Part-2
Basic Concept of Workplace Activities

Excavation

Any man made cavity, cut, trench or depression on an earth surface formed by earth removal.

Types of Excavation:

1. **Manual Excavation:** Excavation performed without the use of powered equipment.
2. **Mechanical Excavation:** Excavation work involving electrical or mechanical equipment.

Excavation Hazards

- ❑ Cave-in or collapse of soil
- ❑ Risk due to the presence of underground installations, pipelines, cables
- ❑ Drowning due to water seepage into the trench
- ❑ Soil vibration due to machinery or heavy vehicle operations in the vicinity
- ❑ Lack of oxygen or asphyxiation, etc.
- ❑ Underground obstruction or damage to buried pipelines and services
- ❑ Accidental fall of personnel or equipment inside a trench
- ❑ Struck or hit by excavating machinery
- ❑ Dropped or falling objects
- ❑ Flammable and/or toxic gas release

Excavation Hazards

- Possible presence of explosive devices
- Encountering wet soil (mixed with water) or reaching water table.
- Encountering contaminated soil
- Damage to shallow underground services due to weight of heavy equipment such as mechanical excavator
- Exposed to airborne contaminants
- Fire and explosion
- Electrical shock due to contact with energized electrical or telecom cables
- Possible presence of explosive devices

Safety Precautions Required for A Safe Excavation

- ❑ No excavation work is allowed without Explosive Ordnance Disposal (EOD) clearance.
- ❑ Mechanical excavation is not permitted within 5 meters of any hydrocarbon-carrying pipeline.
- ❑ Mechanical excavation is not allowed within 3 meters of non-hydrocarbon carrying pipelines, cables, and services.
- ❑ For any excavation deeper than 1 meter, a ladder must be positioned to project a minimum of 1 meter above the edge of the excavation.
- ❑ Ladders shall be provided every 7.5 meters (25 feet) of lateral travel in the trench.
- ❑ Ladders must be securely supported at both the bottom and the top.

Safety Precautions Required for A Safe Excavation

- Excavated material shall be placed 1 meter from the edge of the excavation for depths up to 1.2 meters.
- The placement of excavated material shall be increased proportionally to the depth of the excavation.
- Heavy equipment and machinery shall be kept at least 3 meters away from the edge.
- Any walkway across the trench shall have a scaffold-type platform with handrails.
- All trenches shall have barriers, such as fixed guardrails, and reflective warning notices clearly displayed.
- Flashing lights are mandatory during poor visibility.
- Access to plant, equipment, and emergency services must not be obstructed by the trenches.
- No mechanical excavation is allowed at Gathering Centers, Booster Stations, water injection facilities, handling facilities, etc.

Confined Space

- An enclosure is defined as having limited means of entry and exit and not being designed for continuous occupancy.
- It may contain hazardous substances such as flammable and toxic gases, oxygen deficiency, a hot or humid atmosphere, or a combination of these.

Examples include process vessels, tanks, bins, stacks, large pipes, ducts, pits, and trenches, among others. Any excavation with a depth greater than 1.2 meters is also included.

Confined Space Hazards

- Oxygen deficiency or enrichment
- Presence of flammable, combustible, or pyrophoric materials (e.g., HC, sludge, etc.)
- Presence of toxic gases, corrosive, or hazardous materials (e.g.,H_2S, CO, NH3, etc.)
- Poor illumination, ventilation, and communication
- High temperature and humidity
- Limited entry and exit, restricted access
- Restricted movement inside
- Falling or tripping hazards
- Presence of reactive or self-igniting materials
- Hazards related to electricity or moving machinery
- Hazards related to pressurized fluids
- Hazards related to the nature of work conducted inside a confined space.

Safety Precautions Required for A Confined Space

1. Permit must be procured form operations, making sure of the following
   - ❑ Complete isolation of the space to be entered
   - ❑ Draining, depressurization and purging or cleaning should be performed
   - ❑ Gas test should be conducted to ensure no hazardous atmosphere is present
   - ❑ Space ventilation
2. A pre-task meeting must be conducted with all authorized entrants before entering a confined space.
3. The attendant (standby person) shall be assigned at the entrance to maintain communication with employees working inside, ensuring their safety. A logbook shall be maintained at the entrance to track the people inside the space.
4. Safety attendants must be trained and authorized to use gas testing equipment.

Safety Precautions Required For A Confined Space

5. Entrants must wear a body harness, and if necessary, a lifeline should be attached to the harness to facilitate entry and rescue.
6. Lighting should be provided. If necessary, a maximum of 24 volts lighting should be used with a Ground-Fault Circuit Interrupter (GFCI) attached.
7. Only intrinsically safe or explosion-proof equipment shall be used inside.
8. Depending on the situation, an emergency rescue team may be put on standby.
9. If an emergency occurs within the confined space, the standby person must not enter it until the rescue team arrives.
10. Barricade the area with warning signboards.

Scaffolding

Scaffolding is a temporary working platform used to provide support for both workers and materials in various tasks such as maintenance, construction, and demolition work.

Types of scaffoldings:

- Permanent scaffolding
- Hanging scaffolding/Suspended scaffolding
- Mobil scaffolding.

Potential Hazards of Scaffolding

- ❑ Collapse of Scaffolding
- ❑ Falling from Heights
- ❑ Falling Objects
- ❑ Slip and Trip Hazards
- ❑ Pinch Point Hazards and Sharp Edges
- ❑ Openings without Guardrails
- ❑ Scaffold Erection During Storms, High Winds, Rain, and Poor Visibility
- ❑ Blocking Emergency Access and Walkways

The Cause of Scaffolding Failure

- Slipping of unsecured ladder
- Use of unsuitable scaffold or faulty materials
- Inadequate or irregular platform width
- Omission of guard rails or toe boards
- Failure to proper secure the scaffold to the building or to brace it adequately
- Overloading on the scaffold platforms

Safety Precautions Required for A Scaffolding

- "Red Tag" signifies danger and means "Do not use," while the Green Tag indicates that the scaffold is complete and ready for use when finished.
- The gap between boards or planks should be 1 inch (25mm).
- Top guardrails, midrails, and toe boards should be provided.
- Guardrails and toe boards shall be fitted to the inside of standards.
- Guardrails should have a height between 38 inches and 45 inches.
- Toe boards should be 6 inches (15 cm) high and secured with toe board clips.
- If a scaffold is to be erected on soft ground, a sole plate should be used.
- Workers should not work on scaffolds during storms, high winds, or poor visibility.
- Sole plates shall extend under at least two standards.
- Base plates with screw jacks should be used for proper scaffold leveling adjustment.
- All standards shall be kept vertical.

Safety Precautions Required for A Scaffolding

- Scaffolds should be properly braced by cross bracing or diagonal braces or both for securing vertical members together
- Access ladder must be provided for any platform & clamped with scaffold structure
- Ladder should be 4:1 ratio and angle 75
- Ladder should be rise 1 meter (42 inch) above from the landing place/platform
- Scaffold should be not obstruct access to/from any fire fighting equipment / emergency equipment, operating area equipment, instrument and control panels, ladders, stairways etc.
- Scaffold platform opening should be secured with guardrail and sign board
- All scaffolding couplers should be tightened.
- Ledgers shall be securely fixed to standards using couplers.

Hazards Associated With Electricity

- Inadequate wiring
- Exposed electrical parts
- Wire with bad insulation
- Undergrounded electrical systems and tools
- Overloaded circuits
- Damaged power tools and equipment
- Using the wrong PPE and tools
- Overhead Power lines
- All hazards are exacerbated in wet conditions.

Precautions To Be Taken To Avoid Electrocution

- All electrical work must be covered by an appropriate work permit.
- Only an authorized person approved by the relevant Maintenance Team can carry out electrical work.
- Electrical safety floor mats made from a special grade of insulating rubber shall be provided in front of switchboards or high-voltage equipment to protect personnel against accidental electric shock.
- Warning tape should be placed on top of buried cables, and electrical cable tiles must be provided as an early warning notice for excavations.
- All portable electrical equipment must be approved by the Maintenance Team and should be used only in areas suitable for their intended purpose.
- Do not reach blindly into areas that may contain energized parts.
- Do not enter a space where adequate lighting and working space are not available.
- Only industrial-type plugs and sockets shall be used in all locations, except for offices and houses.

Precautions To Be Taken To Avoid Electrocution

- ❑ All testing and measuring equipment used for electrical work should be tested, calibrated, and documented.
- ❑ Ensure that all equipment is grounded and should be attached to a GFCI / ELCB.
- ❑ Inspect electrical equipment before use.
- ❑ Electrical panels, junction boxes, pull boxes, and fittings must have approved covers.
- ❑ Unused openings in cabinets, boxes, and fittings must be closed.
- ❑ Avoid overloading circuits.
- ❑ Maintain a safe distance from overhead power lines during crane activities, scaffolding erection, and other tasks.
- ❑ All power tools and portable tools' cables should be double insulated.

Precautions To Be Taken To Avoid Electrocution

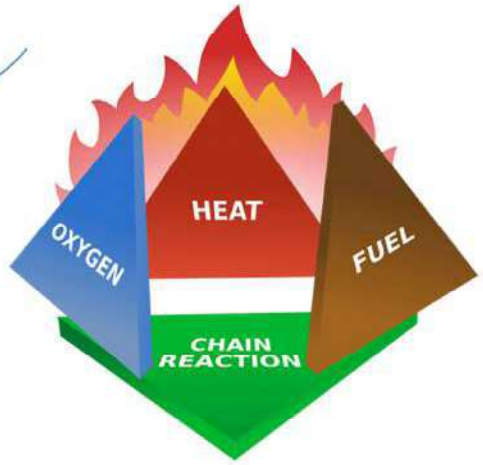
- Do not use damaged extension cords, and avoid contact with live wires and wires at different voltages.
- Do not touch damaged equipment until it has been isolated.
- Disconnect the power when equipment is not in use or when changing accessories.
- Use the appropriate personal protective equipment (PPE) for the job.
- Testing and energizing of equipment should be carried out by competent, qualified, and approved personnel.
- Implement an electrical lock-out and tag-out system when working on electrical equipment.
- In the event of a fire on an electrical panel or equipment, the electrical power supply must be isolated, and a suitable fire extinguisher shall be used to extinguish the fire.

Fire

What is Fire.....?

Fire is a chemical chain reaction.

It occurs when fuel, oxygen and an ignition source are brought together.



What Is Fire Safety?

Fire safety is the set of practices intended to reduce the damage caused by fire.

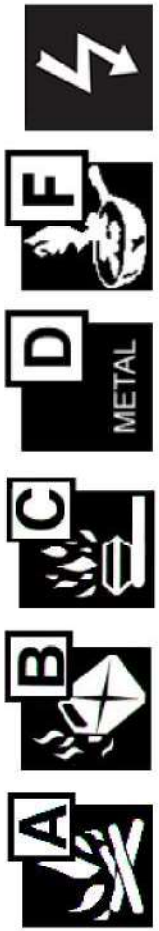
Fire safety is often a component of building safety.

Common Principles:
Prevention, Detection and Communication, Protection, Containment and Extinguishment.

Classification of Fires As Per British Standard

Fires are classified in six groups A, B, C, D, F and electrical:

1) **Class A fire** – are fires involving organic solids like paper, wood, etc.
2) **Class B fire** – are fires involving flammable liquids
3) **Class C fire**– are fires involving flammable gasses
4) **Class D fire** – are fires involving burning metals
5) **Class F fire**– are fires involving fats such as used in deep fat fryers
6) **Electrical fire (the letter E is not used. Instead the symbol of an electric spark is displayed)** – are fires caused by electrical equipment



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Fire Extinguisher Type

Fire Type		Powder	Foam	CO^2	Water	Wet Chemical
CLASS A	**Solids** (e.g. wood, plastic, paper)	✓	✓	✗	✓	✗
CLASS B	**Flammable Liquids** (e.g. solvents, paint, fuels)	✓	✓	✓	✗	✗
CLASS C	**Gases** (e.g. butane, propane, LPG)	✓	✗	✗	✗	✗
CLASS D	**Metals** (e.g. lithium, magnesium)	✓	✗	✗	✗	✗
ELECTRICAL	**Equipment** (e.g. computers, servers, TVs)	✓	✗	✓	✗	✗
CLASS F	**Cooking Oils** (e.g. cooking fat, olive oil)	✗	✗	✗	✗	✓

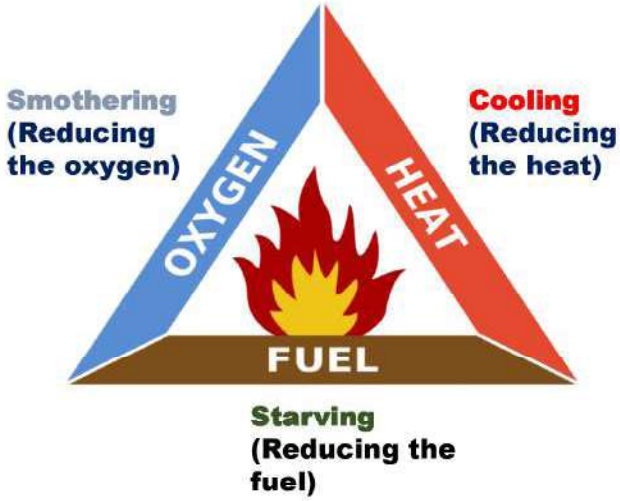
Strategies for Controlling and Extinguishing Fires

Smothering (Reducing the oxygen): Smothering by cutting off oxygen supply (e.g., by applying foam, carbon dioxide).

Cooling (Reducing the heat): Cooling the fuel by removing heat (e.g., by applying water).

Starving (Reducing the fuel): Starving the fire by removing the fuel.(e.g., stopping gas flow during a pipeline fire).

Inhibition: Inhibition by stopping the chain reaction. (e.g., by applying dry chemical powder).



Removal of any of these elements will extinguish the fire.

Welding And Cutting Hazards (Hot Work)

- Risk due to toxic gas & fumes generated while welding or cutting
- Fire or explosion started by flame, sparks and hot material from the activities
- Electrical shock from arc welding equipment
- Burn hazard due to heat generated while welding or cutting
- Weld bead particulars or slag entering unprotected eyes during chipping
- Inhalation of welding fumes
- Falling Gas cylinders
- Radiation from UV and Infra-Red (flash eye)

Safety Precaution for A Hot Work

- Hot work should commence only with a valid hot work permit.
- If the work is inside a Gathering Center (GC) or refinery, it is essential to cover the welding point with a proper fire blanket.
- Frequent gas tests must be conducted.
- Wet the area with water, and keep a pressurized firewater hose near the hot work area.
- Remove combustible materials from the welding point.
- Ensure a certified and valid fire extinguisher is kept near the hot work area.
- A trained and certified fire watcher should be present.
- All equipment to be used for hot work must be inspected before commencing the job.

Safety Precaution for A Hot Work

- All welding machines must be connected to a GFCI (Ground Fault Circuit Interrupter) or ELCB (Earth Leakage Circuit Breaker) and should have an approved spark arrester.
- Ensure that all welding machines are properly grounded with a static-earthing device.
- All cables must have proper insulation, and electrode holders, plugs, and sockets must be in good condition.
- When welding or grinding, the equipment or pipe spool should be securely supported on a firm base.
- Cover all valves, flanges, drains, canals, etc., where gas leaks or the presence of a flammable atmosphere is possible.

Safety Precaution for Work At Height

- The work is properly planned, organized, and appropriately supervised, ensuring the safety of workers and the integrity of the worksite.
- The worksite, including its access and exit points, is secure with necessary fall protection measures.
- Workers assigned to work at heights are trained and aware of potential hazards.
- Personal Protective Equipment (PPE) and suitable fall arrest systems, such as Safety Harnesses and Safety Nets, shall be used to protect individuals from falls.
- Personnel working at heights must utilize an appropriate and approved Full Body Safety Harness securely attached to a stable anchorage.

Safety Precaution for Work At Height

- All the straps of safety harness shall be securely tightened to the body parts.
- The tools and equipment to be used at height must be kept properly secured to prevent its accidental fall or tripping hazard.
- The area in the vicinity of work at height should be barricaded and danger notice posted to alert the personnel.

Man Basket: Workers should keep all body parts inside the man basket while it is being lifted or positioned. Workers must wear a personal fall arrest system, and Helmet with chin strap must be worn at all times.

Sloping Roofs: Employee worked in roofing activities on slope roofs with unprotected sides and edges of 6 feet (1.8 meters) or more, it is essential to utilize appropriate Safety Harness, Safety Net and Guardrail or a combination of these.

Lifting Hazards

- Accidents hit or crush by hanging load.
- Falling objects
- Collapse of lifting equipment due to overload.
- Overturning of the crane.
- Failure of lifting gears such as wire ropes, hooks, shackle, eyebolts, chain etc.

Safety Precaution for A Lifting Operation

- Ensure the load is free of any obstructions.
- Securely sling the load and use tie ropes.
- Reconfirm the load's security once it is raised a few inches.
- Do not use the crane to drag the load or pull the slings beneath a few inches.
- Prohibit any movement under the suspended load.
- Establish a barricade around the crane's swing radius.
- Avoid slinging different sizes of tubular materials together.
- Ensure the crane hook is centrally positioned over the load.
- All equipment must be inspected by a third party, and the validity of the inspection must be verified.

Safety Precaution for A Lifting Operation

- The daily inspection sheet for cranes must always be available with the crane operator.
- The Safe Working Load (SWL) of the crane and hook should be marked and highlighted.
- Ensure there is an approved fire extinguisher with the appropriate type and capacity.
- Secure the crane hook to prevent swinging action during transit.
- Display a calibrated SWL indicator and crane capacity chart prominently in the cabin.
- Remove all loose materials from the top of the load.
- Protect slings from sharp edges by using suitable padding.
- Hooks used on lifting equipment should be equipped with safety devices to prevent load or sling displacement.
- Do not use wire rope slings if they are kinked, crushed, frayed, or corroded.
- Never shorten slings by tying knots or wrapping them around a crane hook.

Manual Handling

Manual handling is a common activity in most workplaces

- It includes lifting, lowering, pulling, pushing, carrying, moving, holding or restraining an object
- Injuries and musculoskeletal disorders affect the back, neck, shoulder, arms & hands
- It can be prevented through a systemic approach of identification, assessment and control of risks associated with manual handling.

Hazards Associated With Manual Handling

Heavy

Sharp

Odd shapes

Obstruction of walking view

Toxic substances

Common Injuries From Manual Handling

- Neck Strain
- Wrist Sprains
- Back Sprains
- Shoulder pain
- Upper back pain
- Slips, trips and fall
- Cuts
- Skin Dermatitis
- Occupational respiratory & lung diseases
- Occupational Eye Diseases

Proper Manual Handling –Individual

Step 1: Hold the load firmly

Step 2: Keep the load close to you

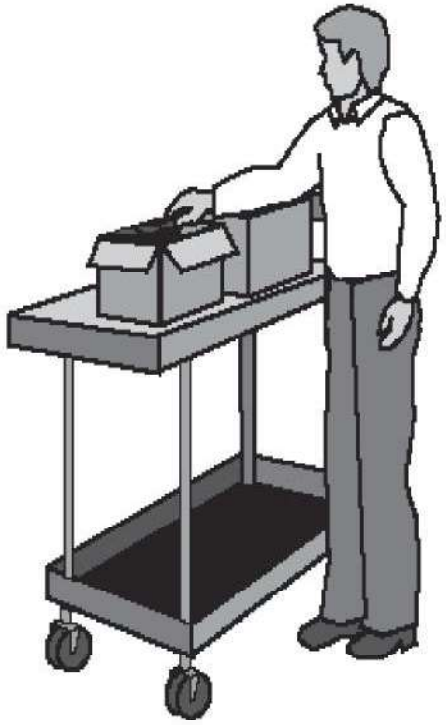
Step 3: Lift the load by pushing up your leg

Step 4: Ensure your legs are stable before moving off

ALWAYS KEEP YOUR BACK STRAIGHT WHILE LIFTING

Job Designs to Prevent Manual Handling Injuries

- Team handling for heavy or odd shape loads
- Breaks to reduce muscular fatigue
- Handlers job rotation between heavy and light activities
- Rearrange workplace to reduce twisting, stretching & stooping
- Keep heavy loads around waist level
- Use of mechanical handling aid
- Package heavy materials into smaller container
- Provide handles, hand grips or indents for loads
- Loads to be free from dust, oil, corrosive deposits, sharp corners, jagged edges or rough surfaces
- Provide secondary containment for chemicals



Lock Out Tag Out (LOTO)

- Lock out & Tag out is a process to block the flow of energy from the source and it will locked with lock system or padlock for not restore the energy and these should be tag on it, the tag will be as warning "do not operate"
- Locks and tags will be normally be removed only by the person who installed them whenever possible.
- Before lockout and tag out make sure that a valid isolation permit being obtained.

Slip, Trip and Fall

Slips, trips, and falls are some of the most common accidents that occur in both residential and commercial environments. These types of accidents can result in serious injuries, ranging from minor bruises to fractures, head injuries, and even death.

Slip, Trip and Fall

Slips occur when there is a lack of friction between a person's footwear and the surface they are walking on. This can be caused by wet or oily surfaces, loose or uneven flooring, or poor footwear.

Trips occur when a person's foot strikes an object or obstacle, causing them to lose balance and potentially fall. This can be caused by obstacles in walkways, uneven surfaces, poor lighting, or cluttered workspaces.

Finally, falls occur when a person loses their balance and cannot regain it, resulting in a fall to the ground. This can be caused by any number of factors, including slippery surfaces, tripping hazards, and poor lighting.

Cause of Slip, Trip and Fall

Slips, trips, and falls can result from a variety of factors. One of the most common causes is inadequate maintenance of flooring and other surfaces. This may involve issues such as broken or uneven tiles, loose floorboards, or poorly maintained carpets. Additionally, wet or oily surfaces can contribute to slips, as can cluttered or inadequately lit workspaces. Furthermore, wearing improper footwear can make it more challenging to maintain balance and increase the risk of slipping or tripping.

Prevention of Slip, Trip and Fall

Preventing slips, trips, and falls requires a combination of proactive measures and ongoing vigilance. Some fundamental steps that can be taken include:

Ensuring that all flooring and other surfaces are kept clean and well-maintained.
Installing slip-resistant flooring in areas where water or other fluids are frequently present.
Providing proper lighting in all work areas to improve visibility.
Keeping walkways clear of obstacles and ensuring that any changes in flooring height are clearly marked.
In addition to these fundamental measures, it is essential to provide ongoing training and education to all employees and other individuals who use the space. This continuous effort is crucial to maintaining a safe working environment and preventing accidents related to slips, trips, and falls.

Hygiene Education

Hygiene education is an important part of promoting good health and preventing the spread of diseases. It encompasses a range of topics related to personal and environmental hygiene, including hand hygiene, food safety, water sanitation, and waste management.

The Importance of Hygiene Education

Poor hygiene practices can lead to serious health consequences, especially in regions with limited resources and frequent disease outbreaks. For instance, according to the World Health Organization, more than 800 children under the age of five die every day from preventable water and sanitation-related diseases. Hygiene education plays a crucial role in preventing the spread of these diseases by equipping individuals and communities with the knowledge and tools necessary to maintain a clean and healthy environment.

Beyond disease prevention, hygiene education can also enhance overall health and well-being. For example, practicing good hand hygiene can help prevent the spread of common colds and other infectious diseases, while proper food handling practices can reduce the risk of foodborne illnesses. Moreover, promoting sound hygiene practices can empower individuals, boost their confidence, and enable them to protect themselves and their families from diseases.

How Can Hygiene Education Be Promoted?

- **Partnering with local organizations:** Partnering with local organizations, such as schools, healthcare facilities, and community centers, can help to increase the reach and impact of hygiene education programs.
- **Using interactive and engaging materials:** Using interactive and engaging materials, such as games, quizzes, and videos, can help to make hygiene education more fun and memorable.
- **Providing hands-on demonstrations:** Providing hands-on demonstrations of proper hygiene practices can help to reinforce the importance of these practices and ensure that individuals are able to apply what they have learned in real-world situations.
- **Tailoring education to different audiences:** Tailoring hygiene education to different audiences, such as children or adults, can help to ensure that the material is relevant and effective.

Housekeeping

- Everything has its place, and everything should be in its place. Housekeeping should be maintained not only before starting a job but also during the job and after its completion.
- Waste materials and rubbish pose a fire and accident hazard.

Thank You.