise role play on the four phases of Disaster Management.

Exercise:

2. The four phases of Disaster Management are

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3. Preparedness include

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4. What is disaster relief operation?

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5. What is mitigation?.

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4.9 Accident Management:

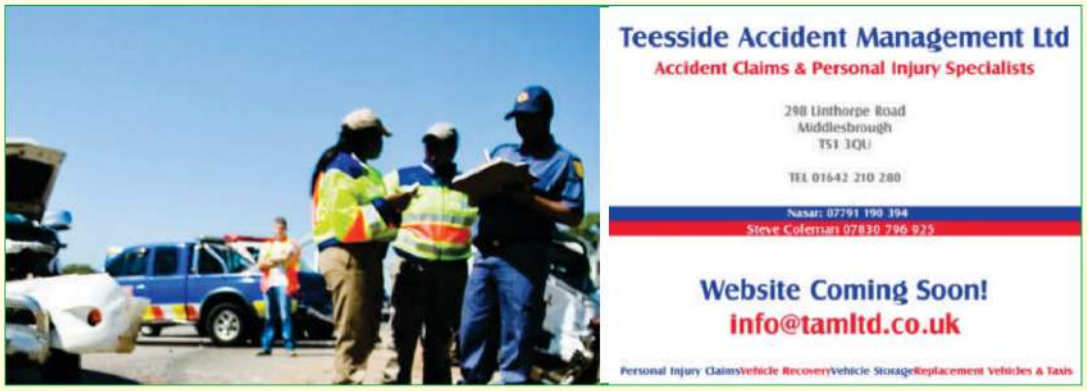

Fig .4.30 Accident Management

The term "accident management" covers a whole lot of services; which may include 24-hour services like vehicle recovery, damage assessment, replacement provision, arrangement of vehicle repairs, and mediation with insurers.. Accident Management has become an agency work in many of the countries. The first task of the Accident Management is swift shifting of the injured to hospital. They will have to arrange for the assessment of the damage settlement and for the repair and recovery of the vehicles. All the paper works related to insurance and civil or criminal cases, will be done by them. In India agency works are not popular in all the areas.

Activity:

1. A seminar on the Accident Management ,preferably by Power Point Presentation

Exercise:

1. Mention any five services included in the accident Management?

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4.9.1 Traffic Management and Regulation.

The rail accidents and air accidents appear to the fore surprisingly once in a while. Mostly they turn out to be National Disasters, because they destroy large amount of material and man. But road accidents have become events rather than accidents .Creation of awareness among people to prevent accidents and a sense of high moral responsibility among the staff are the need of the hour .Safety awareness programmes may be conducted on various safety sensitive subjects to improve awareness among transportation staff. In House Safety bulletins may also be published, in which finer aspects of safety can be discussed in detail. Special drives may be conducted to counsel, educate and improve awareness among general public regarding prevention of accidents at places like unmanned level crossings.

Fig.4.31 An accident prone broad way

Fig.4.32 A Zebra Crossing

Printed handbills may be distributed among road users near unmanned level crossings, petrol pumps and villages about possible hazards. Advertisements may regularly be published in newspapers and electronic media to educate and improve awareness among public on Safety Issues

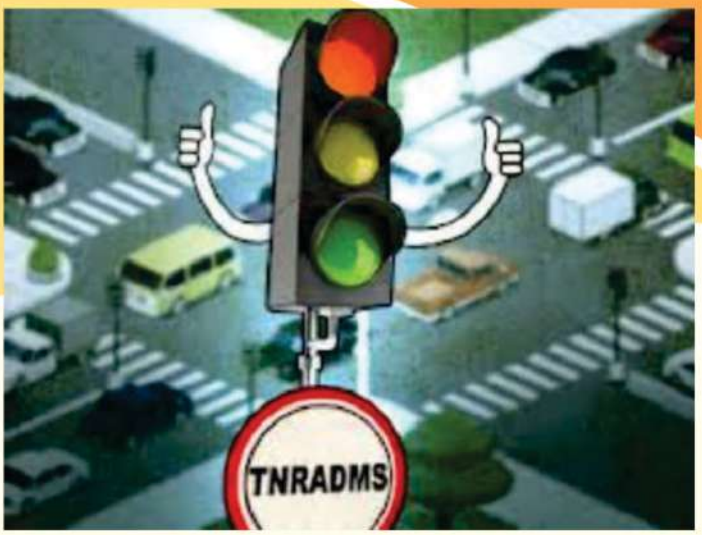

Fig.4.33 Attention!!! Traffic signal!!

4.9.2 Suggestions of Road Safety Recommendation Committee:

Make road safety a political priority. Appoint a lead agency for road safety. Give it adequate resources, and make it publicly accountable. Develop a multidisciplinary approach to road safety. Set appropriate road safety targets and establish national road safety plans to achieve them. Support the creation of safety advocacy groups. Create budgets for road safety and increase investment in demonstrably effective road safety activities.

Prevention is better than cure:

- Walk on the foot path only. When no foot path is there, walk on the extreme right hand side of the road. Don't rush or run on the roads.
- Cross only the zebra crossings, traffic signals, subways, foot over bridges etc. Cross only on a clear green signal.
- Don't cross unless all lanes are clear. Never cross a road at a curve or a turn

Activity:

1. Children can prepare placards and present in the morning Assembly regarding the rules for pedestrians
2. Prepare and display the signs and symbols used while driving.
3. A Quiz competitions on the traffic rules.
4. Prepare a Power Point presentation and conduct a seminar on the traffic rules.

GOLDEN RULES ON THE ROAD

Be cautious and courteous.

Have consideration for others

Don't pr ovoke others in any way, while driving

Don't make inappropriate hand and gestures

Use horn sparingly.

Always wear safety belts.

Use low beams in bad weather conditions

Keep specified speed limit in mind.

Limit the speed at curves and turns.

During night, be cautious about slow moving vehicles, animals, pedestrians, and always ensure the road signs

Allow others to overtake

Don't drive under the influence of drugs and drink.

Use indicators whenever necessary

Don't use cell phones while driving

Always drive in correct gears

Don't use tinted glasses

Don't over load the vehicles

Always carry driving licence and all other relevant documents

Exercise

1. The educational qualification for a driver is

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2. Suggest five measures for reducing rail and road accidents

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4.10 Summary:

According to the experts at the National Transportation Planning and Research Centre (NTPRC) the number of road accidents in India is three times higher than that prevailing in developed countries. The number of accidents for 1000 vehicles in India is as high as 35 while the figure ranges from 4 to 10 in developed countries. Indeed time is invaluable. So are the lives of human beings too. Any causality, man or material, is a national loss .And it remains irreparable. In this chapter you studied about the causes of various accidents and their impact on the society. You have seen possible accident management programmes and various suggestions to prevent the accidents."Prevention is always better than cure." Preach it, propagate and practise it while you are in a vehicle on the road.

4.11 Test your Understanding

1. Write any three causes of air accidents.
2. Mentions two precautions to be taken while transporting hazardous goods.
3. Write the environmental changes which may reduce accidents.
4. Suggest four safety storage measures.
5. What is accident Management?
6. Write any four suggestions put up by the Road Safety recommendation Committee.
7. Suggest any six measures to prevent road accidents.
8. Write any six "Golden Rules" to be followed while on the road.
9. Prepare a list of programmes which can be organised to create social awareness to prevent accidents.
10. Mention any six tips or precautions for safe cargo securing.
11. Explain the care to be taken while the cargo is in transit?

4.12 Practical:

1. Prepare a note on any two major air accidents in the World (from News papers/websites) covering
   (a) causes of accidents,
   (b) number of causalities,
   (c) the compensation package given, and
   (d) the disaster management followed.
2. Prepare a note on any two major rail accidents took place in the country over the last two years (from News papers/websites) covering
   (a) causes of accidents
   (b) number of causalities,
   (c) the compensation package given, and
   (d) the disaster management followed.
3. Prepare a note on any two major road accidents took place in the country over the last two years (from News papers/websites) covering
   (a) causes of accidents
   (b) number of causalities,
   (c) loss of freight in rupee terms