Familiarization of the Industrial Training Institute

Objectives: At the end of this lesson you shall be able to
- **identify the staff structure of the institute**
- **list the available trades in the institute and their functions**
- **describe the ITI training system in India.**

Industrial Training Institutes (ITI) plays a vital role in the economic development of the country, especially in terms of providing skilled manpower requirements by training competent, quality craftsmen.

The Directorate General of Training (DGT) comes under the Ministry of Skill Development and Entrepreneurship (MSDE) offers a range of vocational training under engineering and non engineering trades affiliated with the National Council for Vocational Training (NCVT) NewDelhi. NCVT is the Govt of India body responsible for framing the polices, approving the syllabus for Craftsman Training System (CTS), carrying out the All India Trade Test and issuing the National Trade Certificates (NTC) to the successful candidates.

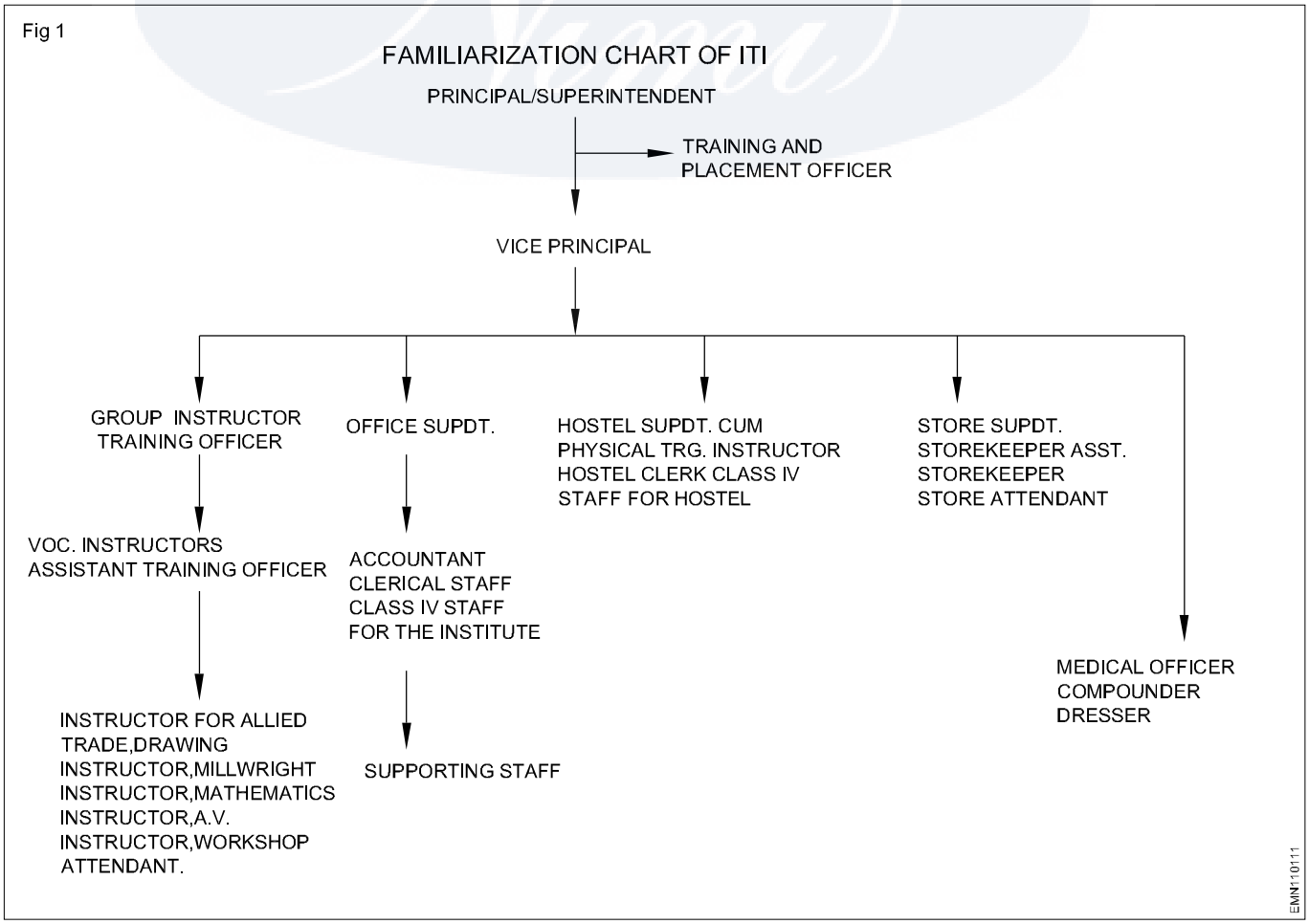
In India there are about 2293 Govt. ITIs and 10872 Private ITIs. (Based on the Govt.of India, Ministry of Labour Annual report of 2016-2017). The Govt. ITIs in each state functioning under the Directorate of Employment and Training Dept (DET) under the state Govts.

The head of the **ITI** is the Principal, under whom there is one Vice-Principal, Group Instructor/ Training officer/ A.T.O and a number of trade instructors as shown in the Organisation chart of ITI.

There are133 trades selected for vocational training and 261 trades identified for Apprentice training, according to the requirement of industrial needs and the duration of the training is from 1 year to 2 years.

At present the Electronic Mechanic trade has been included under National Skill Qualification Frame work (NSQF) with level - 5 competency. The trainees are advised to make a list of othe trades available in their ITI, the type of training and the scope of these trades in getting self employment or job opportunity in the rural and urban areas and also identify the location of the ITI, nearby hospital, fire station and police station ect.

Fig 1



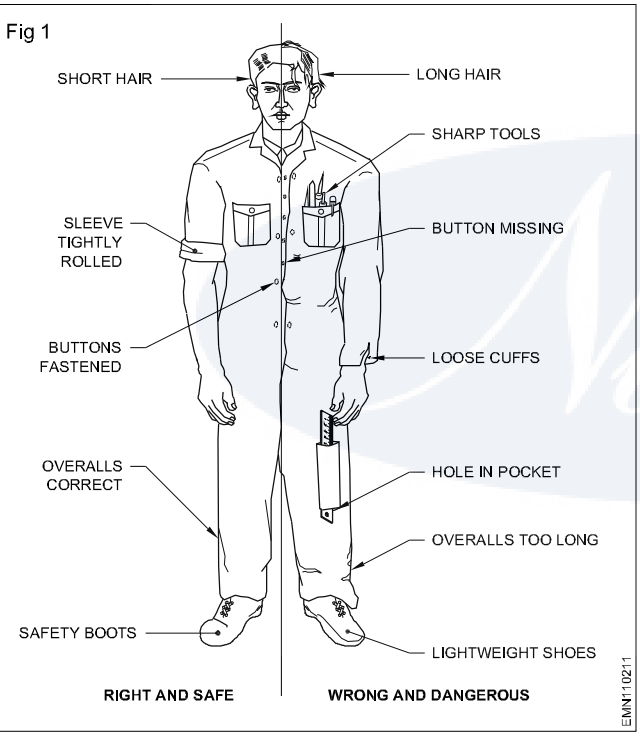
Importance of safety and precautions to be taken in the industry/ shop floor

Objectives: At the end of this lesson you shall be able to
- **state the importance of safety**
- **state the personal safety precautions to be observed**
- **list out the safety precautions to be observed while working on the machines.**

Importance of safety

Generally accidents do not happen; they are caused. Most accidents are avoidable. A Good craftsman, having a knowledge of various safety precautions, can avoid accidents to himself and to his fellow workers and protect the equipment from any damage. To achieve this, it is essential that every person should follow safety procedure. (Fig 1)

Fig 1



Safety in a workshop can be broadly classified into 3 categories.

- General safety
- Personal safety
- Machine safety

General safety

Keep the floor and gangways clean and clear.

Move with care in the worksop, do not run.

Don't leave the machine which is in motion.

Don't touch or handle any equipment/ machine unless authorised to do so.

Don't walk under suspended loads.

Don't cut practical jokes while on work.

Use the correct tools for the job.

Keep the tools at their proper place.

Wipe out split oil immediately.

Replace worn out or damaged tools immediately.

Never direct compressed air at yourself or at your co-worker.

Ensure adequate light in the workshop.

Clean the machine only when it is not in motion.

Sweep away the metal cuttings.

Know everything about the machine before you start it.

Personal safety

Wear a one piece overall or boiler suit.

Keep the overall buttons fastened.

Don't use ties and scarves.

Roll up the sleeves tightly above the elbow.

Wear safety shoes or boots or chain.

Cut the hair short.

Don't wear a ring, watch or chain.

Never lean on the machine.

Don't clean hands in the coolant fluid.

Don't remove guards when the machine is in motion.

Don't use cracked or chipped tools.

Don's start the machine until

- the workpiece is securely mounted
- the feed machinery is in the neutral
- the work area is clear.

Don't adjust clamps or holdig devices while the machine is in motion.

Never touch the electrical equipment with wet hands.

Don't use any faulty electrical equipment.

Ensure that electrical connections are made by an authorised electrician only.

Concentrate on your work.

Have a calm attitude.

Do things in a methodical way.

Don't engage yourself in conversation with others while concentrating on your job.

Don't distract the attention of others.

Don't try to stop a running machine with hands.

Machine safety

Switch off the machine immediately if something goes wrong.

Keep the machine clean.

Replace any worn out or damaged accessories, holding devices, nuts, bolts, etc., as soon as possible.

Do not attempt operating the machine until you know how to operate it properly.

Do not adjust tool or the workpiece unless the power is off.

Stop the machine before changing the speed.

Disengage the automatic feeds before switching off.

Check the oil level before starting the machine.

Never start a machine unless all the safety guards are in position.

Take measurements only after stopping the machine.

Use wooden planks over the bed while loading and unloading heavy jobs.

Safety is a concept, understand it.

Safety is a habit, cultivate it.

Safety Sign Boards

Signboards are a common sight in almost all places such as roadways, railways, hospitals, offices, instituition, industrial units and so on.

Signboards are visual indicators. The signs on the signboards may be just a symbol, a small text, a figure or a combination of these.

Signboards carry a single clear message. These messages are to ensure safety.

Sigboards can be classified into four basic categories.

a) Prohibition signs

Indicating a behaviour which is prohibited (not allowed) in that situation or environment. Refer to chart 1 for examples.

b) Mandatory signs

Indicating a behaviour which is a must, which when not obeyed may cause accidents. Refer to chart 1 for examples.

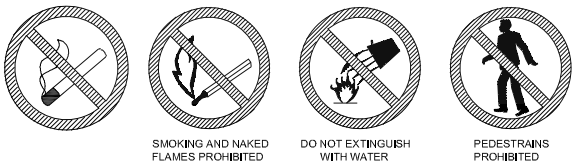
c) Warning signs

Indicating a warning such tht suitable precatution is taken. Refer to chart 1 for examples.

d) Information signs

Giving information which is very useful and reduces waste of time. Refer to chart 1 for examples.

Chart 1

a) Prohibition signs  	**Shape** Circular. **Colour** Red border and crossbar. Black symbol on white background. **Meaning** Shows what must not be done. **Example** No smoking and naked flames
b) Mandatory signs  	**Shape** Circular. **Colour** White symbol on blue background. **Meaning** Shows what must not be done. **Example** Wear hand protection.

c) Warning signs

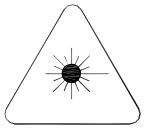
RISK OF FIRE

RISK OF ELECTRIC SHOCK

TOXIC HAZARD

CORROSIVE SUBSTANCES

RISK OF IONIZING RADIATION

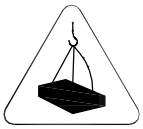


LASER BEAM

RISK OF EXPLOSION

OVERHEAD (FIXED) HAZARD

GENERAL WARNING RISK OF DANGER



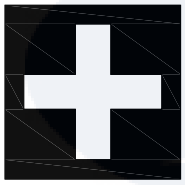
OVERHEAD LOAD

FRAGILE ROOF

FORK LIFT TRUCK

Shape	Triangular.
Colour	Yellow background with black border and symbols.
Meaning	Warns of hazard or danger.
Example	Caution, risk of electric shock.

d) Information signs



FIRST AID POINT

Shape	Square or oblong
Colour	White symbols on green background.
Meaning	Indicates or gives information of safety provision/First aid
Example	Caution, risk of electric shock.

Personal Protective Equipment (PPE)

Objectives: At the end of this lesson you shall be able to
- **state the personal protective equipment and its purpose**
- **list the most common type of personal protective equipment**
- **list the conditions for selection of personal protective equipment.**

Personal protective equipment (PPE)

Devices, equipments, or clothing used or worn by the employees, as a last resort, to protect against hazards in the workplace. The primary approach in any safety effort is that the hazard to the workmen should be eliminated or controlled by engineering methods rather than protecting the workmen through the use of personal protective equipment (PPE). Engineering methods could include design change, substitution, ventilation, mechanical handling, automation, etc. In situations where it is not possible to introduce any effective engineering methods for controlling hazards, the workman shall use appropriate types of PPE.

As changing times have modernized the workplace, government and advocacy groups have brought more safety standards to all sorts of work environments. The Factories Act, 1948 and several other labour legislations 1996 have provisions for effective use of appropriate types of PPE. Use of PPE is an important.

Ways to ensure workplace safety and use personal protective equipment (PPE) effectively.

- Workers to get up-to-date safety information from the regulatory agencies that oversees workplace safety in their specific area.
- To use all available text resources that may be in work area and for applicable safety information on how to use PPE best.
- When it comes to the most common types of personal protective equipment, like goggles, gloves or bodysuits, these items are much less effective if they are not worn at all times, or whenever a specific danger exists in a work process. Using PPE consistently will help to avoid some common kinds of industrial accidents.
- Personal protective gear is not always enough to protect workers against workplace dangers. Knowing more about the overall context of your work activity can help to fully protect from anything that might threaten health and safety on the job.
- Inspection of gear thoroughly to make sure that it has the standard of quality and adequately protect the user should be continuously carried out.

Categories of PPEs

Depending upon the nature of hazard, the PPE is broadly divided into the following two categories:

1 **Non-respiratory:** Those used for protection against injury from outside the body, i.e. for protecting the head, eye, face, hand, arm, foot, leg and other body parts

2 **Respiratory:** Those used for protection from harm due to inhalation of contaminated air.

They are to meet the applicable BIS (Bureau of Indian Standards) standards for different types of PPE.

The guidelines on 'Personal Protective Equipment' is issued to facilitate the plant management in maintaining an effective programme with respect to protection of persons against hazards, which cannot be eliminated or controlled by engineering methods listed in table1.

Table1

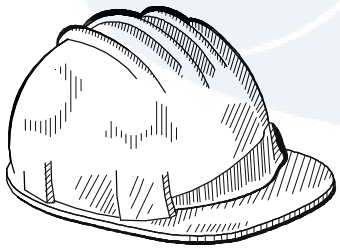
No.	Title
PPE1	Helmet
PPE2	Safety footwear
PPE3	Respiratory protective equipment
PPE4	Arms and hands protection
PPE5	Eyes and face protection
PPE6	Protective clothing and cover all
PPE7	Ears protection
PPE8	Safety belt and harnesses

Personal protective equipments and their uses and hazards are as follows

Types of protection	Hazards	PPE to be used
Head Protection (Fig 1)	1. Falling objects 2. Striking against objects 3. Spatter	Helmets

Foot protection (Fig 2)	1. Hot spatter 2. Falling objects 3. Working wet area	Leather leg guards Safety shoes Gum boots
Nose (Fig 3)	1. Dust particles 2. Fumes/ gases/ vapours	Nose mask
Hand protecion (Fig 4)	1. Heat burn due to direct contact 2. Blows sparks moderate heat 3. Electric shock	Hand gloves
Eye protection (Fig 5, Fig 6)	1. Flying dust particles 2. UV rays, IR rays heat and High amount of visible radiation	Goggles Face shield Hand shield Head shield
Face Protection (Fig 6, Fig 7)	1. Spark generated during Welding, grinding 2. Welding spatter striking 3. Face protection from UV rays	Face shield Head shield with or without ear muff Helmets with welders screen for welders
Ear protection (Fig 7)	1. High noise level	Ear plug Ear muff
Body protection (Fig 8, Fig 9)	1. Hot particles	Leather aprons

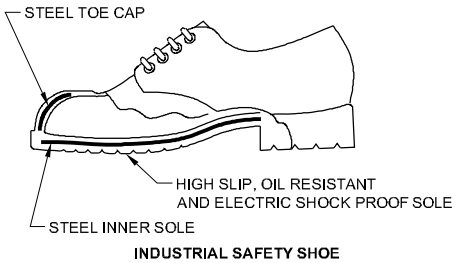
Fig 1



HELMET

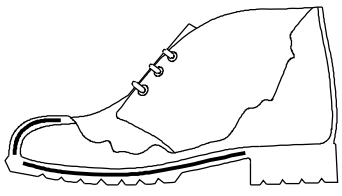
EMN110311

Fig 2



INDUSTRIAL SAFETY SHOE

STOUT LEATHER PREVENTS
INJURY TO THE ANCHILIES TENDON



INDUSTRIAL SAFETY BOOT

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Fig 3

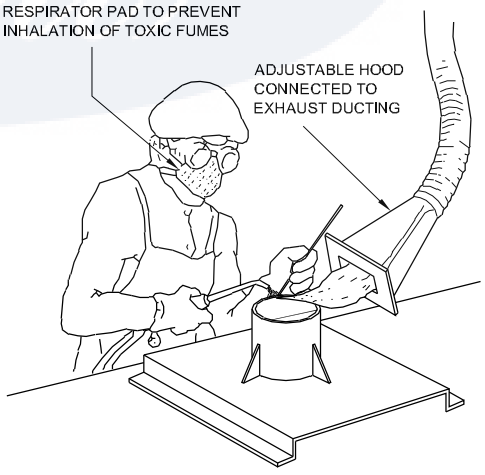

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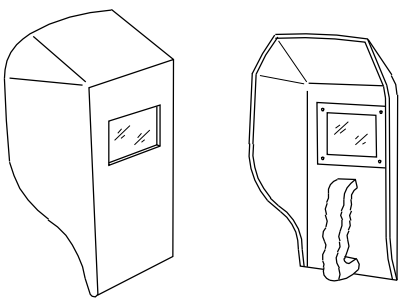
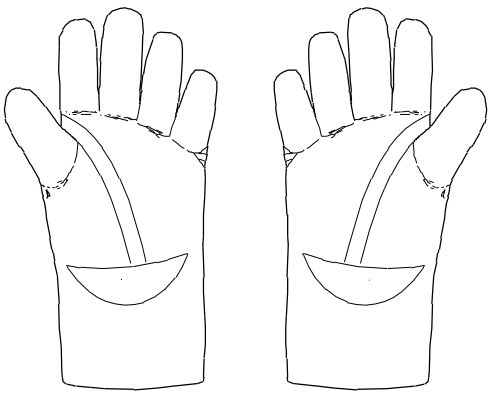
Fig 6



HAND SCREEN

EMN110316

Fig 4



GLOVES

EMN110314

Fig 5

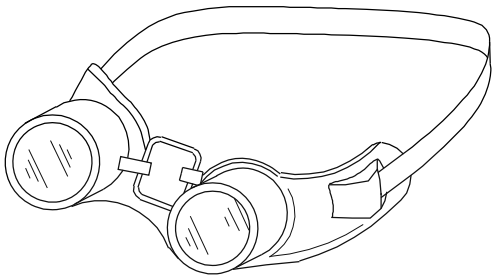


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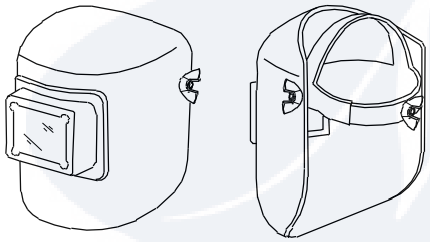
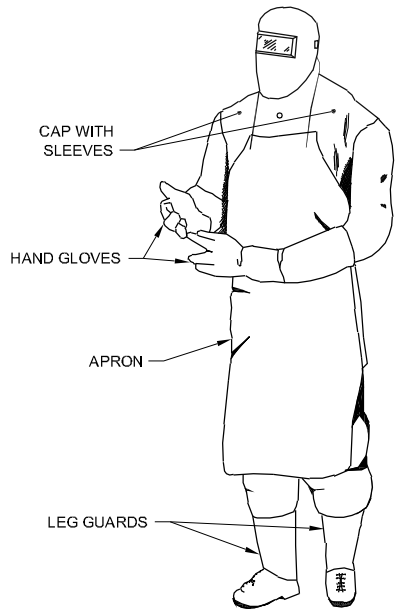
Fig 7



WELDING HELMET

EMN110317

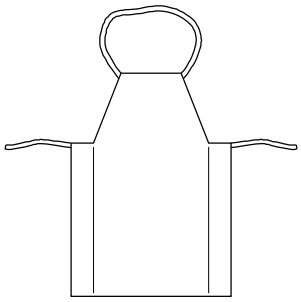
Fig 9



LEG GUARDS

EMN110319

Fig 8



APRON

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Quality of PPE's

PPE must meet the following criteria with regard to its quality-provide absolute and full protection against possible hazard and PPE's be so designed and manufactured out of materials that it can withstand the hazards against which it is intended to be used.

Selection of PPE's requires certain conditions

- Nature and severity of the hazard
- Type of contaminant, its concentration and location of contaminated area with respect to the source of respirable air
- Expected activity of workman and duration of work, comfort of workman when using PPE
- Operating characteristics and limitations of PPE
- Ease of maintenance and cleaning.
- Conformity to Indian/ International standards and availability of test certificate.

Proper use of PPEs

Having selected the proper type of PPE, it is essential that the workman wears it. Often the workman avoids using PPE. The following factors influence the solution to this problem.

- The extent to which the workman understands the necessity of using PPE
- The ease and comfort with which PPE can be worn with least interference in normal work procedures
- The available economic, social and disciplinary sanctions which can be used to influence the attitude of the workman
- The best solution to this problem is to make 'wearing of PPE' mandatory for every employee.
- In other places, education and supervision need to be intensified. When a group of workmen are issued PPE for the first time.

First Aid

Objectives: At the end of this lesson you shall be able to
- **state the first aid**
- **explain the ABC of the first aid**
- **explain the first-aid treatment for a victim**
- **state the importance of house keeping**
- **explain environment, health and safety**
- **state the importance of safety and safety signs.**

First aid is defined as the immediate care and support given to an acutely injured or ill person, primarily to save life, prevent further deterioration or injury, plan to shift the victim to safer place, provide best possible comfort and finally help them to reach the medical centre/ hospital through all available means. It is an immediate life-saving procedure using all resources available within reach.

Imparting knowledge and skill through institutional teaching at younger age group in schools, colleges, entry point at industry level is now given much importance. Inculcating such habits at early age, helps to build good healthcare habits among people.

First aid procedure often consists of simple and basic life saving techniques that an individual performs with proper training and knowledge.

The key aims of first aid can be summarized in three key points:

- **Preserve life:** If the patient was breathing, a first aider would normally then place them in the recovery position, with the patient leant over on their side, which also has the effect of clearing the tongue from the pharynx. It also avoids a common cause of death inunconscious patients, which is choking on regurgitated stomach contents. The airway can also become blocked through a foreign object becoming lodged in the pharynx or larynx, commonly called choking. The first aider will be taught to deal with this through a combination of 'back slaps' and 'abdominal thrusts'. Once the airway has been opened, the first aider would assess to see if the patient is breathing.
- **Prevent further harm:** Also sometimes called prevent the condition from worsening, or danger of further injury, this covers both external factors, such as moving a patient away from any cause of harm, and applying first aid techniques to prevent worsening of the condition, such as applying pressure to stop a bleed becoming dangerous.
- **Promote recovery:** First aid also involves trying to start the recovery process from the illness or injury, and in some cases might involve completing a treatment, such as in the case of applying a plaster to a small wound.

Training

Basic principles, such as knowing to use an adhesive bandage or applying direct pressure on a bleed, are often acquired passively through life experiences. However, to provide effective, life-saving first aid interventions requires instruction and practical training. This is especially true where it relates to potentially fatal illnesses and injuries, such as those that require cardiopulmonary resuscitation (CPR); these procedures may be invasive, and carry a risk of further injury to the patient and the provider. As with any training, it is more useful if it occurs before an actual emergency, and in many countries, emergency ambulance dispatchers may give basic first aid instructions over the phone while the ambulance is on the way. Training is generally provided by attending a course, typically leading to certification. Due to regular changes in procedures and protocols, based on updated clinical knowledge, and to maintain skill, attendance at regular refresher courses or re-certification is often necessary. First aid training is often available through community organization such as the Red cross and St. John ambulance.

ABC of first aid

ABC stands for airway, breathing and circulation.

- **Airway:** Attention must first be brought to the airway to ensure it is clear. Obstruction (choking) is a life-threatening emergency.
- **Breathing:** Breathing if stops, the victim may die soon. Hence means of providing support for breathing is an important next steps. There are several methods practiced in first aid.
- **Circulation:** Blood circulation is vital to keep person alive. The first aiders now trained to go straight to chest compressions through CPR methods.

When providing first aid one needs to follow some rule. There are certain basic norms in teaching and training students in the approach and administration of first aid to sick and injured.

Not to get panic

Panic is one emotion that can make the situation more worse. People often make mistake because they get panic. Panic clouds thinking may cause mistakes. First aider need calm and collective approach. If the first aider himself is in a state of fear and panic gross mistakes may result.

It's far easier to help the suffering, when they know what they are doing, even if unprepared to encounter a situation. Emotional approach and response always lead to wrong doing and may lead one to do wrong procedures. Hence be calm and focus on the given institution. Quick and confident approach can lessen the effect of injury.

Call medical emergencies

If the situation demands, quickly call for medical assistance. Prompt approach may save the life.

Surroundings play vital role

Different surroundings require different approach. Hence first aider should study the surrounding carefully. In other words, one need to make sure that they are safe and are not in any danger as it would be of no help that the first aider himself get injured.

Do no harm

Most often over enthusiastically practiced first aid viz. administering water when the victim is unconscious, wiping clotted blood (which acts as plug to reduce bleeding), correcting fractures, mishandling injured parts etc., would leads to more complication. Patients often die due to wrong FIRST AID methods, who may otherwise easily survive. Do not move the injured person unless the situation demands. It is best to make him lie wherever he is because if the patient has back, head or neck injury, moving him would causes more harm.

This does not mean do nothing. It means to make sure that to do something the care gives feel confident through training would make matters safe. If the first aider is not confident of correct handling it is better not to intervene of doing it. Hence moving a trauma victim, especially an unconscious one, needs very careful assessment. Removal of an embedded objects (Like a knife, nail) from the wound may precipitate more harm (e.g. increased bleeding). Always it is better to call for help.

Reassurance

Reassure the victim by speaking encouragingly with him.

Stop the bleeding

If the victim is bleeding, try to stop the bleeding by applying pressure over the injured part.

Golden hours

India have best of technology made available in hospitals to treat devastating medical problem viz. head injury, multiple trauma, heart attack, strokes etc, but patients often do poorly because they don't gain access to that technology in time. The risk of dying from these conditions, is greatest in the first 30 minutes, often instantly. This period is referred to as Golden period. By the time the patient reach the hospital, they would have passed that critical period. First aid care come handy to save lives. It helps to get to the nearest emergency room as quickly as possible through safe handling and transportation. The shorter that time, the more likely the best treatment applied.

Maintain the hygiene

Most important, the first aider need to wash hands and dry before giving any first aid treatment to the patient or wear gloves in order to prevent infection.

Cleaning and dressing

Always clean the wound thoroughly before applying the bandage gently wash the wound with clean water.

Not to use local medications on cuts or open wounds

They are more irritating to tissue than it is helpful. Simple dry cleaning or with water and some kind of bandage are best.

CPR (Cardio-Pulmonary Resuscitation) can be life-sustaining

CPR can be life sustaining. If one is trained in PR and the person is suffering from choking or finds difficulty in breathing, immediately begin CPR. However, if one is not trained in CPR, do not attempt as you can cause further injury. But some people do it wrong. This is a difficult procedure to do in a crowded area. Also there are many studies to suggest that no survival advantage when bystanders deliver breaths to victims compared to when they only do chest compressions. Second, it is very difficult to carry right maneuver in wrong places. But CPR, if carefully done by highly skilled first aiders is a bridge that keeps vital organs oxygenated until medical team arrives.

Declaring death

It is not correct to declare the victim's death at the accident site. It has to be done by qualified medical doctors.

How to report an emergency?

Reporting an emergency is one of those things that seems simple enough, until actually when put to use in emergency situations. A sense of shock prevail at the accident sites. Large crowd gather around only with inquisitive nature, but not to extend helping hands to the victims. This is common in road side injuries. No passer-by would like to get involved to assist the victims. Hence first aid management is often very difficult to attend to the injured persons. The first aiders need to adapt multi-task strategy to control the crowd around, communicate

to the rescue team, call ambulance etc., all to be done simultaneously. The mobile phones helps to a greater extent for such emergencies. Few guidelines are given below to approach the problems.

Assess the urgency of the situation. Before you report an emergency, make sure the situation is genuinely urgent. Call for emergency services if you believe that a situation is life-threatening or otherwise extremely critical.

- A crime, especially one that is currently in progress. If you're reporting a crime, give a physical description of the person committing the crime.
- A fire - If you're reporting a fire, describe how the fire started and where exactly it is located. If someone has already been injured or is missing, report that as well.

- A life-threatening medical emergency, explain how the incident occurred and what symptoms the person currently displays.
- A car crash - Location, serious nature of injures, vehicle's details and registration, number of people involved etc.

Call emergency number

The emergency number varies - 100 for Police & Fire, 108 for Ambulance.

Report your location

The first thing the emergency dispatcher will ask is where you are located, so the emergency services can get there as quickly as possible. Give the exact street address, if you're not sure of the exact address, give approximate information.

Give the dispatcher your phone number

This information is also imperative for the dispatcher to have, so that he or she is able to call back if necessary.

Describe the nature of the emergency

Speak in a calm, clear voice and tell the dispatcher why you are calling. Give the most important details first, then answer the dispatcher's follow-up question as best as you can.

Do not hang up the phone until you are instructed to do so. Then follow the instructions you were given.

How to do basic first aid?

Basic first aid refers to the initial process of assessing and addressing the needs of someone who has been injured or is in physiological distress due to choking, a heart attack, allergic reactions, drugs or other medical emergencies. Basic first aid allows one to quickly determine a person's physical condition and the correct course of treatment.

Important guideline for first aiders

Evaluate the situation

Are there things that might put the first aider at risk. When faced with accidents like fire, toxic smoke, gasses, an unstable building, live electrical wires or other dangerous scenario, the first aider should be very careful not to rush into a situation, which may prove to be fatal.

Remember A-B-Cs

The ABCs of first aid refer to the three critical things the first aiders need to look for.

- Airway - Does the person have an unobstructed airway?
- Breathing - Is the person breathing?
- Circulation - Does the person show a pulse at major pulse points (wrist, carotid artery, groin)

Avoid moving the victim

Avoid moving the victim unless they are immediate danger. Moving a victim will often make injuries worse, especially in the case of spinal cord injuries.

Call emergency services

Call for help or tell someone else to call for help as soon as possible. If alone at the accident scene, try to establish breathing before calling for help, and do not leave the victim alone unattended.

Determine responsiveness

If a person is unconscious, try to rouse them by gently shaking and speaking to them.

If the person remains unresponsive, carefully roll them on the side (recovery position) and open his airway.

- Keep head and neck aligned.
- Carefully roll them onto their back while holding his head.
- Open the airway by lifting the chin.

Look, listen and feel for signs of breathing

Look for the victim's chest to raise and fall, listen for sounds of breathing.

If the victim is not breathing, see the section below

- If the victim is breathing, but unconscious, roll them onto their side, keeping the head and neck aligned with the body. This will help drain the mouth and prevent the tongue or vomit from blocking the airway.

Check the victim's circulation

Look at the victim's colour and check their pulse (the carotid artery is a good option; it is located on either side of the neck, below the jaw bone). If the victim does not have a pulse, start CPR.

Treat bleeding, shock and other problems as needed

After establishing that the victim is breathing and has a pulse, next priority should be to control any bleeding. Particularly in the case of trauma, preventing shock is the priority.

- **Stop bleeding:** Control of bleeding is one of the most important things to save a trauma victim. Use direct pressure on a wound before trying any other method of managing bleeding.
- **Treat shock:** Shock may causes loss of blood flow from the body, frequently follows physical and occasionally psychological trauma. A person in shock will frequently have ice cold skin, be agitated or have an altered mental status, and have pale colour to the skin around the face and lips. Untreated, shock can be fatal. Anyone who has suffered a severe injury or life-threatening situation is at risk for shock.
- **Choking victim:** Choking can cause death or permanent brain damage within minutes.
- **Treat a burn:** Treat first and second degree burns by immersing or flushing with cool water. Don't use creams, butter or other ointments, and do not pop blisters. Third degree burns should be covered with a damp cloth. Remove clothing and jewellery from the burn, but do not try to remove charred clothing that is stuck to burns.

- **Treat a concussion:** If the victim has suffered a blow to the head, look for signs of concussion. Common symptoms are: loss of consciousness following the injury, disorientation or memory impairment, vertigo, nausea, and lethargy.
- **Treat a spinal injury victim:** If a spinal injury is suspected, it is especially critical, not move the victim's head, neck or back unless they are in immediate danger.

Stay with the victim until help arrives

Try to be a calming presence for the victim until assistance can arrive.

Unconsciousness (COMA)

Unconscious also referred as Coma, is a serious life threatening condition, when a person lie totally senseless and do not respond to calls, external stimulus. But the basic heart, breathing, blood circulation may be still intact, or they may also be failing. If unattended it may lead to death.

The condition arises due to interruption of normal brain activity. The causes are too many.

The following symptoms may occur after a person has been unconscious:

- Confusion
- Drowsiness
- Headache
- Inability to speak or move parts of his or her body (see stroke symptoms)
- Light headedness
- Loss of bowel or bladder control (incontinence)
- Rapid heartbeat (palpitation)
- Stupor

First aid

- Call EMERGENCY number.
- Check the person's airway, breathing, and pulse frequently. If necessary, begin rescue breathing and CPR.
- If the person is breathing and lying on the back and after ruling out spinal injury, carefully roll the person onto the side, preferably left side. Bend the top leg so both hip and knee are at right angles. Gently tilt the head back to keep the airway open. If breathing or pulse stops at any time, roll the person on to his back and begin CPR.
- If there is a spinal injury, the victims position may have to be carefully assessed. If the person vomits, roll the entire body at one time to the side. Support the neck and back to keep the head and body in the same position while you roll.
- Keep the person warm until medical help arrives.
- If you see a person fainting, try to prevent a fall. Lay the person flat on the floor and raise the level of feet above and support.
- If fainting is likely due to low blood sugar, give the person something sweet to eat or drink when they become conscious**.**

Do not

- Do not give any food or drink of an unconscious person
- Do not leave the person alone.
- Do not place a pillow under the head of an unconscious person.
- Do not slap an unconscious person's face or splash water on the face and try to revive him.

Loss of consciousness may threaten life if the person is on his back and the tongue has dropped to the back of the throat, blocking the airway. Make certain that the person is breathing before looking for the cause of unconsciousness. If the injuries permit, place the casualty in the recovery position (Fig 2) with the neck extended. Never give any thing by mouth to an unconscious casualty.

How to diagnose an unconscious injured person

- Consider alcohol: look for signs of drinking, like empty bottles or the smell of alcohol.
- Consider epilepsy: are there signs of a violent seizure, such as saliva around the mouth or a generally dishevelled scene?
- Think insulin: might the person be suffering from insulin shock (see 'How to diagnose and treat insulin shock")?
- Think about drugs: was there an overdose? Or might the person have under dosed - that is not taken enough of a prescribed medication?
- Consider trauma: is the person physically injured?
- Look for signs of infection: redness and/ or red streaks around a wound.
- Look around for signs of Poison: an empty bottle of pills or a snakebite wound.
- Consider the possibility of psychological trauma: might the person have a psychological disorder of some sort?
- Consider stroke, particularly for elderly people.
- Treat according to what you diagnose.

Shock

A severe loss of body fluid will lead to a drop in blood pressure. Eventually the blood's circulation will deteriorate and the remaining blood flow will be directed to the vital organs such as the brain. Blood will therefore be directed away from the outer area of the body, so the victim will appear pale and the skin will feel ice cold.

As blood flow slows, so does the amount of oxygen reaching the brain. The victim may appear to be confused,

weak, and dizzy and may eventually deteriorate into unconsciousness. Try to compensate for this lack of oxygen, the heart and breathing rates both speed up, gradually becoming weaker, and may eventually cease.

Potential causes of shock include: sever internal or external bleeding; burns; severe vomiting and diarrohea, especially in children and the elderly; problems with the heart.

Symptoms of shock

Victims appear pale, ice cold, pulse appear initially faster and gets slower, breathing becomes shallow. Weakness, dizziness, confusion continue. If unattended the patient may become unconscious and die.

Shock kills, so it is vital that you can recognize these signs and symptoms. With internal bleeding in particular, shock can occur sometime after an accident, so if a person with a history of injury starts to display these symptoms coupled with any of the symptoms of internal bleeding, advise them to seek urgent medical attention. Or take or send them to hospital.

First aid

Keep the patient warm and at mental rest. Assure of good air circulation and comfort. Call for help to shift the patient to safer place/ hospital.

- **Warmth:** Keep the victim warm but do not allow them to get overheated. If you are outside, try to get something underneath her if you can do easily. Wrap blankets and coats around her, paying particular attention to the head, through which much body heat is lost.
- **Air:** Maintain careful eye on the victim's airway and be prepared to turn them into the recovery position if necessary, or even to resuscitate if breathing stops. Try to keep back bystanders and loosen tight clothing to allow maximum air to victim.
- **Rest:** Keep the victim still and preferably sitting or lying down. If the victim is very giddy, lay them down with there legs raised to ensure that maximum blood and therefore maximum oxygen is sent to the brain.

Power Failure

Minor electric shock, fire, or product failure may occasionally occur. Do not disassemble, modify, or repair the product or touch the interior of the product.

Minor injury due to electric shock may occasionally occur. Do not touch the terminals while power is being supplied.

Minor burns may occasionally occur. Do not touch the product while power is beinng supplied or immediately after power is turned OFF.

Fire may occasionally occur. Tighten the terminal screws with the specified torque.

Minor electric shock, fire, or product failure may occasionally occur. Do not allow any pieces of metal or conductors or any clippings or cuttings resulting from installation work to enter the product.

Precautions for Safe Use

Input Voltage

Use a commercial power supply for the power supply voltage input to models with AC inputs.

Inverters with an output frequency of 50/60 Hz are available, but the rise in the internal temperature of the power supply may result in ignition or burning. Do not use an inverter outpur for the power supply of the product.

Grounding

Connect the ground completely. Electric shock occur if te the ground is not connected completely.

Operating Environment

Use each product within the rated range for ambient operating temperature, ambient operating humidity, and storage temperature specified for that product.

Use the power supply within the ranges specifed for vibration and shock reistance.

Do not use the power supply in locations subjects to excessive amount of dust or where liquids, foreign matter, or corrosive gases may enter the interior of the product.

Install the power supply well away from devices that produce strong, high-frequency noise and surge.

Do not use the power supply in locations subject to direct sunlight.

Mounting

The installation screws can be tightened into the power supply only to a limited depth. Make sure that the lengths of the screws protruding into the power supply are within the specified dimensions.

Wiring

Use caution when connecting the input cable to the power supply.

The power supply unit may be destroyed if the input cable is connected to the wrong terminals. Use caution when using a model with a DC input. The power supply unit may be destroyed if the polarity is reversed.

Do not apply more than 75-N force to the terminal block when tightening the terminals.

Wiring materials

Use a wire size that suits the rated ouput current of the power supply to be used in order to prevent smoking or ignition caused by abnormal loads.

Caution is particularly required if the output current from one power supply is distributed to multiple loads. If thin wiring is used to branch wiring, the power supply's overload protection circuit may fail to operate depending on factors such as the impedence of the load wiring even the load is short-circuited.

Therefore insertion of a fuse in the line or other protective measures must be considered.

Precautions against ingress of metal fragments (Fillings)

Drilling on the upper section of an installed power supply may cause drilling fragments to fall onto the PCB, thereby short-circuiting and destroying the internal circuits. Whether the power supply cover is attached or not, cover the power supply with a sheet to prevent ingress of fragments when performing work on the upper sector of the power supply.

Be sure to remove the sheet covering the power supply for machining before power-ON so that it does not interface with heat dissipation.

Load

Internal parts may possibly deteriorate or be damaged if a short-circuited or over current state continues during operation.

Charging a battery

When connection a battery at the load, connect an overcurrent limiting circuit and overvoltage protection circuit.

Output and Ground connections

The power supply output is a floating output (i.e., the primary side and secondary side are separated). so the output line (i.e., +V or -V) can be connected externally directly to a ground. Though the ground, however, the insulation between the primary side and secondary side will be lost. Confirm that no loops are created in which the power supply output is short-circuited through the internal circuits of the load.

Example: When the +V side of the power supply is connected directly to a ground and a load is used for which the internal 0-V line uses the same ground.

Fire safety

Prepare before a fire:

Always familiarize yourself to "where you are" and be sure to know how to reach the two nearest exits.

Remember that in a fire situation, smoke is blinding and will bank down in the rooms and hallways. This condition may force you to crouch or crawl to escape to safety. By always being aware of your surroundings, your knowledge of the nearest exits and having a plan will greatly increase your ability to deal with sudden

If you are notified of, or discover a fire:

- Move quickly to the nearest accessible exit.
- Notify, and assist others to evacuate along the way.
- If the building fire alarm is not yet sounding, manually activate the alarm pull station located near the exit.
- Exit the building and proceed to the " Area of gathering"

Evacuation procedures for persons with mobility issues:

In the event of an actual emergency incident, persons with mobility issues or who are unable to safely self-evacuate should follow this procedure:

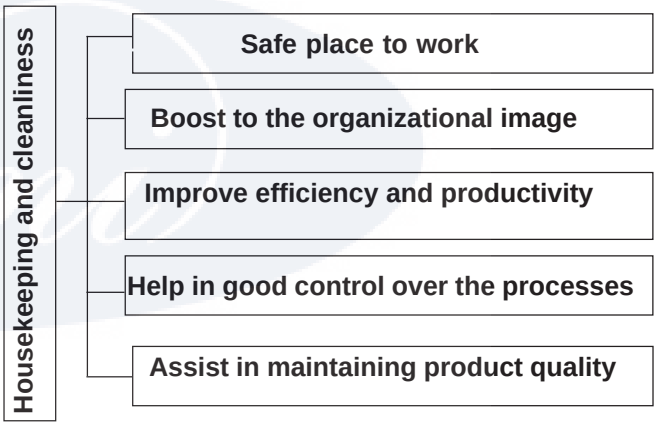
- Relocate to an entry to an evacuation stairwell, marked by a red exit sign.
- Wait near the enclosed exit stairwell if there is no smoke or other threats to your safety. Most fire alarm activations are brief, allowing occupants to return within a few minutes.

If smoke, fire, or other threat is imminent, move into the stairwell:

- After the stairwell crowd has passed below your floor level, enter the stairwell with assistant(s) and wait on the stair landing. Make sure that the door is securely closed.

Housekeeping and cleanliness at workplace

Housekeeping and cleanliness at the workplace are closely linked to the industrial safety. the degree, to which these activities are effectively managed, is an indicator of the safety culture of the organization. House keeping and cleanliness not only make the organization a safer place to work in but also provide a big boost to the image of the organization. These activities also (i) improve efficiency and productivity, (ii) helps in maintaining good control over the processes, and (iii) assist in maintaining the quality of the product. These important aspects of housekeeping and cleanliness are furnished below.



There are several signs which reflect poor housekeeping and cleanliness at the workplace in the organization. Some of these signs are (i) cluttered and poorly arranged work areas, (ii) untidy or dangerous storage of materials (such as materials stuffed in corners and overcrowded shelves etc.), (iii) dusty and dirty floors and work surfaces, (iv) items lying on the shop floor which are in excess or no longer needed, (v) blocked or cluttered aisels and exits, (vi) tools and equipment left in work areas instead of being returned to proper storage places, (vii) broken containers and damaged materials, (viii) overflowing waste bins and containers, and (ix) spills and leaks etc.

Housekeeping and cleanliness is crucial to a safe workplace. It can help prevent injuries and improve productivity and morale, as well as make a good imprint on the people visiting the workplace.

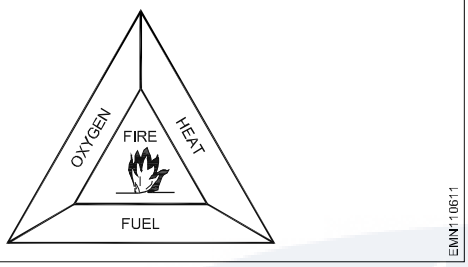
Fire extinguishers

Objectives: At the end of this lesson you shall be able to
- **state the effects of a fire break out**
- **state the conditions required for combustion relevant to fire prevention**
- **state the general precautionary measures to be taken for fire prevention**
- **determine the correct type of fire extinguisher required for a particular function**
- **state environment, health and safety.**

Fire

Fire is nothing but burning of a combustible material. For combustion the three main requirements are shown in Fig 1.

Fig 1



Fuel

Fuel can be any combustible substance in the form of a solid, liquid or gas. Examples; wood, paper, petrol, kerosene, LPG etc., The fuel will catch fire and burn provided a high enough temperature(heat) is brought about and a continuous supply of oxygen is given. It is important to note that without fuel, combustion cannot take place.

Heat

Fuels will begin to burn at a certain temperature. Different types of fuels need different temperatures to catch fire and burn. For example, wood needs a higher temperature to catch fire and burn than paper. Petrol needs much lesser temperature to catch fire and burn than paper. Generally liquid fuels give off vapour when heated. It is this vapour which ignites. Some liquids such as petrol do not have to be heated as they give off vapour at room temperature (15^{o}C - 25^{o}C) itself. It is important to note that without heat, fuel cannot get ignited(catch fire) and hence combustion cannot take place.

Oxygen

Oxygen exists in air. The amount of oxygen in air is sufficient to continue the combustion once it occurs. Hence to keep a fire burning, oxygen is a must. It is important to note that without oxygen, combustion cannot continue to take place.

Controlled and uncontrolled fire

Fire is a boon to mankind. Without fire, there would not be cooked food or hot water for bath as and when we want it. At the same time if the fire does not get constrained to a place of requirement, fire can become a bane(curse) to mankind. An uncontrolled fire can cause such a disaster which not only leads to destruction of material but also endanger the life of persons. Hence, the lesson one must never forget is, keep the fire under control. Every effort must be made to prevent uncontrolled fire. When there is a fire outbreak, it must be controlled and extinguished immediately without any delay.

Preventing fire

The majority of fires begin with small outbreaks. If this is not noticed, fire goes out of control and will be on its way of destruction. Hence, most fires could be prevented if suitable care is taken by following some simple common sense rules as given below.

– Do not accumulate combustible refuse such as cotton waste, waste or cloth soaked with oil, scrap wood, paper, etc. in odd corners. These refuse should be in their collection bins or points.

– Do not misuse or neglect electrical equipments or electrical wiring as this may cause electrical fire. Loose connections, low rated fuses, overloaded circuits causes over heating which may in turn lead to fire. Damaged insulation between conductors in cables cause electrical short circuit and cause fire.

– Keep away clothing and other materials which might catch fire from heating appliances. Make sure the soldering iron is disconnected from power supply and is kept safe in its stand at the end of the working day.

– Store highly flammable liquids and petroleum mixtures such as thinner, adhesive solutions, solvents, kerosene, spirit, LPG gas etc. in the storage area exclusively meant for storage of flammable materials.

– Turn off blowlamps and torches when they are not in use.

Controlling and Extinguishing fire

Isolating or removing any of three factors illustrated in Fig1, will control and extinguish fire. There are three basic ways of achieving this.

1 **Starving the fire of fuel**

To remove the fuel which is burning or cut further supply of fuel to the fire.

2 **Smothering**

To stop the supply of oxygen to the fire by blanketing the fire with foam, sand etc.

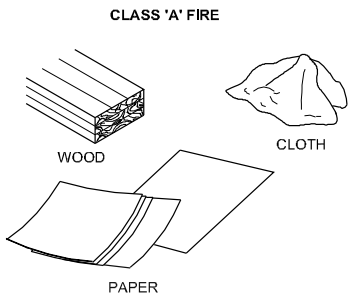
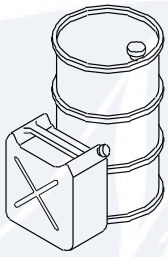
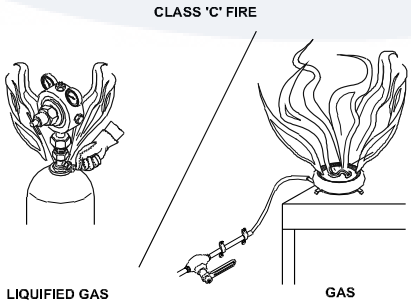
3 **Cooling**

To reduce the temperature of the fire by spraying water and thus cooling the fire.

By any one of the above three methods, fire can be first controlled and then extinguished.

For the purpose of determining the best method of extinguishing different types of fires, fires are classified under four main classes based on the type of fuel as given in Table 1.

TABLE 1

Classification of Fire	Fuel involved	Precautions and extinguishing
Class A Fire	Wood, paper cloth etc. Solid materials 	Most effective method is cooling with water. Jets of water should be sprayed on the base
Class B Fire	Flammable liquids & liquefiable solids 	Should be smothered. The aim is to cover the entire surface of the burning liquid. This has the effect of cutting off the supply of oxygen to the fire. Water should never be used on burning liquids. Foam, dry powder or CO_2 may be used on this type of fire.
Class C Fire	Gas and liquefied gas 	Extreme caution is necessary in dealing withliquefied gases. There is a risk of explosion and sudden outbreak of fire in the entire vicinity. If an appliance fed from a cylinder catches fire -shut off the supply of gas. The safest course is to raise an alarm and leave the fire to be dealt with by trained personnel. Dry powdered extinguishers are used on this type of fire.
Class D Fire	Involving metals 	The standard range of fire extinguishing agents is inadequate or dangerous when dealing with metal fires. **Fire in electrical equipment**: Carbon -di-oxide, dry powder, and vapourising liquid(CTC) extinguishers can be used to deal with fires in electrical equipment. Foam or liquid (eg. water) extinguishers must not be used on electrical equipment at all.

Fire extinguishers

Different fire extinguishing agents should be used for different types of fires as listed in Table 1. Using a wrong type of extinguishing agent can make things worse.

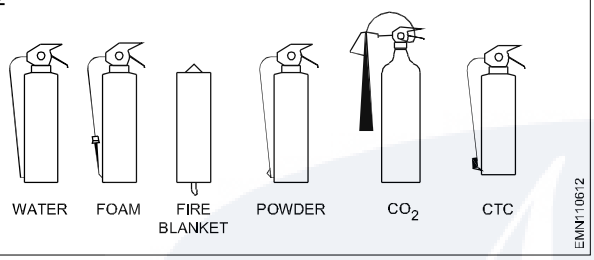
A fire extinguishing agent is the material or substance used to put out the fire. These extinguishing materials are usually (but not always) contained in a container called the 'fire extinguisher' with a mechanism for spraying into the fire when needed.

There is no classification for **electrical fires** as these are only fires in materials where electricity is present. To control electrical fire in a building the electrical supply should be cut off first.

Types of fire extinguishers

Many types of fire extinguishers are available with different extinguishing *agents* to deal with different classes of fires as shown in Fig 2. Always check the operating instructions on the extinguisher before use.

Fig 2



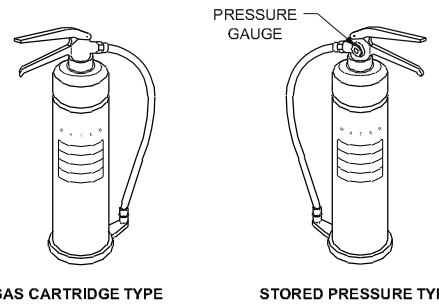
(i) Water-filled extinguishers

In water-filled extinguishers, as shown in Fig 3, there are two types based on the method of operating the extinguisher.

a Cartridge type

b Stored pressure type

Fig 3



In both the methods of operation, the discharge can be interrupted as required. This is to conserve the contact area and to prevent unnecessary damage to the material due to water.

(ii) Foam extinguishers

These may be stored pressure or gas cartridge types as shown in Fig 4.

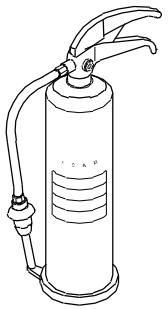
Most suitable for:

– flammable liquid fires

– running liquid fires.

Not to be used in fires where electrical equipment is involved.

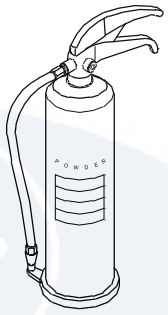
Fig 4



(iii) Dry powder extinguishers

Extinguishers fitted with dry powder may be of the gas cartridge or stored pressure type as shown in Fig 5. Appearance and the method of operation is the same as that of water-filled one. The main distinguishing feature is the fork-shaped nozzle. Powders have been specially developed to deal with Class D fires.

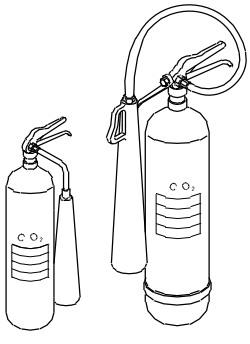
Fig 5



iv) Carbon-di-oxide (CO_2)

This type is easily distinguished by the distinctively shaped discharge horn as shown in Fig 6. These extinguishers are suitable for fires on flammable liquids and liquefiable solids. Best suited where contamination by deposits must be avoided. Not generally effective in the open air.

Fig 6



v) Halon Extinguishers (Fig 7)

Carbontetrachloride(CTC) and Bromochlorodifluoro methane (BCF). They may be either gas cartridge or non-conductive.

The fumes given off by these extinguishers are dangerous especially in confined space.