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- To learn the relief procedure in case of emergency situations to the living beings.
- To learn the road safety rules.
- To learn the handling of tools and equipments in the workshop.

#### **1.0 INTRODUCTION**

Safety rules are necessary to ensure owners and employees not to injure themselves or customers during operation in machines. Perfection is required before doing the job, during the job and after doing the job. For perfection in work, an operator should know the handling of machine and equipment in a safe manner. For example, a welder can use goggles to protect the eyes from the heat and ultraviolet radiation produced by the welding. Other safety devices can be used depending upon the job. Such procedures to use proper safety in devices and operation is called as safety rules. The following are the classification of safety rules depends on the place of work.

- 1. Safety in Shop floor
- 2. Self-Safety

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- 3. Safety in Machines
- 4. Safety in Tools
- 5. Road safety rules
- 6. Vehicle safety rules

#### **1.1 WORKSHOP SAFETY RULES**

The following rules have been followed in the workshop to ensure the safety of all employees while operating machines. The majour safety equipments are shown in Fig 1.1.

- 1. Always wear helmet and shoe in the workshop.
- 2. Always walk on the designated path.
- 3. Don't talk or distract the other employees during work.
- 4. Without prior notice, do not disconnect or connect an electrical connection.
- 5. Operate the machine after proper training and permission from authorities.
- 6. Keep the tools in their designated places only.
- 7. Keep the board "Under Fault" in the faulty machines.
- 8. Keep the first aid box at appropriate places
- 9. Use appropriate dress code inside the work premises.
- 10. When working with machine tools or other equipment with rotating spindles, watches, rings, jewellery, loose clothing etc., are prohibited and long hair must be completely covered.
- 11. Use proper material handling equipments to transfer raw material.
- 12. Maintain clean and hygiene canteen, water and restrooms.
- 13. An operator should not operate the machine continuously for more than 8 hours. Provide break at the specified intervals.

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- 14. Don't allow an ill operator to operate the machine.
- 15. Exit path should be clearly marked and the pathway should be kept clear of any obstacles.
- All the safety rules and procedures should be meticulously followed by all the employees.



Figure 1.1 Safety Equipments

#### 1.2 SELF-SAFETY

An operator should prepare himself to do the work correctly, effectively within the stipulated time. This preparation will prevent the operator from accidents and such safety measure is called as self-safety. Figure 1.1 shows self-safety items and Figures 1.2 and 1.2(a) show their practice. The following are self-safety rules and should be followed.

- 1. Always wear fit clothes.
- 2. Don't have long hair.
- 3. Always wear shoe.
- 4. Operate a machine tool after getting proper training.
- 5. Sharp tools should be kept only at the designated place.
- 6. Handle sharp tools with proper safety wear.
- Operate the machine/vehicle after pre

   checkup.
- 8. Don't wear watches, rings during work.
- 9. Wear a helmet while travelling on a twowheeler. Wear a seat belt while travelling in the car.



Figure 1.2 Self-Safety in Work Place





Figure 1.2(a) Wear Fit Cloths in Self-Safety

- 10. Avoid having food, chats in the workplace.
- 11. Ensure proper lighting and ventilation at the workplace.
- 12. Don't work with illness.

# 1.3 SAFETY PRECAUTION IN MACHINES

The following are the safety rules to be followed before the process, during the process and after the process. Refer Figures 1.3, 1.3(a) and 1.3(b).

- 1. Don't lean on the machine during its working.
- 2. Operate the machine after ensuring the working condition of the machine.
- 3. Equipment should be used with proper safety guards, especially for rotating parts.
- 4. Ensure proper grease and lubrication oil before the start of any operation.
- 5. Stop the machine, if an unusual sound is heard.
- 6. Lubrication should be made periodically.



Figure 1.3 Safety Precaution in Machines

- 7. Operate the new machine after understanding its operation.
- 8. Lay proper foundation based on speed, weight and its operating features.
- 9. Don't service the machine during its operation.
- 10. Clear visible note should be attached to the machine when it is out of order.



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#### Grinder Safety (cont)



Figure 1.3 (b) Safety Precaution in Machines

### 1.4 SAFETY PRECAUTION IN USING TOOLS

Hand tools are a common part of our daily work lives. Hand tools like Hammers, wrenches, chisels, pliers, screwdrivers etc., may look harmless, but they are the cause of many injuries. These injuries can be serious, including loss of fingers or eyesight. Hence proper safety measure should be taken while in use. Refer Figures 1.4 and 1.4(a).

- 1. Use files, chisels or other hand tools with proper handle.
- 2. Use appropriate coolants during cutting operation.
- 3. Keep the sharp tools securely in their protective covers before and after use.
- Select and Use the right tool for the job. Substitutes increase the chance of having an accident. For example, Don't use a wrench as a hammer, screwdriver as a chisel, file as lever etc.,

- 5. Don't over tight the hacksaw blade.
- 6. Always provide training on how to choose the right tool for the job, how to correctly use each tool, and how to identify when tools need repair.
- Use good quality tools and Keep tools in good condition at all times. Inspect tools for defects before use. Replace or repair defective tools.
- 8. Carry tools in a sturdy toolbox to and from the worksite.
- 9. Wear safety glasses or goggles, or a faceshield (with safety glasses or goggles)



Figure 1.4 Safety Precaution in Using Tools

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Chips or dents on face Mushroom face Crack in claw section Dents in hammer handle

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and well-fitting gloves wherever required.

- 10. Do not apply excessive force or pressure on tools.
- Do not use tools during electrical work unless they are designed for electrical work (e.g., properly insulated).
- 12. Keep the workspace clean and tidy. Store tools properly when not in use.

## 1.5 ROAD SAFETY

Road safety refers to the methods and measures that are used to prevent road users from being killed or seriously injured. Typical road users include: pedestrians, cyclists, motorists, vehicle passengers and passengers on public transport mainly buses. Shown in Figure 1.5 and 1.5(a).

# The following are basic road safety rules.

- 1. Pedestrians should walk on the footpath.
- 2. Use subway or foot over bridge to cross the road.
- 3. Use separate lane for the cyclist, lowspeed vehicle, high-speed vehicle and trucks.



Figure 1.5 Road Safety

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Figure 1.5(a) Road Safety

- 4. Ensure proper drainage of rainwater during the rainy season.
- 5. Usage of barricades to prevent animals running on roads.
- 6. Obey traffic signals especially at junctions.
- 7. Laying of speed breaker at school zones / crossing roads.



What Is the 5S System?

**5S** is the name of a workplace organization method that uses a list of five Jap-

anese words: seiri, seiton, seiso, seiketsu, and shitsuke. In English, these words are often translated to Sort, Set in Order, Shine, Standardize and Sustain.

5S system is a lean manufacturing tool that improves workplace efficiency and eliminates waste. Managers and workers

- 8. Sharp curve warning signal by the signboard.
- 9. An indication of bridges, narrow roads through sign boards.
- An indication of hospitals, tollgate, fuel bunk, airport, railway station, unmanned level crossing etc., at appropriate places through signboards.

achieve greater organization, standardization, and efficiency-all while reducing costs and boosting productivity.



#### 1.5.1 Mandatory Signs

Mandatory signs are road signs which are used to set the compulsions of all traffic which use a specific area of road. Mandatory signs tell traffic what it must do. Most mandatory road signs are circular a white background with a red symbol or white symbols on a blue background with white border. The violators are punishable under law. Shown in Figure 1.5.1.

#### Some of the mandatory signs are given below.



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Figure 1.5.1 Mandatory Signs

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#### 1.5.2 Cautionary Signs

These signs are used to alert and warn the driver to understand the upcoming

road condition. These symbols are black in colour within the red triangle on white back-ground. Shown in Figure 1.5.2.



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#### 1.5.3 Informatory Signs

Informatory signs are used to indicate the location, direction and distance of fuel bunk, hospital, toilet, alternative path etc., to the driver. This symbol is located along the direction of travel. They are square in shape. Shown in Figure 1.5.3.



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#### **1.6 VEHICLE SAFETY**

At present, usage of the vehicle is highly mandatory. Further, people are travelling a large distance in a shorter time. Hence, they are using their own vehicle to travel



at the required place without using the public transport. It would be highly beneficial for the vehicle owner if they understand the condition of their vehicles or else the vehicle may breakdown during the travel. To avoid vehicle breakdown, to safeguard the people travelling, safety and warning devices are installed. Situations like vehicle theft, an accident during reversing the vehicle, on the four road junctions etc., can be avoided with the help of warning devices. This is called as Vehicle safety. Shown in Figure 1.6.

#### Car safety features





#### 1.6.1 Warning Indicator Used In Vehicles

The following indicators are used to indicate operating condition of engine and vehicle with the help of gauges and warning symbols. Shown in Figure 1.6.1.



Figure 1.6.1 Warning Indicator used in Vehicles

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- 1. Lubricating Oil Pressure Gauge
- 2. Engine Temperature Gauge
- 3. Fuel Gauge
- 4. Door Open Signal Indicator
- 5. Handbrake signal indicator

The following indicators are used to alert the driver through sound with the help of buzzer.



Figure 1.6.1.1 Seat Belt Alarm System

#### **1.6.1.1** Seat Belt Alarm System

One should wear a seat belt while driving. If a driver or person forgets to wear the seat belt, then it will alert the driver. Shown in Figure 1.6.1.1.

#### 1.6.1.2 Headlight Alarm System

Most modern vehicles have inbuilt headlight alarms or automatic headlight switch off functions. Sounds an audible alarm when the ignition is turned off while the head lights are turned on.

#### **1.6.1.3** Reverse Parking Sensor

Parking sensors are proximity sensors for road vehicles designed to alert the driver to obstacles while parking. Car Parking Sensor suitable for parallel parking, backing up your car, distance keeping, especially in dark, rain or any other poor rear visibility conditions.

#### 1.6.1.4 Anti-Theft Car Alarm

Anti-theft systems are designed to prevent your vehicle from being stolen. It generates a loud alarm when there is a theft attempt. When the intruder opens the door, the circuit senses the attempt of theft and the alarm will be activated. An anti-theft system may also integrate a car alarm or it might be just an engine immobilizer.

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#### 1.7 Safety Devices

#### 1.7.1 Air Bag

An airbag is a type of vehicle safety device and is an occupant restraint system. The airbag module is designed to inflate extremely rapidly and then quickly deflate during a collision or impact with a surface or a rapid sudden deceleration. It consists of the airbag cushion, a flexible fabric bag, inflation module and impact sensor. The purpose of the airbag is to provide the occupants with a soft cushioning and restraint during a crash to prevent any impact or impact-caused injuries between the failing occupant and the interior of the vehicle like steering wheel, instrumental panel, structural body frame, headliner and windshield. Refer Figure 1.7.1.



Figure 1.7.1 Airbag

#### 1.7.2 Anti-Lock Braking System (ABS)

An anti-lock braking system (ABS) is an automobile safety system that allows the wheel to maintain tyre contact with the road surface while sudden braking. It prevents the wheels from locking up and it will avoid skidding of vehicles. Refer Figure 1.7.2.



Figure 1.7.2 Anti-lock Braking System (ABS)

#### **1.7.3** Automatic Door Lock

Automatic door locks will lock all the door simultaneously if the driver forgets to lock the doors. This will increase the safety of the car as well as things kept inside the car.

#### 1.7.4 Steering Wheel Lock

Modern vehicles are fitted with a steering lock and it is an anti-theft device. It is fitted to the steering column usually below the steering wheel. The lock is combined with the ignition switch and engaged and disengaged either by a mechanical ignition key or electronically from the vehicles electronic control unit.

#### 1.8 FIRST AID

Even a person following safety rules, there may be chances of an accident due to sudden failure of hand tools or machines. In such case, the medical assistance given to such person before taking to the hospital is called as First aid. First aid is provided to preserve life, prevent the condition from worsening or to promote recovery. First aid is generally performed by the layperson, with training in basic levels of first aid.

First Aid was started by S. Mark in the year 1823. A First Aid Kit should have the following contents. Shown in Figure 2(a).

- 1. Tincture Iodine
- 2. Tincture Benzene
- 3. Dettol
- 4. Burnol
- 5. Boric Powder
- 6. Meshed Cloth

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#### First Aid: Convulsions



Figure 2 First Aid

- 7. Cotton
- 8. Small Scissor
- 9. Knife
- 10. Plaster
- 11. Small bamboo strips
- 12. Blade
- 13. Hydrogen peroxide, etc.,

# 1.9 IMPORTANT THINGS TO NOTICE

- 1. If patients are severely injured, he has taken immediately to the hospital or arrange for a doctor visit.
- 2. Level of first aid depends upon the severity of the injury.
- Bleeding of blood should be stopped, especially if the patient is in the unconscious.



Figure 2(a) First Aid

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#### **1.10 IF DUST FALLS ON EYE**

- 1. If dust or metal chip falls on the eye, do not press or squash the eye.
- 2. Pull the upper eyelash down.
- 3. If the dust in the eye reaches one end of the eye, the dust can be removed with the help of a clean wet cloth.
- 4. Consult the eye doctor, if necessary.

# 1.11 PROCEDURE TO HANDLE VEHICLE DURING EMERGENCY

A lot of developments are made in the field of automobile engineering. It is easy to operate a vehicle and journey is more comfortable, hence most of the people preferred self – driving when travelling to their required place. Hence it is highly essential to understand the principle of operation of the warning system, dashboards instruments, indicators etc., of an automobile. Refer Figures 3 and 3(a).



Figure 3



Figure 3(a)





Ministry of Labour & Employment

The Ministry of Labour and Employment is India's federal ministry which is responsible to protect and safeguard the interest of workers in general and the poor, deprived and disadvantaged sections of the society.

The Ministry aims to create a healthy work environment for higher production and productivity and to develop and coordinate vocational skill training and employment.

However, Skill Development responsibilities, such as Industrial Training and Apprenticeship responsibilities were transferred to the Ministry of Skill Development and Entrepreneurship from 9 November 2014

The Ministry launched the National Career Service portal on 20 July 2015 to help bridge the gap between job providers and job seekers

Running a vehicle AC when a vehicle at a stop, locking all the doors and windows when kids are inside is not advisable. This may cause injuries and accidents and difficult to come out when vehicle catches fire, or during suffocation. In such case, with the sharp edge on the detachable vehicle headrest can be used to break a vehicle's window glass. It is better to avoid sleeping inside the car, lock the kids inside the car, chatting long hours inside the locked car.

#### Student Activity

- I. Students have to follow the following safety precautions:
- 1. Students should visit micro, small and central workshops to learn the machine safety precautions, self-safety precautions and vehicle safety rules and should submit a report on it.

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2. Students should learn the first aid procedures to be followed in case of any accident from the experienced medical individuals and should submit a report on it.

# **Glossary**

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Radiation	-	கதிர்வீச்சு
Spindles	-	தண்டு
Prohibited	-	தடுப்பு
Hygiene	-	சுத்தமான
Meticulously	-	கண்டிப்பான
Clean visible	-	தெளிவான பார்வை
Features	-	வசதிகள்
Ensure	-	உறுதி படுத்துதல்
Works Space	-	பணிபுரியும் இடம்
Signboards	-	அறிவிப்பு விளக்கு பலகை



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#### SAMPLE QUESTIONS

#### Choose the correct answer:

- 1. Name the rules that are used to ensure the employees and equipment's from accident
  - a) Vehicle safety rules
  - b) First aid
  - c) Safety rules
- 2. Name the device which is to be used during welding to protect eyes.
  - a) Airbag b) Goggles
  - c) Helmet
- 3. Which device is to be used to protect from Head injury?
  - a) Cap b) Goggles
  - c) Helmet
- 4. Maximum working hour for an Operator should not exceed
  - a) 4 hours b) 6 hours
  - c) 8 hours

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- 5. What is the abbreviation of ABS?
  - a) Anti-lock Braking System
  - b) Anti Brake System
  - c) Air Brake System

#### Answer the following questions:

- 1. Explain about safety Precaution.
- 2. Classify the types of safety precautions.
- 3. Write any five points on precautions about safety in shop floor.
- 4. Define self-safety precaution.
- 5. Explain any five points on self-safety precaution.

- 6. Explain any five points on machine safety precaution.
- 7. Explain any five-safety precaution on the tools.
- 8. Define First Aid.

- 9. what are the basic materials required for First Aid?
- 10. Explain some important points of the First Aid.
- 11. what is road safety?
- 12. Write five points to be considered on road safety.
- 13. What is meant by mandatory symbol of the traffic signals?
- 14. Draw and explain any three-mandatory symbol used in traffic signals.
- 15. What is meant by cautionary symbol of the traffic signals?
- 16. Draw and explain any three-cautionary symbol used in Traffic signals.
- 17. What is meant by Informatory symbol of the traffic signals?
- 18. What are the various precautionary alarms used in the vehicle?
- 19. What are the various instruments that are connected with Dangerous sound alarms?
- 20. Explain about ABS.

