

Comprehensive Notes On

Maintain Health, Safe and Secure Working Environment

Class X - Domestic Data Entry Operator (IT-ITeS)

Contents

1	Introduction to Workplace Health, Safety, and Security	3
1.1	Fundamental Concepts: Health, Safety, and Security	3
1.2	Essential Workplace Health Facilities	3
2	Workplace Policies and Procedures	4
2.1	Definition of Health, Safety, and Security Policy	4
2.2	Objectives and Objectives of HSS Policies	4
2.3	Key Clauses of Occupational Safety and Health (OSH) Policy	4
3	Workplace Hazards and Hazard Control	4
3.1	Hazard vs. Risk	4
3.2	Major Categories of Workplace Hazards	5
3.3	Detailed Analysis of Physical, Electrical, and Fire Hazards	5
3.3.1	Physical Hazards (Slips, Trips, and Falls)	5
3.3.2	Electrical Hazards	5
3.3.3	Fire Hazards	6
3.4	Hierarchy of Hazard Control	6
4	Air and Water Quality Management	6
4.1	Air and Water Quality Testing Methods	6
4.2	Guidelines for Maintaining Clean Air and Water	7
5	Computer Ergonomics and Health Issues	7
5.1	Understanding Ergonomics	7
5.2	Early Warning Signs and Body Symptoms	7
5.3	Major Computer-Related Health Conditions	8
5.3.1	Musculoskeletal Problems (MSDs)	8
5.3.2	Occupational Overuse Syndrome (OOS) / Repetitive Strain Injury (RSI)	8
5.3.3	Computer Vision Syndrome (CVS) and Eye Strain	8
5.3.4	Hazards of Exclusive Laptop Usage	8
5.3.5	Screen Blue Light and Sleep Disruptions	8
5.4	Standard Workstation Setup Guidelines	9
5.5	Safety Cautions While Operating Computers	9
6	Workplace Accidents and Emergency Management	9
6.1	Accident vs. Emergency	9
6.2	Identifying and Handling Workplace Accidents	9
6.3	Limits of Responsibility and Authority	10
6.4	General Evacuation Procedures	10
7	Fire Safety and Extinguishers	11
7.1	Fire Prevention and Ignition Sources	11
7.2	Classes of Fire and Suitable Extinguishers	11
7.3	Operating Fire Extinguishers: The PASS Method	11
8	First Aid and Electrical Rescue Techniques	12
8.1	First Aid Kit Requirements	12

8.2	Electrical Safety and Rescue Techniques	12
8.3	Cardiopulmonary Resuscitation (CPR)	12
9	Comprehensive Question Bank	13
9.1	Multiple Choice Questions (MCQs)	13
9.2	Assertion-Reasoning Questions	16
9.3	One-Word / Brief Answer Questions	17
9.4	Differentiate Between Questions	17
9.5	Short Answer Questions	18
9.6	Long Answer Questions	19
9.7	Case-Study / Competency-Based Questions	21

1 Introduction to Workplace Health, Safety, and Security

In the modern IT and IT-enabled Services (ITeS) sector, working culture differs significantly from routine manual or clerical work. Employees frequently spend long, non-fixed hours in front of computer workstations. Adopting proper health, safety, and security practices in the workplace ensures worker well-being, minimizes occupational risks, and enhances organizational productivity.

1.1 Fundamental Concepts: Health, Safety, and Security

- **Health:** Health is defined as a state of complete physical, mental, and social well-being of an employee, and not merely the absence of disease or infirmity. Every organization must maintain a clean, hygienic, and well-ventilated environment to keep workers in optimal physical condition.
- **Safety:** Safety refers to a work environment that is completely free from hazards and operational risks. It ensures that workers are protected against physical injury, electrical accidents, and machinery hazards.
- **Security:** Security implies freedom from potential harm, threat, or unauthorized access. A dedicated security department protects personnel, hardware, digital assets, electrical installations, and campus infrastructure.

Important Note

Workplace Responsibility: Creating a safe workplace is a joint responsibility. While management must provide resources and safety officers, every individual employee must take active responsibility for their own safety and report hazardous conditions immediately.

1.2 Essential Workplace Health Facilities

To ensure optimal employee health and prevent occupational illnesses, an organization must mandate the following basic amenities:

1. **Cleanliness:** Work areas, desks, floors, and common spaces must be cleaned daily before operational hours begin.
2. **Air Quality and Conditioning:** Proper centralized air-conditioning systems must supply clean, filtered, and temperature-controlled air.
3. **Safe Drinking Water:** Hygienically filtered and purified drinking water facilities must be accessible to all personnel.
4. **Fresh Food Cafeteria:** Food served in company cafeterias must meet strict nutritional and hygiene standards.
5. **Sanitation Facilities:** Clean, properly maintained washrooms with adequate running water and soaps are mandatory.

2 Workplace Policies and Procedures

2.1 Definition of Health, Safety, and Security Policy

A **Health, Safety, and Security (HSS) Policy** is a formal written statement issued by an employer outlining the organization's legal commitment to protecting the health, physical safety, and security of its employees as well as the general public.

Guideline / Rule

National Compliance Standard: Every employer in India must adhere to minimum statutory standards set out in relevant company laws and the **National Policy on Occupational Safety, Health and Environment (OSH&E)** formulated by the Government of India.

2.2 Objectives and Objectives of HSS Policies

Workplace HSS policies serve vital legal, economic, and moral functions:

- Demonstrates management's genuine commitment to employee welfare beyond corporate profits.
- Outlines clear lines of accountability and safety duties for every managerial and technical role.
- Establishes proactive procedures to identify, evaluate, and control workplace hazards.
- Reduces business operational costs by lowering workplace accident compensation, medical liabilities, and insurance premiums.

2.3 Key Clauses of Occupational Safety and Health (OSH) Policy

A comprehensive IT company OSH policy generally contains clauses stipulating:

- Provision of continuous financial and technical resources to ensure ongoing OSH performance improvement.
- Compliance with all statutory legal OSH requirements, aspiring to "beyond-compliance" leadership.
- Setting measurable OSH targets, conducting regular safety audits, and reviewing performance metrics periodically.

3 Workplace Hazards and Hazard Control

3.1 Hazard vs. Risk

Understanding the distinction between a hazard and a risk is fundamental to workplace safety:

- **Hazard:** Any source, situation, or substance with the potential to cause harm, injury, ill health, or property damage (e.g., a bare electrical wire, a wet floor, a noisy machine).
- **Risk:** The probability or likelihood that a hazard will actually cause harm to a person, combined with the severity of the potential impact.

3.2 Major Categories of Workplace Hazards

Table 1: Summary of Major Workplace Hazard Categories

Hazard Type	Primary Causes	Potential Impact
Physical	Slippery floors, uneven surfaces, faulty ladders, noise	Fractures, bruises, hearing loss
Electrical	Bare wires, overloaded sockets, un-grounded appliances	Electric shock, burns, electrocution
Fire	Open flames, sparks, faulty electrical circuits, chemicals	Severe thermal burns, asphyxiation
Ergonomic	Poor workstation posture, improper chair height, glare	Back pain, eye strain, Carpal Tunnel
Chemical	Exposure to toxic fumes, solvents, cleaning liquids	Respiratory distress, skin allergies
Psychosocial	Excessive work hours, tight deadlines, workplace conflict	Mental stress, anxiety, burnout

3.3 Detailed Analysis of Physical, Electrical, and Fire Hazards

3.3.1 Physical Hazards (Slips, Trips, and Falls)

Physical hazards are risks arising from structural or environmental conditions like floors, stairs, ramps, and ceilings.

- **Falls from Heights:** Occur due to defective ladders, unsafe scaffolding, or lack of guardrails.
- **Slips and Trips:** Caused by liquid spills, food dropped on floors, loose carpet tiles, or unorganized cables running across walkways.
- **Prevention:** Spills must be cleaned up immediately; warning signs ("Caution: Wet Floor") must be displayed; aisles must remain clutter-free; lighting must be adequate.

3.3.2 Electrical Hazards

Electrical hazards occur when personnel make direct contact with live conductors or indirect contact through conductive surfaces.

- **Common Causes:** Worn-out insulation, exposed wiring, loose plugs, overloading power outlets, using ungrounded equipment, or operating electrical units with wet hands.

- **Prevention:** Inspect wiring routinely; keep food and liquids far away from electrical equipment; use proper surge protectors and grounding.

3.3.3 Fire Hazards

Fires at workplaces result in catastrophic property damage and loss of life.

- **Common Causes:** Electrical short circuits, improper storage of combustible materials, open flames, sparks from machinery, or dust explosions.
- **Prevention:** Enforce strict housekeeping; keep emergency exits, stairwells, and fire extinguishers clear of obstructions; install automatic smoke detectors and fire alarms.

3.4 Hierarchy of Hazard Control

When prioritizing control measures for identified hazards, organizations must strictly follow the **Hierarchy of Hazard Control**:

1. **Elimination:** Completely remove the hazard at its source (e.g., eliminate a dangerous chemical process).
2. **Substitution / Engineering Controls (Isolation):** Replace the hazard with a safer alternative or isolate it using engineering barriers (e.g., soundproofing noisy equipment, installing machine guards).
3. **Administrative Controls:** Implement safe work procedures, training programs, job rotation, and warning signs.
4. **Personal Protective Equipment (PPE):** Use protective gear (safety goggles, earplugs, gloves, safety shoes) as the last line of defense.

4 Air and Water Quality Management

In IT companies, indoor environmental quality directly impacts cognitive performance and employee productivity. Environmental monitoring procedures ensure clean air and pure drinking water.

4.1 Air and Water Quality Testing Methods

Monitoring indoor air and water involves three core analytical approaches:

- **Physical Analysis:** Measuring physical attributes like temperature, turbidity, color, odor, and particulate matter (dust).
- **Chemical Analysis:** Testing chemical composition, including measuring pH levels of water, dissolved oxygen (DO), carbon dioxide (CO_2), nitrogen (N_2), and gaseous pollutants in the air.

- **Biological Analysis:** Utilizing microbial indicators to detect pathogens, bacteria, and fungus in water supply and ventilation ducts.

4.2 Guidelines for Maintaining Clean Air and Water

💡 Important Note

Clean Air Guidelines: To prevent indoor air pollution, companies must control dust generation, limit vehicle access on campus, observe a weekly "No-Vehicle Day", ensure proper exhaust systems, and regularly service HVAC air filters to clear pollen and mold spores.

⚠️ Guideline / Rule

Clean Water Guidelines: Drinking water tanks must be cleaned and disinfected periodically. Filtration units (UV / RO systems) must undergo mandatory routine maintenance to guarantee potable water free from harmful microorganisms.

5 Computer Ergonomics and Health Issues

5.1 Understanding Ergonomics

Ergonomics is the scientific discipline concerned with designing and arranging workplaces, equipment, workstations, and tasks so that workers can interact with them easily, comfortably, and safely. Applying ergonomic principles minimizes physical strain, prevents chronic repetitive stress injuries, and maximizes workplace efficiency.

5.2 Early Warning Signs and Body Symptoms

Ignoring minor physical discomfort while working on computers can lead to chronic musculoskeletal disorders. The table below lists common early warning signs and immediate corrective actions:

Table 2: Ergonomic Warning Symptoms and Immediate Solutions

Symptom / Problem	Potential Ergonomic Cause	Corrective Action
Sore lower back	Lack of lumbar support	Adjust chair backrest height; insert a lumbar pillow.
Burning in upper back / neck	Document placement too low; monitor too far	Use a document holder; raise monitor to eye level.
Wrist pain / tingling	Wrist resting on sharp desk edge; improper angle	Use wrist rest; keep keyboard at elbow level.
Eye fatigue / Headaches	Screen glare; high contrast light; dry eyes	Install anti-glare filter; follow 20-20-20 rule.
Leg numbness / strain	Chair height too high; feet dangling	Lower chair seat height; use an inclined footrest.

5.3 Major Computer-Related Health Conditions

5.3.1 Musculoskeletal Problems (MSDs)

Poor sitting posture, unadjustable chairs, and wrong monitor positions lead to pain in the neck, back, shoulders, arms, and feet.

- **Monitor Positioning:** Top of monitor screen should align with eye level, positioned directly ahead at an arm's length (20 – 24 inches) away.
- **Seating Position:** Maintain full back contact against chair backrest, keeping thighs horizontal and knees at 90°.

5.3.2 Occupational Overuse Syndrome (OOS) / Repetitive Strain Injury (RSI)

OOS is caused by repetitive muscular movements, constrained working postures, or excessive force over extended periods.

Important Note

Carpal Tunnel Syndrome (CTS): CTS is a widespread condition caused by compression of the median nerve at the wrist due to repetitive typing or tight mouse gripping. Symptoms include severe wrist pain, numbness, and tingling in fingers. Prevention requires keeping wrists straight, placing fingers over keyboard home keys (ASDF – JKL;), using ergonomic split keyboards, and placing mouse and keyboard at identical height levels.

5.3.3 Computer Vision Syndrome (CVS) and Eye Strain

CVS arises from excessive screen light, flicker, screen glare, and poor office lighting.

- **Symptoms:** Dryness, redness, burning sensation, blurred vision, headaches, and neck stiffness.
- **Mitigation Measures:** Use anti-glare glasses; adjust monitor contrast; position screens at right angles to bright windows; observe the **20-20-20 Rule** (every 20 minutes, look at an object 20 feet away for at least 20 seconds); blink frequently.

5.3.4 Hazards of Exclusive Laptop Usage

Laptops are designed for portable, short-term use. In laptops, the screen and keyboard are attached closely together. If the screen is placed at the correct height for the neck, the keyboard becomes too high for arms, and vice versa. Long-term laptop users should attach an external ergonomic keyboard, mouse, and laptop stand, or switch to a desktop PC.

5.3.5 Screen Blue Light and Sleep Disruptions

Artificial blue light emitted by display screens suppresses melatonin secretion, tricking the brain into daytime alertness and disturbing natural circadian sleep cycles.

5.4 Standard Workstation Setup Guidelines

- **Keyboard:** Must tilt, feature a non-reflective matt surface, and provide clear key contrast.
- **Work Surface / Desk:** Low-reflectance surface with sufficient depth to hold monitor, keyboard, documents, and document holder.
- **Work Chair:** 5-caster stable base, fully height-adjustable seat, dynamic lumbar support, and adjustable armrests.
- **Space Requirements:** Adequate legroom beneath desk to extend legs and shift postures freely.
- **Lighting, Noise & Heat:** Indirect, shielded ambient lighting; noise-canceling headsets if ambient noise is high; adequate heat dissipation from server towers.

5.5 Safety Cautions While Operating Computers

Guideline / Rule

Computer Hardware Handling Rules:

1. **Static Electricity:** Walking across carpets generates static electricity that can destroy sensitive microchips. Always wear anti-static wrist straps or ground yourself before touching internal PC components. Use Surge Protectors and Uninterruptible Power Supply (UPS) units.
2. **Remove Conductive Jewelry:** Remove metal rings, wristwatches, and metallic necklaces before servicing hardware to prevent short circuits and electrical shock.
3. **Unplug Power Outlets:** Always disconnect main AC power cables before opening computer chassis. CPU processors can overheat and burn out within 3 seconds if operated without an attached heatsink and cooling fan!

6 Workplace Accidents and Emergency Management

6.1 Accident vs. Emergency

- **Accident:** An unplanned, uncontrolled, or unforeseen event that results in physical injury, ill health, or damage to property/goods (e.g., slipping on liquid, knocking over expensive glassware).
- **Emergency:** A critical, life-threatening crisis situation requiring immediate, organized response and specialized intervention (e.g., building fire, toxic chemical spill, customer heart attack).

6.2 Identifying and Handling Workplace Accidents

Common workplace accidents include:

1. **Trip and Fall:** Tripping over loose electrical cords, goods left in aisles, or elevated thresholds.
2. **Slip and Fall:** Slipping on wet floors, grease, or broken floor tiles.
3. **Escalator and Elevator Accidents:** Sudden elevator jerks, threshold tripping, or clothes catching in escalator steps.
4. **Falling Objects:** Heavy items or boxes falling off high storage racks onto workers.
5. **Moving Objects:** Trolleys or equipment crashing into personnel.

Important Note

Immediate Accident Response Steps: 1. Attend to the injured person immediately and provide basic First Aid within your authorized limits.
2. Inform your immediate supervisor with accurate details of the incident.
3. Assist the supervisor in investigating the root cause to prevent future recurrences.

6.3 Limits of Responsibility and Authority

Employees must act strictly within their authorized duties during emergencies:

- Do not attempt complex medical procedures unless certified in Advanced First Aid / CPR.
- Follow emergency instructions issued by designated Safety Officers, Floor Wardens, and Emergency Services.
- Certified professionals alone are authorized to take emergency decisions beyond standard organizational SOPs.

6.4 General Evacuation Procedures

During natural (earthquakes, floods) or man-made (fire, chemical leaks) disasters, follow these evacuation steps:

1. Stop work immediately upon hearing the evacuation alarm and guide visitors toward nearest Emergency Exits.
2. Carry essential handheld personal belongings only; do not return to collect items.
3. **NEVER use elevators or escalators** during power failures or fire emergencies; use emergency exit stairwells.
4. Proceed directly to the designated **Emergency Assembly Area** outside the building and report missing colleagues to Floor Wardens.

7 Fire Safety and Extinguishers

7.1 Fire Prevention and Ignition Sources

Fire requires three elements (**Fire Triangle**): Fuel, Oxygen, and Heat/Ignition Source. Eliminating any one element extinguishes the fire.

- **Ignition Sources:** Open flames (lighters, gas torches), friction sparks (saws, grinders), heat sources (space heaters, overloaded motors), and spontaneous chemical combustion.
- **Preventive Rules:** Store flammable liquids in fireproof cabinets; clear combustible paper/wood away from electrical panels; ensure equipment grounding.

7.2 Classes of Fire and Suitable Extinguishers

Table 3: Classification of Fires and Recommended Extinguishing Media

Fire Class	Combustible Material Involved	Suitable Extinguishing Agent
Class A	Ordinary combustibles (Wood, Paper, Cloth, Trash)	Water, ABC Dry Powder, Foam
Class B	Flammable liquids (Petrol, Diesel, Paints, Oils)	CO_2 Extinguisher, Mechanical Foam, Dry Powder
Class C	Flammable gases (LPG, CNG, Methane, Propane)	Dry Chemical Powder, CO_2
Class D	Combustible metals (Magnesium, Titanium, Sodium)	Special Dry Powder (D-Type)
Electrical	Live electrical equipment, computers, circuit boards	CO_2 , Dry Chemical Powder (NEVER Water!)

7.3 Operating Fire Extinguishers: The PASS Method

Guideline / Rule

The PASS Technique for Operating Fire Extinguishers:

1. **P – Pull:** Pull the safety pin located at the top of the extinguisher handle to break the tamper seal.
2. **A – Aim:** Aim the extinguisher nozzle or hose at the **base of the fire**, not at the flames.
3. **S – Squeeze:** Squeeze the operating lever steadily to discharge the extinguishing agent.
4. **S – Sweep:** Sweep the nozzle from side to side across the base of the fire until completely extinguished.

8 First Aid and Electrical Rescue Techniques

8.1 First Aid Kit Requirements

Every establishment must maintain accessible, clearly marked First Aid Stations stocked with sterile cotton, gauze bandages, antiseptic solution (Betadine/Dettol), adhesive tapes, burn ointments, pain relievers, scissors, gloves, and a CPR face shield.

8.2 Electrical Safety and Rescue Techniques

When an individual receives an electric shock, muscle cramping often prevents them from letting go of the live electrical conductor.

Guideline / Rule

Step-by-Step Electrical Rescue Procedure:

1. **Safety First:** Do NOT touch the victim or conductive metal surfaces with bare hands while they are in contact with live current!
2. **Disconnect Power:** Immediately turn off the main circuit breaker or switch.
3. **Isolate Victim:** If power cannot be switched off, use a non-conductive object (dry wooden stick, rubber mat, thick dry rope) to pull or push the victim away from the live wire.
4. **Call Emergency Services:** Call 108 / 112 for medical help immediately.

8.3 Cardiopulmonary Resuscitation (CPR)

If an electrical shock victim is unconscious, not breathing, or has no pulse, perform CPR immediately:

1. **Airway:** Lay victim flat on their back, tilt head back gently, lift chin, and clear mouth of obstructions.
2. **Breathing (Rescue Breaths):** Pinch nose shut, place mouth over victim's mouth forming a tight seal, and give 2 effective rescue breaths until chest rises.
3. **Chest Compressions:** Place heel of hand on center of victim's chest, interlock fingers, and compress chest vertically at a rate of 100–120 compressions per minute (ratio of 30 compressions to 2 rescue breaths) until medical help arrives.

9 Comprehensive Question Bank

9.1 Multiple Choice Questions (MCQs)

1. What is defined as a state of complete physical, mental, and social well-being of an employee?

- A) Security
- B) Health
- C) Safety
- D) Ergonomics

Answer: B) Health

Explanation: Health encompasses physical, mental, and social well-being, whereas safety refers to freedom from hazards, and security ensures protection from harm.

2. Which of the following is a physical hazard at the workplace?

- A) Bare electrical wire
- B) Wet slippery floor
- C) Toxic chemical fumes
- D) Repetitive mouse clicking

Answer: B) Wet slippery floor

Explanation: Slippery floors, loose carpet tiles, and uneven surfaces represent physical hazards leading to slips and trips.

3. What condition is caused by compression of the median nerve at the wrist due to repetitive typing?

- A) Computer Vision Syndrome
- B) Carpal Tunnel Syndrome
- C) Lumbar Spondylosis
- D) Tinnitus

Answer: B) Carpal Tunnel Syndrome

Explanation: Carpal Tunnel Syndrome (CTS) is a nerve compression disorder resulting from repetitive wrist strain and poor typing posture.

4. At what distance should a computer monitor be placed from the user's eyes?

- A) 5 – 10 inches
- B) 10 – 15 inches
- C) 20 – 24 inches (Arm's length)
- D) 35 – 40 inches

Answer: C) 20 – 24 inches (Arm's length)

Explanation: Ergonomic standards state that the screen should sit approximately an arm's length (20 – 24 inches) away with the top of the monitor at eye level.

5. Which type of fire extinguisher must NEVER be used on live electrical fires?

- A) Carbon Dioxide (CO_2)
- B) Dry Chemical Powder
- C) Water Extinguisher
- D) ABC Extinguisher

Answer: C) Water Extinguisher

Explanation: Water conducts electricity and will cause severe electrocution if sprayed on live electrical circuits.

6. In the PASS method for operating fire extinguishers, what does the second letter 'A' stand for?

- A) Activate alarm
- B) Aim at base of fire
- C) Apply pressure
- D) Assess damage

Answer: B) Aim at base of fire

Explanation: PASS stands for Pull the pin, Aim at the base of the fire, Squeeze the lever, and Sweep side to side.

7. How quickly can a modern CPU processor overheat if operated without a heatsink attached?

- A) Within 3 seconds
- B) Within 5 minutes
- C) Within 15 minutes
- D) Within 1 hour

Answer: A) Within 3 seconds

Explanation: Modern high-speed processors generate extreme heat instantly and will suffer permanent thermal damage within 3 seconds without a heatsink.

8. What rule is recommended to prevent eye strain and dry eyes while working on computers?

- A) 10-10-10 Rule
- B) 20-20-20 Rule
- C) 30-30-30 Rule
- D) 50-50-50 Rule

Answer: B) 20-20-20 Rule

Explanation: The 20-20-20 rule advises taking a break every 20 minutes to look at an object 20 feet away for 20 seconds.

9. Which chemical test parameter measures the acidity or alkalinity of workplace drinking water?

- A) Turbidity index
- B) pH value
- C) Ozone level
- D) Microbial count

Answer: B) pH value

Explanation: Chemical analysis tests water quality by measuring its pH value, dissolved oxygen, and chemical impurities.

10. During a building fire evacuation, which transport system should NEVER be used?

- A) Emergency stairwells
- B) Fire exit doors
- C) Elevators / Lifts
- D) Ramps

Answer: C) Elevators / Lifts

Explanation: Elevators must never be used during fires due to risk of power failure trapping occupants inside shaft shafts.

9.2 Assertion-Reasoning Questions

Directions: In the following questions, a statement of Assertion (A) is followed by a statement of Reason (R). Mark the correct choice as:

- A) Both (A) and (R) are true and (R) is the correct explanation of (A).
- B) Both (A) and (R) are true but (R) is NOT the correct explanation of (A).
- C) (A) is true but (R) is false.
- D) (A) is false but (R) is true.

1. **Assertion (A):** Laptops are not ideal for continuous working over extended hours without external accessories.

Reason (R): In laptops, the display screen and keyboard are physically connected close together, making it impossible to position both at ergonomically correct heights simultaneously.

Answer: A) Both (A) and (R) are true and (R) is the correct explanation of (A).

Explanation: Because screen and keyboard cannot be separated, user posture is compromised, causing neck or arm strain.

2. **Assertion (A):** Water must never be thrown onto a live electrical fire.

Reason (R): Water acts as an electrical conductor and can electrocute the person attempting to put out the fire.

Answer: A) Both (A) and (R) are true and (R) is the correct explanation of (A).

Explanation: Unfiltered water conducts electricity, creating a lethal electrocution path back to the user.

3. **Assertion (A):** Technicians must ground themselves or wear anti-static wrist straps when handling computer microchips.

Reason (R): Static electricity generated by walking on carpets can discharge into delicate microprocessors and permanently burn their internal circuits.

Answer: A) Both (A) and (R) are true and (R) is the correct explanation of (A).

Explanation: Static high-voltage discharge destroys sensitive semiconductor junctions instantly.

4. **Assertion (A):** Using a computer monitor in a pitch-dark room causes severe eye fatigue.

Reason (R): High brightness contrast between a bright computer screen and dark surrounding ambient room light strain pupils.

Answer: A) Both (A) and (R) are true and (R) is the correct explanation of (A).

Explanation: Extreme lighting contrast causes eye muscles to constantly adjust, leading to fatigue and Computer Vision Syndrome.

5. **Assertion (A):** During a workplace emergency, an employee should immediately carry out complex medical treatments on injured coworkers.

Reason (R): Only certified and properly trained first aid personnel are authorized to perform medical treatments beyond basic company SOP limits.

Answer: D) (A) is false but (R) is true.

Explanation: Uncertified employees should not perform complex medical procedures as improper treatment can aggravate injuries.

9.3 One-Word / Brief Answer Questions

1. What is the term for anything that has the potential to cause harm or injury to people at work?
Answer: Hazard.
2. Which science deals with arranging equipment and tasks so people can use them comfortably and safely?
Answer: Ergonomics.
3. What is the full form of CTS in computer health hazards?
Answer: Carpal Tunnel Syndrome.
4. What is the probability that a hazard will cause harm to an individual?
Answer: Risk.
5. Name the 4-step acronym technique used to operate a portable fire extinguisher.
Answer: PASS (Pull, Aim, Squeeze, Sweep).
6. Which class of fire involves flammable liquids like petrol, diesel, and paints?
Answer: Class B Fire.
7. What emergency life-saving procedure combines chest compressions with rescue breathing?
Answer: CPR (Cardiopulmonary Resuscitation).
8. What device protects computer hardware from sudden high-voltage line spikes?
Answer: Surge Protector.
9. Name the non-fixed keys on a keyboard where fingers should rest in home position.
Answer: ASDF (left hand) and JKL; (right hand).
10. What is the designated safe location outside a burning building where evacuated employees gather?
Answer: Emergency Assembly Area.

9.4 Differentiate Between Questions

1. Differentiate between Hazard and Risk.

Feature	Hazard	Risk
Definition	Any object or condition with intrinsic potential to cause harm.	The likelihood/probability that harm will occur from exposure to a hazard.
Nature	Static attribute of a substance or equipment.	Calculated statistical probability and severity of potential injury.
Example	Bare electrical wire lying on floor.	The chance that a worker steps on the bare wire and receives an electric shock.

2. Differentiate between Physical Hazards and Ergonomic Hazards.

Feature	Physical Hazards	Ergonomic Hazards
Source	Environmental factors (wet floors, noise, machinery, height).	Improper workstation setup, awkward postures, repetitive movement.
Onset of Injury	Usually immediate acute injury (fracture, cut, burn).	Gradual, chronic cumulative strain over long periods.
Example	Slipping on oil spill; tripping over loose wire.	Developing Carpal Tunnel Syndrome from repetitive mouse use.

3. Differentiate between Accident and Emergency.

Feature	Accident	Emergency
Scale	Unplanned event causing localized injury or minor goods damage.	Severe crisis situation threatening multiple lives or overall business continuity.
Response Needed	Standard First Aid, supervisor reporting, incident logging.	Immediate full evacuation, fire brigade, external medical services.
Example	Dropping a monitor glass; minor finger cut.	Major building fire outbreak; toxic gas leakage.

4. Differentiate between Class A Fire and Class B Fire.

Feature	Class A Fire	Class B Fire
Fuel Material	Solid ordinary combustibles (Wood, Paper, Trash, Cloth).	Flammable liquids (Petrol, Diesel, Kerosene, Paints).
Extinguisher Agent	Water, ABC Dry Powder, Foam.	Carbon Dioxide (CO_2), Mechanical Foam, Dry Powder.
Water Usage	Water effectively cools Class A fires.	Never use water (liquid floats and spreads fire!).

5. Differentiate between Health and Safety.

Feature	Health	Safety
Focus	Overall physical, mental, and physiological well-being.	Freedom from operational risks, acute physical injuries, and hazards.
Target Factors	Air quality, drinking water, cafeteria hygiene, stress levels.	Safe equipment handling, fire protection, electrical insulation.
Outcome	Prevention of chronic occupational diseases.	Prevention of sudden physical workplace accidents.

9.5 Short Answer Questions

1. Why are standard health and safety practices especially important in the IT industry?

Answer: In the IT industry, employees continuously sit in front of computer screens for prolonged, non-fixed hours doing repetitive tasks. Adopting health and safety practices prevents

chronic visual strain, musculoskeletal disorders, and mental stress, thereby ensuring high employee productivity and zero operational downtime.

2. **What is Computer Vision Syndrome (CVS) and how can it be prevented?**

Answer: CVS is a group of eye and vision problems resulting from prolonged computer use due to screen glare, poor lighting, and screen flicker. Symptoms include dry eyes, blurred vision, and headaches. It is prevented by using anti-glare filters, maintaining screen distance of 20 – 24 inches, following the 20-20-20 rule, and adjusting monitor contrast.

3. **Explain the key steps of the Hierarchy of Hazard Control.**

Answer: The hierarchy orders control measures from most to least effective: (1) Elimination (completely removing the hazard), (2) Substitution/Engineering Controls (isolating the hazard via noise barriers or machine guards), (3) Administrative Controls (safety training, warning signs), and (4) Personal Protective Equipment (wearing gloves, earplugs, goggles).

4. **What cautions must be taken regarding static electricity before repairing a PC chassis?**

Answer: Static electricity built up on human skin can instantly ruin delicate semiconductor microchips. Technicians must touch grounded metal surfaces or wear anti-static wrist straps before handling circuit boards, and always unplug the main AC power cord.

5. **List four basic emergency evacuation rules for office staff.**

Answer: (1) Stop work immediately and guide visitors toward emergency exits. (2) Carry handheld personal items only; do not return for lost goods. (3) Use stairwells instead of elevators or escalators. (4) Proceed to the Emergency Assembly Area and report to floor wardens.

9.6 Long Answer Questions

1. **Explain Carpal Tunnel Syndrome (CTS) in detail, including causes, symptoms, ergonomic keyboard setup, and prevention rules.**

Answer: Carpal Tunnel Syndrome (CTS) is a severe repetitive strain injury affecting IT professionals. It occurs when the median nerve running from the forearm into the palm becomes squeezed or compressed at the wrist joint due to repetitive typing or awkward wrist bending.

Causes & Symptoms: Typing with bent wrists, resting forearms on sharp desk edges, and gripping a mouse tightly cause nerve inflammation. Symptoms include burning pain, numbness, tingling sensations in thumb and fingers, and loss of grip strength.

Ergonomic Setup & Prevention:

- Position wrists straight and parallel to the desk surface, using padded wrist rests.
- Keep keyboard and mouse at identical height levels right next to each other.
- Rest fingers over keyboard home keys (ASDF – JKL;) without bending wrists upward.
- Use split ergonomic keyboards and vertical mice that promote neutral wrist alignment.
- Take short 5-minute typing breaks every hour to stretch hands and fingers.

2. **Describe the main classes of fire, ignition sources, and the step-by-step procedure (PASS method) for operating a fire extinguisher.**

Answer: Fire requires Fuel, Oxygen, and Ignition Heat to sustain combustion. Common

ignition sources in offices include open flames, friction sparks, overloaded electrical sockets, space heaters, and chemical reactions.

Classes of Fire:

- **Class A:** Solid organic combustibles (wood, paper, cloth). Extinguished by Water or ABC Dry Powder.
- **Class B:** Flammable liquids (petrol, diesel, paints). Extinguished by CO_2 or Mechanical Foam (**Never Water**).
- **Class C:** Flammable gases (LPG, CNG). Extinguished by Dry Chemical Powder.
- **Electrical Fire:** Live electrical circuits. Extinguished by CO_2 or Dry Chemical Powder (**Never Water**).

Operating Fire Extinguishers (PASS Method):

- (a) **P – Pull:** Pull out the safety locking pin to break the tamper seal.
- (b) **A – Aim:** Point the discharge nozzle or horn at the **base of the fire**.
- (c) **S – Squeeze:** Squeeze the top lever firmly to release the extinguishing agent.
- (d) **S – Sweep:** Sweep the nozzle from side to side across the base of the fire until completely put out.

3. Discuss electrical hazards in an IT facility, rescue techniques for electric shock victims, and step-by-step CPR execution.

Answer: Electrical hazards stem from bare live wires, damaged insulation, ungrounded computer power supply units, and handling electrical switches with wet hands.

Electrical Shock Rescue Techniques:

- (a) **Do Not Touch directly:** Never grab an electric shock victim with bare hands while they are touching live current.
- (b) **Disconnect Power:** Immediately turn off main circuit breakers or pull out plugs.
- (c) **Isolate with Non-Conductor:** Push the victim away from live conductors using a dry wooden pole, rubber rod, or dry folded newspaper.

Cardiopulmonary Resuscitation (CPR) Procedure:

- (a) **Airway:** Lay victim on back, tilt head back gently, lift chin up, and check mouth for blockages.
- (b) **Rescue Breathing:** Pinch nostrils closed, place mouth over victim's mouth forming an airtight seal, and deliver 2 steady rescue breaths.
- (c) **Chest Compressions:** Place heel of hand on lower center of breastbone, interlock fingers of second hand, keep arms straight, and compress chest vertically 2 inches deep at 100 – 120 compressions per minute (30 compressions : 2 breaths ratio) until medical professionals arrive.

9.7 Case-Study / Competency-Based Questions

1. Case Scenario 1: IT Workstation Ergonomic Assessment

Rohan, a senior Data Entry Operator at an IT firm, works 9 hours daily. Lately, he complains of severe lower back pain, burning sensation in upper neck, and dry red eyes by evening. His workstation reveals that his chair has no lumbar support, his monitor is placed 10 inches above eye level on a high shelf, and there is an unshielded glass window directly behind his monitor reflecting bright sunlight.

Questions & Answers:

- a) Identify the specific ergonomic causes of Rohan's lower back pain and upper neck burning.
Answer: Lack of lumbar chair support causes lower back pain. Position of monitor 10 inches above eye level forces him to tilt his head backward, causing upper neck muscle burning.
- b) Why is Rohan suffering from dry red eyes, and how can window light be managed?
Answer: Window light behind monitor creates extreme reflective glare and high contrast, forcing Rohan to blink less. Blinds/drapes should be installed on windows and the computer desk rotated at right angles (90°) to windows.
- c) Suggest three immediate workstation layout changes for Rohan.
Answer: (1) Lower monitor top to eye level at arm's length distance (20 – 24 inches). (2) Adjust chair backrest height or insert a lumbar cushion. (3) Follow 20-20-20 eye rest rule.

2. Case Scenario 2: Electrical Fire Incident in Server Room

During night shifts at a data center, an overloaded power socket attached to a server rack begins sparking, catching fire on nearby unorganized paper files stacked against the rack. A junior operator panics, grabs a bucket of tap water from the washroom, and runs to splash it onto the sparking server rack.

Questions & Answers:

- a) Was the junior operator's decision to use tap water correct? Explain why.
Answer: No, tap water conducts electricity. Splashing water on live server racks causes electric shocks and electrocution.
- b) Which fire extinguisher class and type should be used for this server room fire?
Answer: CO₂ (Carbon Dioxide) or Dry Chemical Powder fire extinguisher (suitable for live electrical fires).
- c) State two preventive safety rules violated in this server room.
Answer: (1) Overloading power outlets beyond rated amperage. (2) Stacking flammable paper files directly against electrical server racks.

3. Case Scenario 3: Emergency Evacuation Drill

While working on the 4th floor of a software company building, the main smoke alarm rings continuously. Smoke is seen rising from the central air conditioning duct. Employee Priya gathers her handbag, grabs her laptop bag, calls her colleagues, and runs toward the elevator to reach the ground floor quickly.

Questions & Answers:

- a) Explain why Priya's choice to use the elevator during the fire alarm is dangerous.
Answer: Elevators can suffer power cuts during fires, trapping occupants inside shafts filled with toxic smoke.

b) What route should Priya and her colleagues take to evacuate the 4th floor?

Answer: They must use the designated fire exit emergency stairwells.

c) Where should all employees report after exiting the building, and why?

Answer: They must gather at the designated Emergency Assembly Area outside so floor wardens can take headcount and identify missing personnel.