

Week 1 FIRST AID AND SAFETY EDUCATION

Learning Objectives

At the end of the lesson, students should be able to:

1. Define first aid.
2. State the objectives of first aid.
3. List the contents of a good first aid box.
4. Explain the ABC of first aid.
5. Identify the qualities of a good first aider.
6. Demonstrate simple first aid treatment for common workshop accidents.
7. Explain the importance of first aid in the Basic Technology workshop.

1. Meaning of First Aid

First aid is the immediate and temporary care given to an injured or suddenly ill person before professional medical treatment is available.

It is not a substitute for medical treatment but helps to preserve life and prevent the condition from becoming worse. It uses the **available** human and material **resources** at the site of accident to provide **initial** care to the **victim** of **injury** or sudden illness until more advance care is provided.

First aid is either administered personally or by another who could be a non-specialist or medical personal. In most cases. It is usually given by non-specialist who happens to be a witness to the accident.

2. Objectives of First Aid

The objectives of first aid are to:

1. Preserve life.
2. Prevent the injury or illness from becoming worse.
3. Relieve pain and suffering.
4. Promote quick recovery.
5. Prevent infection.
6. Keep the casualty comfortable.
7. Arrange for medical assistance when necessary.

3. Contents of a Good First Aid Box

A standard first aid box should contain:

- Adhesive bandages (plasters)
- Sterile gauze
- Cotton wool
- Roller bandages
- Triangular bandage
- Adhesive tape

- Antiseptic solution
- Methylated spirit (where appropriate for cleaning equipment, not open wounds)
- Scissors
- Tweezers (forceps)
- Safety pins
- Disposable hand gloves
- Face mask
- Thermometer
- Burn cream or burn dressing
- Eye pad
- Pain reliever (as recommended)
- Soap
- Hand sanitizer
- First aid manual

4. First Aid Box

First aid box is a container where materials used to give simple medical treatment to a victim of accident or sudden illness are kept.

5. ABC of First Aid

The ABC of basic life support refers to steps or actions taken in the right order of importance during administration of first aid.

The ABC of first aid means:

A – Airway: Check that the casualty's airway is open, remove any obstruction from the mouth if it is safe to do so.

B – Breathing: Check whether the casualty is breathing, if breathing has stopped, begin rescue breathing or CPR if trained.

C – Circulation: Check for signs of blood circulation, Control severe bleeding by applying direct pressure, begin chest compressions if necessary and trained.

5. Qualities of a Good First Aider

A good first aider should be:

1. Calm during emergencies.
2. Observant.
3. Caring and compassionate.
4. Confident.
5. Patient.
6. Responsible.
7. Clean and hygienic.
8. Knowledgeable in first aid.
9. Quick in making decisions.
10. Good at communicating with the casualty and others.

6. Application of Simple First Aid Treatment in the Basic Technology Workshop

A. Minor Cuts

Treatment: Wash hands, Clean the wound with clean water, Apply antiseptic and Cover with a sterile dressing or plaster.

B. Burns

Treatment: Cool the burn with clean running water for at least 20 minutes, cover with a sterile non-stick dressing and do not burst blisters or apply grease, butter, or toothpaste.

C. Bleeding

Treatment: Apply direct pressure using a clean cloth or bandage, Raise the injured part, if possible, Bandage the wound and seek medical help if bleeding is severe.

D. Nose Bleeding

Treatment: Sit the casualty upright, Lean the head slightly forward, Pinch the soft part of the nose for 10–15 minutes and seek medical attention if bleeding continues.

E. Fainting

Treatment: Lay the casualty flat, Raise the legs slightly, loosen tight clothing, ensure fresh air and seek medical attention if recovery is delayed.

F. Electric Shock

Treatment: Switch off the power supply first, do not touch the victim until the electricity is disconnected, Check the ABC (Airway, Breathing, Circulation) and call for medical assistance immediately.

G. Splinter Injury

Treatment: Wash the affected area, Remove the splinter carefully with sterilized tweezers, Apply antiseptic and Cover if necessary.

7. Importance of First Aid in the Workshop

First aid helps to:

- Save lives.
- Reduce pain.
- Prevent infection.
- Prevent permanent disability.
- Reduce the severity of injuries.
- Give confidence to workers and students.
- Promote safety awareness.
- Reduce recovery time.

Safety Rules During First Aid

- Wear disposable gloves before treating wounds.
- Do not panic.
- Keep the casualty calm.
- Use clean and sterilized materials.
- Never give medicine unless authorized.

- Call for medical help when necessary.
- Report every workshop accident immediately.

Assignment

1. Draw and label a **First Aid Box** showing at least **10 items** inside it.
2. Explain the meaning of the **ABC of First Aid**.
3. List **eight workshop accidents** that may require first aid treatment.
4. Describe how to treat:
 1. (a) A minor cut
 2. (b) A burn
 3. (c) Electric shock

WEEK 2 - Topic: Rescue Operation

Learning Objectives

At the end of the lesson, students should be able to:

1. Define rescue operation.
2. State the objectives of rescue operation.
3. Identify the different types (aspects) of rescue operation.
4. List the materials and tools used for rescue operation.
5. Explain the uses of rescue materials and tools.
6. Describe basic safety rules during rescue operations.

1. Meaning of Rescue Operation

Rescue operation is the process of safely removing a person from danger, injury, or an emergency situation and giving immediate assistance before professional help arrives.

Examples of emergencies that may require rescue include fire outbreaks, road accidents, electric shock, floods, building collapse, drowning, and workshop accidents.

2. Objectives of Rescue Operation

The objectives of rescue operation are to:

1. Save lives.
2. Remove victims from danger.
3. Prevent further injuries or damage.
4. Give immediate assistance to injured persons.
5. Protect rescuers and other people at the scene.
6. Reduce pain and suffering.
7. Ensure victims receive proper medical attention.
8. Restore safety at the accident scene.

3. Types (Aspects) of Rescue Operation

The major types or aspects of rescue operation include:

A. Fire Rescue: Rescuing people from fire outbreaks, Using fire extinguishers and fire blankets where appropriate.

B. Road Accident Rescue: Assisting victims of vehicle accidents, controlling traffic and calling emergency services.

C. Water Rescue: Saving people from drowning in rivers, lakes, or swimming pools, Using life jackets, ropes, and lifebuoys.

D. Electrical Rescue: Rescuing people suffering from electric shock, switching off the electricity supply before touching the victim.

E. Building Collapse Rescue: Removing trapped victims from collapsed buildings, Using proper rescue equipment.

F. Workshop Rescue: Helping victims injured by machines, tools, chemicals, or falling objects, Applying first aid before medical treatment.

G. Flood Rescue: Evacuating people from flooded areas using boats or flotation devices.

H. Air-sea rescue: e.g., tornado, tsunami, hurricane, etc.

I. Winter rescue: e.g., blizzard (snow storm), avalanche (snow slide), etc.

J. Land rescue operation: e.g., land/mud slide, earth quake

K. Combat search and rescue operation: e.g., terrorist attack

4. Materials and Tools for Rescue Operation

Material/Tool	Use
First aid box	Treat minor injuries immediately
Stretcher	Carry injured persons safely
Fire extinguisher	Put out small fires
Fire blanket	Smother flames on clothing or equipment
Rope	Pull or secure victims during rescue
Safety helmet	Protect the rescuer's head
Hand gloves	Protect hands from injury and infection
Safety boots	Protect the feet
Reflective jacket	Make rescuers visible, especially at night
Torchlight	Provide light during rescue operations
Whistle	Signal for help or attract attention
Ladder	Reach victims at higher places
Lifebuoy	Rescue people from water
Life jacket	Keep victims afloat in water
Face mask	Protect against smoke, dust, or disease transmission
Crowbar	Remove obstacles during rescue
Blanket	Keep injured persons warm and prevent shock

5. Safety Rules During Rescue Operation

1. Do not panic.
2. Ensure the area is safe before attempting a rescue.
3. Call for professional help immediately.
4. Wear appropriate protective equipment (PPE).
5. Do not move seriously injured victims unless they are in immediate danger.
6. Follow first aid procedures correctly.
7. Keep bystanders away from the accident scene.
8. Remain calm and reassure the victim.

Importance of Rescue Operation: Rescue operations help to:

1. Save lives.
2. Reduce injuries.

3. Prevent further accidents.
4. Provide quick emergency assistance.
5. Protect lives and property.
6. Promote safety awareness.
7. Reduce the impact of emergencies.

Assignment

1. Draw and label **any five rescue tools** used during emergency operations.
2. Explain how to carry out a rescue operation for a person who has received an electric shock in a Basic Technology workshop.

WEEK 3 - Topic: Rescue Operation – Steps, Factors, Stages, and Process

Learning Objectives

At the end of the lesson, students should be able to:

1. State the objectives of rescue operation.
2. Explain the steps involved in rescue operation.
3. Identify the factors to consider before carrying out a rescue operation.
4. Describe the stages and process of rescue operation.
5. Demonstrate safe rescue procedures during emergencies.

1. Objectives of Rescue Operation

The objectives of rescue operation are to:

1. Save lives.
2. Remove victims from danger.
3. Prevent further injury or damage.
4. Protect the rescuer and other people at the scene.
5. Provide immediate care to injured persons.
6. Ensure victims receive prompt medical attention.
7. Restore safety to the affected area.

2. Steps Involved in Rescue Operation

The following steps should be followed during a rescue operation:

Step 1: Assess the Situation: Observe the accident scene carefully, Identify the cause of the emergency and possible dangers.

Step 2: Protect Yourself: Ensure your own safety before helping others, Wear personal protective equipment (PPE) if available.

Step 3: Raise the Alarm: Call for help immediately, contact emergency services or inform responsible adults.

Step 4: Remove the Danger: Switch off electricity if there is an electric shock, extinguish small fires if it is safe to do so and Keep bystanders away from the scene.

Step 5: Rescue the Casualty: Move the victim only if it is safe and necessary and use proper lifting or carrying techniques.

Step 6: Give First Aid: Check the casualty's **ABC (Airway, Breathing, and Circulation)**, Treat injuries such as bleeding, burns, or fractures.

Step 7: Arrange Medical Assistance: Transport the casualty safely to a hospital or health centre if necessary, Continue monitoring the victim until professional help arrives.

3. Factors to Consider Before Carrying Out a Rescue Operation

Before beginning a rescue operation, consider the following:

1. **Safety of the rescuer** – Never put yourself in danger.
2. **Nature of the emergency** – Fire, electric shock, flood, road accident, etc.
3. **Condition of the casualty** – Whether the person is conscious, breathing, or bleeding.
4. **Available rescue equipment** – Ensure the correct tools are available.
5. **Number of casualties** – Determine how many people need assistance.

6. **Environmental hazards** – Smoke, fire, chemicals, unstable structures, or electricity.
7. **Availability of trained personnel** – Seek assistance when needed.
8. **Access to emergency services** – Contact medical or rescue professionals quickly.

3. Stages of Rescue Operation: The stages of a rescue operation include:

Stage 1: Preparation: Gather information, wear protective equipment and Prepare rescue tools.

Stage 2: Response: Reach the accident scene quickly, Assess the situation, Ensure safety.

Stage 3: Rescue: Remove the casualty from danger, Apply safe rescue techniques.

Stage 4: First Aid: Give appropriate first aid treatment and reassure the casualty.

Stage 5: Evacuation: Transport the casualty safely to a medical facility if necessary.

Stage 6: Recovery and Reporting: Ensure the area is safe, Report the incident and Replace used rescue materials and first aid supplies.

5. Process of Rescue Operation

The rescue operation process follows these steps:

1. Identify the emergency.
2. Assess the risks.
3. Protect yourself and others.
4. Call for emergency assistance.
5. Remove the victim from danger if safe.
6. Administer first aid.
7. Transport or hand over the victim to medical personnel.
8. Report the incident and review the rescue operation.

Importance of Following Rescue Procedures

Following proper rescue procedures:

- Saves lives.
- Prevents further injuries.
- Ensures the rescuer remains safe.
- Promotes quick recovery of victims.
- Reduces panic during emergencies.
- Protects lives and property

Meaning of a Rescue Team

A **rescue team** is a group of trained people who work together to save lives, provide emergency assistance, and remove people from dangerous situations such as fires, road accidents, floods, building collapses, and other emergencies.

Members of a Rescue Team: A rescue team may include:

1. **Firefighters** – Extinguish fires and rescue people from burning buildings.
2. **Paramedics (Emergency Medical Personnel)** – Provide first aid and emergency medical care.
3. **Police Officers** – Maintain law and order, control traffic, and secure the accident scene.

4. **Ambulance Personnel** – Transport injured persons to hospitals.
5. **Civil Defence Officers** – Assist during disasters and emergencies.
6. **Red Cross Volunteers** – Provide first aid and humanitarian assistance.
7. **Lifeguards** – Rescue people from drowning in rivers, lakes, or swimming pools.
8. **Community Volunteers** – Help with rescue efforts under proper supervision.

Equipment Used by a Rescue Team: Some common rescue equipment includes:

- First aid box
- Stretcher
- Fire extinguisher
- Fire blanket
- Safety helmet
- Hand gloves
- Safety boots
- Rope
- Ladder
- Torchlight
- Lifebuoy
- Life jacket
- Face mask
- Whistle

Assignment

1. Draw a simple **flow chart** showing the stages of a rescue operation.
2. Explain the actions you would take if a classmate received an electric shock in the Basic Technology workshop.
3. List **eight factors** that should be considered before carrying out a rescue operation.

WEEK 4 - Topic: Energy Conversion

Learning Objectives

At the end of the lesson, students should be able to:

1. Define energy conversion.
2. Explain the principle of energy conversion.
3. State the need for energy conversion.
4. Identify different forms of energy.
5. Give examples of energy conversion in everyday life.
6. Explain the importance of energy conversion in technology.

1. Meaning of Energy Conversion

Energy conversion is the process of changing energy from one form to another so that it can be used to perform useful work.

Energy cannot be created or destroyed, but it can be transformed from one form to another.

2. Principle of Energy Conversion

The principle of energy conversion is based on the **Law of Conservation of Energy**, which states that:

Energy cannot be created or destroyed; it can only be converted from one form to another.

For example:

- An electric fan converts **electrical energy** into **mechanical (kinetic) energy** to rotate its blades.
- A light bulb converts **electrical energy** into **light energy** and **heat energy**.

4. Need for Energy Conversion: Energy conversion is necessary because:

1. Different machines require different forms of energy.
2. It makes energy useful for human activities.
3. It enables machines and equipment to operate efficiently.
4. It provides light, heat, and motion.
5. It improves industrial production.
6. It supports transportation systems.
7. It makes communication and modern technology possible.
8. It improves the standard of living.

4. Forms of Energy: Common forms of energy include:

- Mechanical energy
- Electrical energy
- Heat (thermal) energy
- Light energy
- Chemical energy
- Sound energy
- Solar energy
- Wind energy
- Nuclear energy
- Potential energy
- Kinetic energy

5. Examples of Energy Conversion

Device/Activity	Energy Conversion
Electric bulb	Electrical → Light + Heat
Electric fan	Electrical → Mechanical
Electric iron	Electrical → Heat
Television	Electrical → Light + Sound
Radio	Electrical → Sound
Generator	Mechanical → Electrical
Car engine	Chemical (fuel) → Mechanical + Heat
Torchlight	Chemical (battery) → Electrical → Light
Solar panel	Solar → Electrical
Wind turbine	Wind → Mechanical → Electrical
Gas cooker	Chemical → Heat
Human body	Chemical (food) → Mechanical + Heat

6. Importance of Energy Conversion

Energy conversion:

- Makes machines perform useful work.
- Improves industrial production.
- Makes transportation easier.
- Provides electricity for homes and industries.
- Supports communication systems.
- Makes daily life more comfortable.
- Promotes technological development.

Applications of Energy Conversion in Everyday Life

- Cooking food with gas or electricity.
- Lighting homes and schools.
- Operating electric fans and air conditioners.
- Charging mobile phones and laptops.
- Running vehicles and motorcycles.
- Powering factory machines.
- Pumping water with electric pumps.

Assignment

1. Draw a table showing **10 household appliances** and the **energy conversion** that occurs in each.
2. Explain why energy conversion is important in the operation of machines used in the Basic Technology workshop.
3. State the **principle of energy conversion**.
4. Mention **five reasons** why energy conversion is necessary.

WEEK 5 - Topic: Electrical-to-Heat Appliances

Learning Objectives

At the end of the lesson, students should be able to:

1. Define electrical-to-heat appliances.
2. Explain how electrical-to-heat appliances work.
3. Identify different types of electrical-to-heat appliances.
4. Describe the main parts of electrical-to-heat appliances.
5. State the principles of operation of electrical-to-heat appliances.
6. Explain the uses and safety precautions associated with electrical-to-heat appliances.

1. Definition of Electrical-to-Heat Appliances

Electrical-to-heat appliances are electrical devices that convert **electrical energy into heat energy** for cooking, heating, ironing, drying, or boiling.

They work by allowing electric current to pass through a **heating element**, which becomes hot due to its electrical resistance and produces heat.

2. Types of Electrical-to-Heat Appliances

Common examples include:

1. Electric iron
2. Electric kettle
3. Electric cooker
4. Electric oven
5. Toaster
6. Electric water heater (immersion heater)
7. Electric pressing iron
8. Electric hot plate
9. Rice cooker
10. Electric heater

3. Main Parts of Electrical-to-Heat Appliances

Although the parts vary slightly depending on the appliance, the common parts are:

Part	Function
Heating element	Converts electrical energy into heat energy.
Power cord (flexible cable)	Connects the appliance to the power supply.
Plug	Connects the appliance to a wall socket.
Switch	Turns the appliance ON or OFF.
Thermostat	Controls and regulates temperature automatically.
Indicator light	Shows when the appliance is switched on or heating.
Insulating handle	Protects the user from heat and electric shock.
Outer casing	Covers and protects the internal components.
Fuse	Protects the appliance from excessive current.

4. Principle of Operation: Electrical-to-heat appliances operate on the principle of **electrical resistance heating (Joule heating)**.

Working Principle:

1. The appliance is connected to a power source.
2. Electric current flows through the heating element.
3. The resistance of the heating element causes it to become hot.
4. Heat produced is transferred to the object being heated (water, food, clothes, etc)

5. Uses of Electrical-to-Heat Appliances

- Ironing clothes.
- Boiling water.
- Cooking food.
- Baking cakes and bread.
- Toasting bread.
- Heating rooms.
- Drying materials.

6. Advantages of Electrical-to-Heat Appliances

1. Easy to operate.
2. Clean to use (no smoke).
3. Heat quickly.
4. Efficient and reliable.
5. Easy to control with thermostats.
6. Safe when used properly.

7. Safety Precautions

1. Do not touch the heating element when it is hot.
2. Switch off the appliance after use.
3. Keep electrical appliances away from water.
4. Do not use damaged plugs or cords.
5. Always unplug before cleaning.
6. Keep appliances away from children.
7. Do not overload electrical sockets.
8. Handle appliances with dry hands.

Assignment

1. Draw and label an **electric iron** or **electric kettle**, showing its main parts.
2. Make a table showing **eight electrical-to-heat appliances** and their uses.
3. Explain why the **heating element** is considered the most important part of an electrical-to-heat appliance.

Topic: Chemical-to-Heat Appliances

Learning Objectives

At the end of the lesson, students should be able to:

1. Define chemical-to-heat appliances.
2. Explain the principle of operation of chemical-to-heat appliances.
3. Identify different types of chemical-to-heat appliances.
4. Describe the main parts of chemical-to-heat appliances.
5. State the uses of chemical-to-heat appliances.
6. Observe safety precautions when using chemical-to-heat appliances.

1. Definition of Chemical-to-Heat Appliances

Chemical-to-heat appliances are appliances that convert **chemical energy stored in fuels** into **heat energy** through the process of combustion (burning).

Common fuels used include:

- Liquefied Petroleum Gas (LPG)
- Kerosene
- Charcoal
- Firewood
- Coal
- Biogas

2. Types of Chemical-to-Heat Appliances

Examples include:

1. Gas cooker (LPG cooker)
2. Kerosene stove
3. Charcoal stove
4. Wood-burning stove
5. Coal stove
6. Gas oven
7. Barbecue grill
8. Camping stove

3. Main Parts of Chemical-to-Heat Appliances

A. Gas Cooker

Part	Function
Burner	Produces the flame for heating.
Gas cylinder	Stores LPG gas.
Gas regulator	Controls the pressure of the gas.
Gas hose	Carries gas from the cylinder to the burner.
Control knob	Regulates the flow of gas and flame size.
Ignition system (lighter/spark igniter)	Lights the gas.
Pan support	Holds cooking pots above the burner.

B. Kerosene Stove

Part	Function
Fuel tank	Stores kerosene.
Wick	Draws kerosene to the burner.
Burner	Burns the fuel to produce heat.
Wick adjuster	Controls the flame height.
Pot stand	Supports cooking pots.
Outer casing	Protects the internal parts.

C. Charcoal Stove

Part	Function
Fire chamber	Holds the burning charcoal.
Grate	Supports the charcoal and allows air to circulate.
Air vent	Allows air into the stove to improve burning.
Ash tray	Collects ash after burning.
Pot support	Holds the cooking pot.

4. Principle of Operation

Chemical-to-heat appliances operate on the principle of **combustion**.

Combustion is the burning of a fuel in the presence of oxygen to produce heat energy.

Working Principle

1. Fuel is supplied to the appliance.
2. The fuel is ignited using a match or igniter.
3. The fuel burns in the presence of oxygen.
4. Heat is produced and used for cooking, heating, or boiling.

5. Uses of Chemical-to-Heat Appliances

Chemical-to-heat appliances are used for:

- Cooking food.
- Boiling water.
- Baking.
- Heating rooms.
- Roasting food.
- Outdoor camping and picnics.

5. Advantages of Chemical-to-Heat Appliances

1. Easy to use.
2. Suitable where electricity is unavailable.
3. Produce high heat for cooking.
4. Portable (especially camping stoves).
5. Available in different sizes and types.

7. Safety Precautions

1. Use the appliance in a well-ventilated area.
2. Check for gas leaks before use.

3. Keep flammable materials away from the flame.
4. Turn off the gas supply after use.
5. Do not refill a kerosene stove while it is burning.
6. Keep children away from hot appliances.
7. Store fuels safely.
8. Clean burners regularly for efficient operation.
9. Never leave a burning stove unattended.

Assignment

1. Draw and label a **gas cooker** or **kerosene stove**, showing its main parts.
2. Prepare a table showing **eight chemical-to-heat appliances** and their uses.
3. Explain the difference between **electrical-to-heat appliances** and **chemical-to-heat appliances**.

WEEK 5 - Topic: Electro-Mechanical Devices

Learning Objectives

At the end of the lesson, students should be able to:

1. Define electro-mechanical devices.
2. Explain the principle of operation of electro-mechanical devices.
3. Identify different types of electro-mechanical devices.
4. Describe the main parts of electro-mechanical devices.
5. State the uses of electro-mechanical devices.
6. Observe safety precautions when using electro-mechanical devices.

1. Definition of Electro-Mechanical Devices

Electro-mechanical devices are machines or appliances that **convert electrical energy into mechanical energy (motion)** by using an electric motor or electromagnet.

These devices perform work by producing movement such as rotating, pumping, mixing, cooling, or compressing.

2. Types of Electro-Mechanical Devices

Common examples include:

1. Electric fan
2. Electric blender
3. Water pump
4. Washing machine
5. Vacuum cleaner
6. Electric drill
7. Refrigerator (uses an electric motor to drive the compressor)
8. Air conditioner
9. Electric mixer
10. Sewing machine (electric type)

3. Main Parts of Electro-Mechanical Devices

Although the parts differ slightly from one device to another, the common parts are:

Part	Function
Electric motor	Converts electrical energy into mechanical motion.
Power cord	Connects the appliance to the power supply.
Plug	Connects the appliance to the wall socket.
Switch	Turns the appliance ON or OFF.
Fuse	Protects the appliance from excessive current.
Control knob/button	Controls speed or operation.
Shaft	Transmits rotary motion from the motor.
Bearings	Reduce friction and support the rotating shaft.
Casing	Protects the internal parts.

Examples of Special Parts

Electric Fan

- Blades – Move air.
- Guard – Protects users from the rotating blades.
- Oscillation mechanism – Rotates the fan from side to side.

Electric Blender

- Jar (container) – Holds food or liquid.
- Blades – Cut and blend ingredients.
- Lid – Prevents spilling.

Water Pump

- Impeller – Pushes water through the pump.
- Pump housing – Encloses the impeller.

4. Principle of Operation

Electro-mechanical devices operate on the principle of **electromagnetism**.

Working Principle

1. The appliance is connected to an electrical power supply.
2. Electric current flows into the electric motor.
3. The motor produces a magnetic field.
4. The magnetic field causes the motor shaft to rotate.
5. The rotating shaft drives the moving parts of the appliance, enabling it to perform useful work.

Examples

- An **electric fan** converts electrical energy into the mechanical energy of rotating blades.
- A **blender** converts electrical energy into the mechanical energy that spins the blades.
- A **water pump** converts electrical energy into the mechanical energy that moves water.

5. Uses of Electro-Mechanical Devices

Electro-mechanical devices are used for:

- Cooling rooms (electric fan, air conditioner).
- Blending and mixing food.
- Pumping water.
- Washing clothes.
- Cleaning floors and carpets.
- Drilling holes.
- Preserving food (refrigerator).
- Sewing fabrics.

6. Advantages of Electro-Mechanical Devices

1. Save time and energy.
2. Increase efficiency and productivity.
3. Reduce manual labour.
4. Perform work quickly and accurately.
5. Improve comfort and convenience.
6. Easy to operate.

7. Safety Precautions

1. Read and follow the manufacturer's instructions.
2. Do not operate appliances with wet hands.
3. Keep water away from electrical parts.
4. Switch off and unplug after use.
5. Do not overload electrical sockets.
6. Keep loose clothing and hair away from moving parts.
7. Repair damaged cords and plugs immediately.
8. Keep appliances out of the reach of children.
9. Service and maintain appliances regularly.

Assignment

1. Draw and label an **electric fan** or **electric blender**, showing its main parts.
2. Prepare a table showing **eight electro-mechanical devices** and their uses.
3. Explain the difference between:
 - Electrical-to-heat appliances
 - Chemical-to-heat appliances
 - Electro-mechanical devices

WEEK 6 - Building Construction

Learning Objectives

At the end of this lesson, students should be able to:

1. Define building construction.
2. Explain the importance of building construction.
3. State the stages involved in building construction.
4. Identify the members of the building team and their functions.
5. Identify the major parts of a building.
6. Explain the factors considered before constructing a building.

Definition of Building Construction

Building construction is the process of planning, designing, and erecting a structure using suitable materials, tools, equipment, and skilled labour. It involves all the activities from site preparation to the completion of a building that is safe, durable, and suitable for its intended use.

Objectives of Building Construction

The objectives of building construction are to:

1. Provide safe and comfortable shelter.
2. Protect people and property from weather and external dangers.
3. Provide spaces for living, working, learning, and recreation.
4. Ensure buildings are durable and economical.
5. Improve the appearance and value of the environment.
6. Meet the needs of individuals, businesses, and communities.

Importance of Building Construction

- Provides accommodation for people.
- Promotes economic development.
- Creates employment opportunities.
- Supports industrial and commercial activities.
- Improves public health and sanitation.
- Enhances national development.

Stages of Building Construction

1. Site selection
2. Site preparation
3. Setting out
4. Excavation
5. Foundation construction
6. Wall construction
7. Lintel construction
8. Roofing
9. Installation of doors and windows
10. Flooring
11. Ceiling work
12. Finishing (plastering, painting, tiling, etc.)
13. Installation of building services

14. Final inspection and handover

Main Parts of a Building

- | | | |
|---------------|------------|--------------|
| 1. Foundation | 5. Beams | 9. Windows |
| 2. Floors | 6. Lintels | 10. Stairs |
| 3. Walls | 7. Roof | 11. Ceiling |
| 4. Columns | 8. Doors | 12. Finishes |

Factors to Consider Before Building Construction

- Availability of land
- Nature of the soil
- Cost of construction
- Purpose of the building
- Availability of building materials
- Climate and weather conditions
- Drainage system
- Access roads
- Availability of water and electricity
- Government planning regulations

Common Building Materials

- | | | |
|----------|----------|------------------|
| • Cement | • Blocks | • Aluminium |
| • Sand | • Bricks | • Roofing sheets |
| • Gravel | • Timber | • Glass |
| • Stones | • Steel | • Paint |

Qualities of a Good Building

- | | | |
|----------------------|-------------------|--------------------------|
| • Strong and durable | • Well ventilated | • Economical to maintain |
| • Stable | • Well lighted | • Functional |
| • Safe | • Attractive | |
| • Weather-resistant | | |

Safety Precautions During Building Construction

- Wear personal protective equipment (PPE).
- Keep the site clean and organized.
- Use tools and equipment properly.
- Follow safety signs and instructions.
- Secure scaffolding and ladders.
- Store materials safely.
- Report hazards immediately.
- Only trained personnel should operate machinery.

Assignment

1. Draw and label the major parts of a simple residential building.
2. Explain the functions of the following:
 - Foundation
 - Wall
 - Roof
 - Door
 - Window
3. List ten building materials and state one use of each.

Lesson Topic: Roofs

Lesson Objectives

At the end of the lesson, students should be able to:

1. Define a roof.
2. State the functions of a roof.
3. Identify the different types of roofs.
4. Explain the uses and advantages of each type of roof.
5. Draw and label common roof types.

Definition of a Roof

A **roof** is the uppermost part of a building that covers and protects the interior from weather conditions such as rain, sun, wind, and snow (where applicable). It also enhances the appearance of a building.

Functions of a Roof

A roof performs the following functions:

1. **Protection:** Protects the building from rain, sunlight, wind, and dust.
2. **Shelter:** Provides cover for occupants and property.
3. **Support:** Carries roofing materials and transfers loads to the walls.
4. **Drainage:** Allows rainwater to flow into gutters and downpipes.
5. **Insulation:** Reduces heat entering the building and helps maintain indoor comfort.
6. **Beautification:** Improves the appearance and value of a building.
7. **Security:** Helps safeguard the building and its contents.

Types of Roofs and Their Uses

1. **Flat Roof:** A roof with little or no slope. Nearly level roof
2. **Gable Roof:** A roof with two sloping sides meeting at the top to form a ridge.
3. **Hip Roof:** A roof with four sloping sides meeting at the top.
4. **Shed (Lean-to) Roof:** A roof with one sloping surface.
5. **Butterfly Roof:** A roof with two slopes that meet in the middle, forming a "V" shape. Slopes inward to the centre
6. **Mansard Roof:** A roof with two slopes on each side, where the lower slope is steeper than the upper slope.

Assignment

1. Draw and label the following roof types:
 - Flat roof
 - Gable roof
 - Hip roof
2. Write **three functions** of a roof.
3. State **one use** of each of the six roof types discussed.

Lesson Topic: Walls

Lesson Objectives

At the end of the lesson, students should be able to:

1. Define a wall.
2. State the functions of walls in a building.
3. Identify the different types of walls.
4. Explain the uses of each type of wall.
5. Draw and label common types of walls.

Definition of a Wall

A **wall** is a vertical structure built with materials such as bricks, blocks, stone, concrete, timber, or metal to enclose, divide, and support a building. It forms one of the main structural components of a building.

Functions of Walls

Walls perform the following functions:

1. **Support the roof, floors, and other parts of the building.**
2. **Enclose and protect** the interior from rain, wind, sunlight, and intruders.
3. **Divide the building** into separate rooms or spaces.
4. **Provide privacy** for occupants.
5. **Improve security** by preventing unauthorized access.
6. **Provide insulation** against heat, cold, and noise.
7. **Enhance the appearance** and beauty of a building.
8. **Carry loads** from the roof and upper floors (in load-bearing walls).

Types of Walls and Their Uses

1. **Load-Bearing Wall:** A wall that supports the weight of the roof, floors, and other structural components. Provides structural strength and supports heavy loads.
2. **Partition Wall:** A non-load-bearing wall used to divide the interior of a building into rooms.
3. **Retaining Wall:** A wall built to hold back soil on sloping land. It prevents soil erosion and Improves site stability.
4. **Cavity Wall:** A wall consisting of two separate walls with an air gap (cavity) between them. It Reduces heat transfer and prevents dampness from entering the building.
5. **Boundary Wall:** A wall built around a property to mark its limits and provide security. It Enhances privacy and marks property boundaries.
6. **Curtain Wall:** A non-load-bearing external wall made mainly of glass, aluminium, or steel. It Allows more natural light into the building and gives a modern appearance

Assignment

1. Draw and label the following types of walls:
 - Load-bearing wall
 - Partition wall
 - Cavity wall
2. State **five functions** of walls.
3. Write **one use** of each of the six types of walls discussed.

WEEK 7 - Topic: Windows

Lesson Objectives

At the end of the lesson, students should be able to:

1. Define a window.
2. State the functions of windows in a building.
3. Identify the different types of windows.
4. Explain the uses of each type of window.
5. Draw and label common types of windows.

Definition of a Window

A **window** is an opening made in the wall of a building, fitted with a frame and shutters or glass, to admit **light, air, and ventilation** into the building while also providing a view of the outside.

Functions of Windows

Windows perform the following functions:

1. **Provide natural light** inside a building.
2. **Allow ventilation** by admitting fresh air and removing stale air.
3. **Provide visibility** so occupants can see outside.
4. **Enhance the beauty** and appearance of a building.
5. **Improve comfort** by regulating airflow and indoor temperature.
6. **Serve as an emergency exit** in some buildings.
7. **Reduce electricity costs** by allowing natural daylight into rooms.

Types of Windows and Their Uses

1. **Casement Window:** A window hinged at the side and opened outward or inward. Provides excellent ventilation. Offers a good outside view.
2. **Sliding Window:** A window with shutters that slide horizontally on tracks. Saves space. Suitable where outward-opening windows are not convenient.
3. **Louver (Jalousie) Window:** A window made of horizontal glass, metal, or wooden slats that open and close together. Easy to regulate airflow
4. **Awning Window:** A window hinged at the top and opened outward from the bottom. Prevents rainwater from entering easily. Can remain open during light rain.
5. **Fixed Window:** A window that cannot be opened. Allows maximum natural light. Use in Living rooms where ventilation is not required and cannot be opened
6. **Bay Window:** A window that projects outward from the wall of a building. Creates extra interior space. Admits more natural light

Assignment

1. Draw and label the following types of windows:
 - Casement window
 - Sliding window
 - Louver window
2. State **five functions** of windows.
3. Explain **one use** of each of the six types of windows discussed.

Topic: Doors

Lesson Objectives

At the end of the lesson, students should be able to:

1. Define a door.
2. State the functions of doors in a building.
3. Identify the different types of doors.
4. Explain the uses of each type of door.
5. Draw and label common types of doors.

Definition of a Door

A **door** is a movable barrier fitted into an opening in a wall or partition that allows people and goods to enter or leave a building or room. It also provides security, privacy, and protection.

Functions of Doors

Doors perform the following functions:

1. **Provide access** into and out of a building or room.
2. **Ensure security** by preventing unauthorized entry.
3. **Provide privacy** for occupants.
4. **Protect against weather** such as rain, wind, dust, and sunlight.
5. **Enhance the appearance** of a building.
6. **Control movement** between rooms or spaces.
7. **Serve as emergency exits** during fire or other emergencies.

Types of Doors and Their Uses

1. **Panel Door:** A door made of wooden panels fitted into a frame. Strong and durable. Suitable for both interior and exterior use.
2. **Flush Door:** A door with a smooth, flat surface on both sides. Lightweight and attractive. Easy to clean.
3. **Sliding Door:** A door that opens by sliding horizontally along a track. Saves space. Provides a wide opening.
4. **Folding Door:** A door made of hinged panels that fold together when opened. Suitable for wide openings and saves space
5. **Revolving Door:** A door with several panels attached to a central shaft that rotates. Controls the flow of people. Reduces dust and outside air entering the building.
6. **Metal (Steel) Door:** A door made of steel or other metals. Highly secure and Fire-resistant

Assignment

1. Draw and label the following types of doors:
 - Panel door
 - Flush door
 - Sliding door
2. State **five functions** of doors.
3. Write **one use** of each of the six types of doors discussed.

Topic: Foundations

Lesson Objectives

At the end of the lesson, students should be able to:

1. Define a foundation.
2. State the functions of a foundation.
3. Identify the different types of foundations.
4. Explain the uses of each type of foundation.
5. Draw and label common types of foundations

Definition of a Foundation

A **foundation** is the **lowest part of a building** that is constructed below the ground level to support the entire structure and safely transfer its weight (load) to the soil.

Functions of a Foundation

The foundation performs the following functions:

1. **Supports the entire weight** of the building.
2. **Transfers the building load** safely to the ground.
3. **Provides stability** and keeps the building upright.
4. **Prevents uneven settlement** and cracking of the building.
5. **Anchors the building** firmly to the ground.
6. **Protects the building** against movement caused by wind, floods, or earthquakes.
7. **Increases the durability** and lifespan of the building.

Types of Foundations and Their Uses

1. **Strip Foundation:** A continuous strip of concrete built beneath load-bearing walls. It distributes loads evenly along the wall and Simple to construct.
2. **Pad (Isolated) Foundation:** A square or rectangular concrete base constructed beneath individual columns. It is Suitable for column-supported structures.
3. **Raft (Mat) Foundation:** A large reinforced concrete slab covering the entire area beneath the building. It Spreads the building load over a large area and suitable for poor soil conditions.
4. **Pile Foundation:** Long columns of concrete, steel, or timber driven deep into the ground to reach firm soil. It Supports very heavy loads and suitable for weak surface soils
5. **Combined Foundation:** A single foundation supporting two or more columns and it prevents unequal settlement.
6. **Deep Foundation:** A foundation that extends deep into the ground to transfer loads to strong soil or rock. It provides excellent stability and supports heavy structures.

Assignment

1. Draw and label the following types of foundations:
 - Strip foundation
 - Pad (Isolated) foundation
 - Raft foundation
2. State **five functions** of a foundation.
3. Write **one use** of each of the six types of foundations discussed.

WEEK 8 - Topic: Site and site Preparation

Lesson Objectives

At the end of the lesson, students should be able to:

1. Define a site and site preparation.
2. State the importance of site preparation.
3. Identify the activities involved in site preparation.
4. List the tools and machines used in site preparation.
5. Explain the safety precautions to observe during site preparation.

Definition of Site

A site is a technical name for a place where a building construction is ongoing.

Definition of Site Preparation

Site preparation is the process of clearing, leveling, measuring, and making a piece of land ready before the construction of a building begins. It is the first stage in building construction.

Site preparation is the first stage in building construction and involves surveying, clearing, leveling, excavating, compacting, and providing temporary facilities to make the land ready for construction.

The way a building site is prepared for construction depends on three main factors:

1. The location of the building, for example, village, town, bush, etc
2. The type of build intended, for example, bungalow, storey-building, sky scraper, etc.
3. Types of sites, for example, swampy, rocky, sandy, etc

Importance (Functions) of Site Preparation

Site preparation is important because it:

1. Makes the land suitable for construction.
2. Ensures the building is erected on a stable foundation.
3. Removes obstacles such as trees, rocks, and shrubs.
4. Prevents future structural problems caused by poor soil conditions.
5. Improves drainage and prevents flooding.
6. Provides accurate layout for the building.
7. Enhances the safety of workers during construction.
8. Reduces construction delays and costs

Activities Involved in Site Preparation

The major activities carried out during site preparation include:

- 1. Site Survey:** Measuring and mapping the land. Determining boundaries and levels.
- 2. Site Clearing:** Removing trees, grasses, bushes, stumps, and unwanted materials.
- 3. Demolition:** Removing old buildings or unwanted structures on the site.
- 4. Excavation:** Digging trenches and foundation pits.

5. Levelling and Grading: Making the ground even and providing proper slopes for drainage.

6. Setting Out: Marking the exact positions of the building using pegs, strings, and profiles.

7. Soil Testing: Examining the soil to determine its strength and suitability for construction.

8. Drainage Preparation: Constructing temporary drains to remove surface water.

Site Preparation Tools and Machinery

Site preparation tools and machinery are equipment used to clear, level, excavate, compact, and prepare a construction site before building work begins.

Hand Tools Used in Site Preparation

Tool	Uses
Spade	Digging and transferring soil
Shovel	Scooping and moving loose materials
Hoe	Loosening soil and removing weeds
Cutlass (Machete)	Clearing bushes and grasses
Pickaxe	Breaking hard ground and rocks
Rake	Levelling and gathering debris
Wheelbarrow	Transporting soil and materials
Tape Measure	Measuring distances and dimensions
Spirit Level	Checking horizontal and vertical levels
Peg and Line	Setting out the building layout

Machinery Used in Site Preparation

Machinery	Uses
Bulldozer	Clearing vegetation, pushing soil, and leveling ground
Excavator	Digging trenches, foundations, and removing earth
Backhoe Loader	Excavating and loading materials
Grader	Levelling and smoothing the ground surface
Loader	Loading and transporting loose materials
Dump Truck	Hauling soil, sand, and debris away from the site
Compactor/Roller	Compacting soil to increase its bearing capacity
Scraper	Cutting, transporting, and spreading soil
Concrete Mixer	Mixing concrete for temporary structures and foundations
Water Tanker	Supplying water and controlling dust during site work
Chain Saw	Cutting trees and large branches during site clearing
Bulldozer	Clears vegetation and levels the ground.

Excavator	Digs trenches and foundation pits.
Grader	Levels and smoothens the ground surface.
Loader	Loads soil, sand, and debris into trucks.

Safety Precautions During Site Preparation

1. Wear personal protective equipment (helmet, boots, gloves, reflective vest).
2. Inspect all tools and machines before use.
3. Keep unauthorized persons away from the site.
4. Follow machine operating instructions.
5. Display warning signs around dangerous areas.
6. Avoid working near unstable excavations without support.
7. Maintain good housekeeping by removing waste materials.
8. Ensure first aid equipment is available on site.

Assignment

1. Define **site preparation**.
2. State **seven activities** involved in site preparation.
3. Draw and label **any three** machines used in site preparation.
4. List **five safety precautions** that should be observed during site preparation.

Topic: Setting Out

Definition of Setting Out

Setting out is the process of transferring the dimensions, shape, and position of a building from the architectural or structural drawings onto the actual ground where the building will be constructed. It ensures that the building is constructed in the correct location, size, level, and orientation.

In simple terms, **setting out is the act of marking on the ground exactly where a building will be built.**

Objectives of Setting Out

At the end of the setting-out process, the builder should be able to:

1. Mark the exact position of the building on the site.
2. Establish the correct dimensions of the building.
3. Ensure the building is properly aligned with the site boundaries.
4. Determine the locations of foundations, walls, and corners.
5. Minimize construction errors.

Importance of Setting Out

- Ensures the building is constructed in the correct location.
- Prevents mistakes in the dimensions and layout of the building.
- Ensures the foundation is correctly positioned.
- Saves time and construction costs by reducing errors.
- Helps the building comply with approved plans and regulations.

Tools and Equipment Used in Setting Out

- Measuring tape
- Pegs (stakes)
- Wooden profiles or profile boards
- Hammer or mallet
- Builder's line (string line)
- Spirit level
- Plumb bob
- Ranging rods
- Steel pins
- Theodolite or total station (for large projects)

Steps in Setting Out

1. Study the building plan and site plan.
2. Clear and prepare the site.
3. Establish a reference point or baseline.
4. Measure and mark the building dimensions.
5. Drive pegs into the ground at the corners.
6. Fix profile boards outside the excavation area.
7. Stretch builder's lines between the profiles.
8. Check the measurements and diagonals to ensure the layout is square.
9. Mark the foundation trenches.
10. Begin excavation.

Methods of Setting Out

1. **Tape and Peg Method** – Suitable for small buildings.
2. **3-4-5 Method (Pythagorean Method)** – Used to establish right angles.
3. **Theodolite Method** – Used for accurate alignment on larger projects.
4. **Total Station Method** – Uses electronic surveying equipment for high precision.

Precautions During Setting Out

- Use accurate measurements.
- Check all dimensions more than once before excavation.
- Ensure corners form right angles where required.
- Protect pegs and profile boards from being disturbed.
- Follow the approved building plan exactly.

Summary

Setting out is one of the most important stages of building construction because it transfers the building design from paper to the ground. Accurate setting out ensures that the building is correctly positioned, properly aligned, and built according to the approved dimensions.

Assignment...

1. Sketch six tools used for setting out.
2. Outline the steps involved in setting out a building.
3. Explain why setting out is important in building construction.
4. Describe the 3-4-5 method of setting out a right angle.

Topic: Building Team

A **building team** is a group of professionals, skilled workers, and the client who work together to plan, design, construct, supervise, and complete a building project safely, efficiently, and according to the required standards.

Each member of the building team has a specific role and responsibility, and they cooperate to ensure that the building is completed on time, within budget, and meets the required quality.

Members of a Building Team and Their Functions

Member	Function
Client (Owner)	Initiates the project, provides funds, and approves major decisions.
Architect	Designs the building and prepares architectural drawings and specifications.
Builder	Organizes, supervises, and manages the construction work on site.
Structural Engineer	Designs the structural components such as foundations, beams, columns, and slabs to ensure the building is safe and stable.
Quantity Surveyor	Estimates the cost of the project, prepares bills of quantities, and controls construction costs.
Land Surveyor	Measures the land, prepares site plans, and sets out the building on the site.
Civil Engineer	Designs and supervises external works such as roads, drainage, and water supply where required.
Electrical Engineer	Designs and supervises electrical installations, lighting, and power systems.
Mechanical Engineer	Designs plumbing, air-conditioning, ventilation, fire protection, and other mechanical services.
Town Planner	Ensures the building complies with planning laws and land-use regulations.
Clerk of Works	Inspects construction work to ensure it meets the approved drawings and specifications.
Skilled Craftsmen (Masons, Carpenters, Plumbers, Electricians, Painters, Welders, Roofers, Tilers, etc.)	Carry out the actual construction work according to the design and specifications.

Importance of a Building Team

- Ensures proper planning and coordination of the project.
- Produces safe, durable, and quality buildings.
- Helps complete the project on schedule.
- Controls construction costs and minimizes waste.
- Ensures compliance with building regulations and standards.
- Reduces construction errors and accidents.
- Improves communication among everyone involved in the project.

Assignment

1. Define a building team.
2. List six members of a building team.
3. State the function of the following:
 - Client
 - Architect
 - Builder
 - Quantity Surveyor
 - Structural Engineer
 - Land Surveyor
4. Mention five reasons why a building team is important in construction.

WEEK 9 - Topic: Water Supply in Buildings

Learning Objectives

At the end of this lesson, students should be able to:

1. Define water supply.
2. State the importance of water supply in buildings.
3. Identify the sources of water supply.
4. Explain the components of a water supply system.
5. Describe the methods of water distribution.
6. State the maintenance practices and safety precautions for water supply systems.

Definition of Water Supply

Water supply is the process of collecting, treating, storing, and distributing clean and safe water to homes, schools, industries, and other buildings for domestic, commercial, and industrial use.

A **water supply system** is the network of pipes, tanks, pumps, valves, and fittings used to convey water from its source to the points where it is needed.

Sources of Water Supply: Water can be obtained from the following sources:

1. **Rainwater:** Water collected from rainfall.
2. **Surface Water:** Water found on the earth's surface. **Examples:** Rivers, Streams, Lakes, Dams, Ponds
3. **Groundwater:** Water stored beneath the ground. **Examples:** Wells, Boreholes, Springs
4. **Public Water Supply:** Water supplied by a government or private water authority through pipelines.

Components of a Water Supply System

1. **Water Source** – The origin of the water (river, borehole, well, or public supply).
2. **Water Pump** – Lifts water from the source to storage tanks.
3. **Storage Tank** – Stores water for future use.
4. **Pipes** – Carry water throughout the building.
5. **Valves** – Control the flow of water.
6. **Taps (Faucets)** – Allow users to draw water.
7. **Water Meter** – Measures the quantity of water used.
8. **Filters** – Remove impurities from water.

Methods of Water Distribution

1. **Direct Water Supply System:** Water flows directly from the main supply to taps without passing through a storage tank.
2. **Indirect Water Supply System:** Water is first stored in a storage tank before being distributed to taps.

Uses of Water in Buildings

- Drinking
- Cooking
- Bathing
- Washing clothes
- Cleaning floors and equipment
- Flushing toilets
- Gardening
- Firefighting

Water Treatment: Water treatment is the process of making water safe for drinking and other domestic uses.

Common Methods of Water Treatment

- Filtration
- Boiling
- Chlorination
- Sedimentation
- Coagulation
- Disinfection using ultraviolet (UV) light

Advantages of a Good Water Supply System

- Provides safe drinking water.
- Reduces the spread of diseases.
- Improves sanitation and hygiene.
- Supports domestic and industrial activities.
- Saves time and effort in obtaining water.
- Increases the comfort and value of buildings.

Key Terms

- **Water Supply:** The provision of clean water for use.
- **Water Supply System:** A network of equipment used to collect, store, and distribute water.
- **Groundwater:** Water found beneath the earth's surface.
- **Surface Water:** Water found on the surface of the earth.
- **Filtration:** The removal of impurities by passing water through a filter.
- **Chlorination:** The addition of chlorine to water to kill harmful microorganisms.

Assignment

1. Draw and label a simple diagram of a domestic water supply system showing the water source, pump, storage tank, pipes, and tap.
2. Explain the advantages and disadvantages of **rainwater**, **surface water**, **groundwater**, and **public water supply**.
3. Visit a nearby building and identify the components of its water supply system. Write a short report on your observations.

Topic: Transmission of Water

Learning Objectives

At the end of this lesson, students should be able to:

1. Define transmission of water.
2. Explain the importance of water transmission.
3. Identify the methods of transmitting water.
4. Describe the materials used for water transmission.
5. Explain the factors affecting water transmission.
6. State the maintenance practices and safety precautions for water transmission systems.

Definition of Transmission of Water

Transmission of water is the process of conveying or transporting water from its source (such as a river, dam, borehole, or water treatment plant) to storage facilities and consumers through a network of pipes, channels, pumps, and other equipment.

In buildings, water transmission refers to the movement of water from the storage tank or source to different points of use such as taps, bathrooms, kitchens, and toilets.

Objectives of Water Transmission

The objectives of transmitting water are to:

1. Deliver clean water from the source to users.
2. Ensure a continuous and reliable water supply.
3. Reduce water wastage during transportation.
4. Supply adequate water for domestic, commercial, industrial, and agricultural use.
5. Maintain the quality of water during transportation.

Importance of Water Transmission

- Provides a steady supply of clean water.
- Supports domestic activities such as cooking and washing.
- Supplies water for industries and agriculture.
- Provides water for firefighting.
- Promotes public health by ensuring access to safe water.
- Saves time and labour in obtaining water.

Methods of Water Transmission

1. **Gravity System:** Water flows from a higher elevation to a lower elevation under the force of gravity.
2. **Pumping System:** Water is moved using electric, diesel, petrol, or solar-powered pumps.
3. **Combined Gravity and Pumping System:** Water is first pumped into an elevated storage tank and then distributed by gravity.

Key Terms

- **Transmission of Water:** The movement of water from its source to storage or users.
- **Gravity System:** A method of transmitting water using the natural force of gravity.
- **Pumping System:** A method of transmitting water using mechanical pumps.
- **Reservoir:** A structure used for storing large quantities of water.
- **Valve:** A device used to control the flow of water in a pipeline.
- **Pipeline:** A system of connected pipes used to transport water.

Assignment

1. Draw and label a simple diagram showing the transmission of water from a **borehole** to an **overhead storage tank** and then to a **house**.
2. Compare the **gravity system** and the **pumping system** of water transmission.
3. Explain why regular maintenance of water transmission systems is important.

Topic: Distribution of Water Supply

Learning Objectives

At the end of the lesson, students should be able to:

1. Define water distribution.
2. Explain the importance of water distribution.
3. Identify the methods of water distribution.
4. State the components of a water distribution system.
5. Explain the factors affecting water distribution.
6. State the advantages and disadvantages of different distribution methods.

Definition of Water Distribution

Water distribution is the process of conveying treated water from the water treatment plant or storage reservoirs to homes, schools, hospitals, industries, and other consumers through a network of pipes and fittings.

It is the final stage in the public water supply system after water has been collected, treated, and stored.

Importance of Water Distribution

Water distribution is important because it:

- Supplies clean and safe drinking water to consumers.
- Provides water for cooking and domestic use.
- Supplies industries with water for production.
- Provides water for hospitals and schools.
- Supplies water for firefighting.
- Promotes good sanitation and public health.
- Supports agricultural activities.

Methods of Water Distribution: There are three main methods:

- 1. Gravity Distribution System:** Water flows naturally from an elevated reservoir to consumers using gravity.
- 2. Pumping Distribution System:** Water is pumped directly from the treatment plant to consumers.
- 3. Combined Gravity and Pumping System:** Water is first pumped into an elevated storage tank or reservoir and then distributed by gravity.

Components of a Water Distribution System

- 1. Service Reservoir:** Stores treated water before distribution.
- 2. Distribution Pipes:** Carry water from reservoirs to consumers.
- 3. Trunk Main:** Large pipes that transport water over long distances.
- 4. Branch Mains:** Smaller pipes that distribute water to different streets and communities.
- 5. Service Pipes:** Connect the main distribution pipes to individual buildings.
- 6. Valves:** Used to control, regulate, or stop the flow of water.
- 7. Water Meters:** Measure the amount of water used by consumers.
- 8. Hydrants:** Provide water for firefighting and emergency purposes.

Types of Water Distribution Pipe Networks

- 1. Dead-End System:** Pipes end at different points without forming loops.
- 2. Grid Iron System:** Pipes are interconnected to form a network.
- 3. Ring (Circular) System:** Pipes form a closed ring around an area.

4. Radial System: Water is supplied from a central reservoir to different zones.

Factors Affecting Water Distribution

- Population size.
- Distance from the reservoir.
- Water pressure.
- Elevation of the land.
- Pipe diameter.
- Water demand.
- Leakage in pipes.
- Availability of electricity for pumping.
- Maintenance of the distribution network.

Maintenance of Water Distribution System

- Repair leaking pipes promptly.
- Replace damaged or old pipes.
- Clean storage tanks regularly.
- Inspect valves and hydrants.
- Detect and repair burst pipes.
- Prevent illegal water connections.
- Monitor water pressure.
- Carry out regular maintenance of pumps

Assignment

1. Draw and label a simple diagram of a water distribution system showing the reservoir, trunk main, branch main, service pipe, valve, hydrant, and consumer.
2. Explain the advantages and disadvantages of the gravity, pumping, and combined water distribution systems.