Laboratory Safety Guidelines
Discipline Of Physics

Safety Guidelines in Computing Labs

1. Computing lab should be maintained clean, organized, and properly lighted.
2. Keep your workspace clean and free of clutter. Dust can affect computers adversely. Ensure that the machines are cleaned on a regular basis.
3. Everyone must understand and follow safety procedures
4. Follow the basic safety guidelines to prevent cuts, burns, electrical shock, and damage to eyesight
5. Sharp edges inside the computer case should be covered with tape.
6. Do not spill water or any other liquid on the machine. It can cause short circuit fire as well as damage the machine.
7. Do not touch areas in printers that are hot or that use high voltage. Remember that some components retain a high voltage even after the printer is turned off.
8. Do not open a power supply or a CRT monitor. They contain high voltages.
9. Beware that Electrostatic discharge (ESD), harsh climates, and poor-quality sources of electricity can cause damage to computer equipment. Use equipment that stabilizes power to prevent equipment damage and data loss.
10. Beware that too high temperatures can cause the equipment to overheat, low humidity increases the chances of ESD, while high humidity can cause moisture damage to the equipments. It is recommended to have AC installed in your computing lab for protection against such damages.
11. To avoid eye fatigue and Computer vision syndrome, blink your eyes often/ relax eyes by closing them for few minutes at regular intervals or perform eye exercises. Look away from the screen once in a while to give your eyes a rest. Use quality display screen and avoid glare.
12. Sit straight and in comfortable posture to avoid neck and back pains.
13. Spread fingers apart or rotate wrists at regular intervals to avoid Carpal tunnel syndrome.
14. A fire extinguisher and first-aid kit should be available in case of fire or injury.

15. Poorly placed or unsecured cables can cause tripping hazards in a Computing lab. If there are many cables, they should be installed in conduit or cable trays to avoid clutter and prevent hazards.
16. Before performing service for malfunctioning equipment, the power should be switched off and equipment should be unplugged.
17. Do not eat, drink, smoke, or apply cosmetics in the laboratory.
18. Bend your knees when lifting heavy objects to avoid injuring your back.
19. Electrical devices have certain power requirements. For example, AC adapters are manufactured for specific laptops. Exchanging power cords with a different type of laptop or device may cause damage to both the AC adapter and the laptop.
20. Be alert for odors emitting from computers and electronic devices to prevent accidents in case of fire. When electronic components overheat or short out, they emit a burning odor.
21. UPS should never be overloaded. Refrain from connecting heavy load equipment such as laser printer to UPS.
22. You should use Surge suppressor, UPS as well as standby power supply to shield your equipments against power fluctuation problems.
23. Proper disposal or recycling procedures as recommended by manufacturer should be followed when disposing of computer equipments as many of them contain trace amount of hazardous materials.

Safety Guidelines in Cryostat, Furnace and Thin Film Labs

Hydraulic Press:

1. Put 'shield' before applying pressure
2. Do not apply more than 5 ton pressure when using a 10 mm die set for making pellets.
3. Always release the pressure valve once the pellet has been removed.
4. The pressure valve must be given maximum 2 turns.

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Furnaces:

1. Check earthing voltage at the industrial plugs before switching on the furnaces. It should be less than 1 V.
2. Never open any furnace above 100°C.
3. While using bulk furnace, all the samples must be covered.
4. Bulk furnace filaments should not be touched by hand and the samples must be kept away from them.
5. Furnace room exhaust fan and the ceiling fan must always be kept ON when any of the furnaces is working to maintain air circulation.
6. While using tube furnace the radiation blocks must always be placed at both the ends.
7. For monitoring gas flow in tube furnace oil must be placed only when observing and removed at all other times.
8. Never go beyond the maximum temperature limit of the furnaces.

Closed cycle cryostat system:

1. Check the earthling voltage of the switches which should be less than 1 Volt.
2. Check the load on the UPS before switching on the instrument.
3. Check the static pressure on the Helium compressor before switching it on. It should be 290 psi.
4. The chiller must be on before switching on the compressor.
5. Make sure the vacuum of the cryostat chamber is below 4 x10-5 mbar before switching on the Helium compressor.
6. Check the dynamic pressure of the compressor after turning it on. It should be between 300-310 psi.
7. Close the knob connecting the vacuum pump to cryostat before temperature reach 77 K.

PLD:

1. Before switching on the assembly, check the earthing voltage. It should always be less than 1 V.
2. Always check the gas pressure at all the cylinders before use.
3. When the Laser is operating, there should not be any eye contact either with the direct beam or scattered/reflected beams. Be alert in the lab when Laser is on.
4. Always wear 'laser glasses' while working on Laser.
5. When laser is operating one should never enter the region between the Laser and chamber as it can turn hazardous.
6. While depositing films, cold cathode gauge should never be switched on in presence of gas.
7. All the cylinders must always be kept locked with chains.

Sample synthesis:

1. Use mask and gloves while grinding toxic/harmful powders. Do not touch powders with bare hands.
2. Avoid using acetone for cleaning. If required to use acetone anyway, do NOT inhale acetone, use mask.

Safety Guidelines in Physics Labs(M.Sc., B.Tech., Material Research Lab)

1. Wear impact-resistant safety goggles in the laboratory when instructed to do so.
2. Goggles binoculars, telescopes, spectroscopes, 3-D glasses, or any laboratory devices that are positioned near the eyes, should be sanitized before and after use.

   This does not apply if such goggles belong to you, and you are the only person using them.

3. Do not position yourself under hanging masses or other heavy objects. Be attentive to the possibility that top-heavy equipment may topple over.
4. Stay out of the path of moving objects to avoid injury.
5. Handle hot materials with protective gloves. Be careful around steam. Keep hands and face away from spouts that emit steam. Be aware that true steam is invisible.
6. When working with electrical circuits: Ensure the electrical ground connection in your lab before switching on the electrical instruments.
   a. Construct only those circuits prescribed by the laboratory write-up.
   b. Do not turn on the power supply until the instructor has checked your circuit.
   c. Use only currents and voltages prescribed in laboratory write-up.
   d. Do not allow electrical circuits to dangle over the edge of your lab table.
   e. If you observe smoke, melting, or other electrical irregularity, turn the power off immediately and notify instructor.
   f. Turn off and unplug electrical equipment when finished. Wrap power cords around equipment, or bind them with rubber bands. Do not leave cords dangling in the aisles.
   g. Unplug equipment by pulling on plug, not cord.
7. When using lasers: (Ensure you wear protective glasses before switching on the laser)
   a. Do not shine laser in anyone's eyes, including your own.
   b. Do not look into laser, even when it is turned off.
   c. Do not look directly at the beam's reflection off a shiny surface.

8. When working with radioactive materials:

   a. Never put radioactive sources in mouth or near face.

   b. Make sure all radioactive sources are accounted for before leaving the laboratory.

   c. Wear gloves and lab coats when handling radioactive minerals or liquids. Wash your hands with soap after coming into contact with such materials. This does not apply to plastic encased samples, which require no special handling.

   d. Use the principles of TIME, DISTANCE, and SHIELDING to minimize your exposure.

   - Decrease TIME spent next to sources.
   - Increase DISTANCE between you and the source.
   - Increase SHIELDING between you and the source.

9. Spectrum tube power supplies operate at HIGH VOLTAGE. Always turn power supply OFF and let it cool for a minute before attempting to change a tube.
10. When working with lenses, mirrors, or other glassware:

    a. Examine the item carefully before picking it up. If it is chipped or cracked, you could get cut.

    b. Bring any chipped, cracked, or broken glassware to the attention of your instructor.

    c. Do not set lenses or mirrors near the edge of a lab table, from which they might fall.

    d. Do not stack anything on top of a lens or mirror.
11. Never look at the intense source of light either directly with the naked eye or through a any lens or telescope.