



SOP
FOR MAINTENANCE AND
UTILISATION
OF
LABORATORIES



PREPARED BY
THE INTERNAL QUALITY
ASSURANCE CELL,
Siliguri Institute of Technology

A NAAC Accredited Institution

MARCH 8, 2022



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*“I will be the guide to the consistency safety
sustainability progress and prosperity”*

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Introduction:

Siliguri Institute of Technology is committed to deliver the state-of-the-art Laboratory facilities to encompass the Laboratory practical works integrated in Engineering curriculum to provide students with hands-on skills, better understanding of theoretical courses and expose them to knowledge in relevant engineering field. The purpose of this manual is to ensure the utmost utilization, maintenance, development, and safety of different laboratories of the Institute. A set of rules and regulations regarding the management, safety measures, procurement, utilization, maintenance and upgradation of the different laboratories, and the responsibilities of all the stake holders must be followed with zero tolerance.

Objectives:

The objective of this manual is to provide in a concise format of the Policies and Aims of the Institution for building up a Quality Management System and thereby Achieving Quality Assurance in the different Engineering Laboratories.

- Maximum utilization of resources is ensured.
- Desired level of quality accuracy and efficiency of the resources are ensured.
- Errors in can be minimized and deviations from the quality policy can be detected and necessary corrective measures can be carried out.
- The experiments and research works conducted, and results can be made reliable to the desired level.
- Safety of Human being, Apparatus and Machines involved in the various actions can be ensured by preventing Threats and Hazards.

Laboratory Structure and Facilities:

According to the university syllabus of a particular course the Laboratories shall be appropriately designed and structured by considering the following significant factors:

- Proper Ventilation and air conditioning
- Proper Lightning
- Storeroom with shelves and cabinets
- Furniture
- Wash basin
- First Aid Kit
- Non-Slippery Floor
- High Voltage Electrical insulation mats on floor or insulating

footwear

- Fire Fighting Equipment

Major Resources of the Laboratories:

The Institute must provide the following essential resources for different laboratories.

1. Major modern Equipments
2. Consumable items
3. Stock registers for non-consumable and consumable items
4. Unserviceability and Repair Record Register
5. Maintenance Record Register
6. Laboratory Course File
7. Laboratory Manual/Handbook
8. Attendance Register
9. Technical Assistant/Laboratory Instructor
10. Teacher in-Charge

Routine Works in the Laboratory:

1. Preparation of the Laboratory Course Files for the current semester.
2. Physical verification of the Laboratory Equipments and consumable items and updating of the stock register before the commencement of the current semester.
3. Placing demand for the additional requirements of non-consumable and consumable items.
4. Placing demand for new Laboratory setup (if applicable).
5. Arrangement of Equipments and other facilities on Experimental Test bench.
6. Housekeeping should be ensured to provide hygiene and safety in the laboratory.
7. DI (daily inspection) of Major Equipments before the commencement of the Laboratory.
8. Conduction of laboratory according to the Laboratory schedule.
9. Record any malfunction/defect/damage observed during DI or during experiment in the Unserviceability and Repair Record Register and inform the Teacher-in-Charge and Technical Supervisor/HOD for subsequent remedial measure.

Procedure for New Laboratory Setup:

A new Laboratory is required to be set up whenever a new program is launched or a new subject in existing program is introduced. Details of activities to be performed to setup a new Laboratory are described below.

- Prior to the start of the course, identify the various requirements such

as Faculty and Technical staff, space, and material according to the university syllabus/curriculum.

- Prepare the list of the various requirements i.e., furniture requirement, electrical requirement, Laboratory equipment, consumables etc. after the brain storming session of departmental academic committee, purchase committee led by the head of the department.
- Invite quotation of materials from multiple reputed vendors.
- Prepare the comparative statement of the prices quoted by different vendors who satisfy the subject requirements.
- Prepare the approximate budget and get approval from higher authorities.
- Call the vendors for price negotiations at the Institute purchase committee meeting.
- On the recommendation of purchase committee, the vendors are finalized.
- The purchase order to be placed by the Institute purchase committee after approval by the Principal/Administrator/GCEO.
- Based on the terms and conditions of the purchase order the selected vendor supplies and installs the equipment. The technical expert of the vendor provides necessary training to the concerned Teacher-in-Charge and Laboratory technicians.
- The Challan and Tax Invoice is passed after the purchased items satisfy all requirements.
- The details of the material including installation and test report, warranty card, AMC (wherever applicable) are entered in the departmental main stock register as well as laboratory stock register.
- The passed invoice is sent to the accounts section for bill settlement.

Procedure for Purchase of Equipment and Consumables in existing Laboratory:

To meet the additional requirement or to replenish consumables and replace the obsolete equipment the concerned Teacher in-Charge of a laboratory prepares the requisition of the material.

- All the requisitions of the department are scrutinized by the departmental purchase committee.
- The departmental purchase committee prepares the consolidated requisition for all the laboratories in line with the approved budget allocation.
- Quotation for the materials to be procured are obtained from multiple reputed vendors.
- Requisition along with quotation are sent to the institute purchase committee after the recommendation of the Head of the Department

or Program coordinator.

- Requisition is to be approved by the Administrator and the Principal of the Institute through Project manager.
- Approval by higher authority (GCEO) may be required. After all the approvals supply order/ work order is generated and sent to the concerned vendor for delivery of materials.
- New Equipments and materials being supplied to the laboratories shall be received by technician or store in-Charge after verification of specified quality and working condition in presence of the teacher in-Charge and supplier's representative.
- All assembly, installation, and commissioning work of sophisticated Equipments shall be carried out by technical experts authorized by the supplier. Necessary entries to be maintained in the stock register.

Procedure for Repairing Works to be done:

Despite all sorts of maintenance carried at times a fault may arise on an equipment due to mishandling, ageing or environmental cause. The department should form a centralized Repair and Maintenance Cell for all the laboratories.

- As soon as any defect arises on an equipment the Technical Staff must inform the Teacher in-Charge and record in the Unserviceability and Repair Record register.
- If the faulty equipment is under Warranty or AMC, the concerned Supplier to be informed telephonically and by email to rectify the fault as soon as possible.
- If the equipment is beyond warranty or AMC, an attempt to repair the equipment is to be initiated at the department by repair and maintenance cell or at institute level.
- If the defect is beyond the scope of local repair, then requisition for repair will be raised by teacher in-charge of concerned laboratory which will be approved by HOD with due consideration of repairing cost involved and cost of new equipment.
- Quotation for repairing to be obtained from a concerned repairing agency
- Requisition for repair along with quotation to be forwarded to the Project manager for approval by the Administrator/Principal/GCEO.
- After getting the approval of repair from the concerned authority work order to be raised by the purchase committee and to be sent to the repairing agency.
- Repairing work may be done on site or the faulty equipment to be shipped to the repairing agency.
- After repair the equipment to be tested for serviceability by the technical assistant and Teacher in-Charge of the concerned

Lab/workshop and necessary record of repair to be entered in the Unserviceability and Repair record register.

- After necessary endorsement in the Tax invoice and Challan (if the faulty equipment is serviced outside the Institute) referring the Unserviceability record register entry along with Test report, forwarded to the Account Section through the Project Manager for bill settlement.
- To make the requisition and execution against those requisition for IT infrastructure (Computer and its peripherals), the network and system team member of the department will act according the following the guidelines
 - I. Make hard copy of requisition for repair of the faulty equipment.
 - II. Get an approval by the HOD/in-Charge of the department.
 - III. Make a scan copy of the requisition.
 - IV. Send an email to network and system administrator of the institute for further necessary action.

Procedure for Physical Verification:

Stock verification of the assets including the consumables of the Laboratory is done periodically once a year. The purpose of stock verification is to keep updated records for the intactness, performance and cost appraisal. It helps to replenish consumed or defected items. It supports the value of stock shown in the balance sheet, verifies the accuracy of stock records, discloses the possibility of fraud, theft or loss, or deterioration and reveals the weakness of the system, if any (i.e., whether the stock is in safe custody).

- A team consisting of in-Charge of individual Laboratories/Workshops to be constituted in a department to physically verify the stocks in all the laboratories/workshops of the concerned department.
- The departmental stock verification team has to physically count and evaluate the physical presence of the item, intactness etc. and make suitable recommendation or remark and tally the stock of individual Laboratories with the master stock register of the Department.
- Any discrepancy found in the stock to be informed to the head of the Department for necessary remedial action.
- A consolidated report of stock verification of Fixed Assets to be sent to the Project Manager through the HOD.

Laboratory Maintenance Procedure:

A Laboratory Maintenance Team must be formed for strict adherence to the routine and preventive maintenance schedule for efficient, smooth and reliable operation of all equipment and machinery. Necessary entries to be made on the maintenance registers on completion of all types of maintenance work with signature of Technicians and Supervisor attending the job.

Types of maintenance to be carried out are **Biannual/Annual maintenance** (whichever applicable). Following maintenance work to be performed:

- I. External cleaning of front and back panel of equipment, dusting out of PCBs (wherever applicable)
- II. Functional checks of all controls, switches, connectors, cables, misc. electric hardware and displays
- III. Lubrication of moving parts (wherever required)
- IV. Replacement of faulty parts
- V. Calibration checks
- VI. Endorse the necessary entries in the Log-Book/Maintenance Registers.

Responsibility of Teacher in-Charge:

The Teacher in-Charge of the laboratory is given responsibility for operation, maintenance and modernization of the concerned laboratory as follows.

- Preparation of the Laboratory Course file according to the University syllabus.
- Guide the Laboratory technician in preparation of Laboratory manual for each experiment.
- Supervise the Laboratory set up by the Laboratory technician at the beginning of the semester.
- Supervise the Laboratory conduction according to schedule.
- Supervise the Laboratory maintenance activity by technical assistant.
- Raise and follow-up requisition for repair of any faulty laboratory Equipment.
- Suggest purchase of new equipment if any in consultation with the HOD.
- Supervise the conduction of physical verification of Equipments and consumables at the end of each semester/year.
- Supervise updating of stock and maintenance register of concerned Lab.
- Whenever a new experimental set up is incorporated he has to ensure training to the technical assistant of concerned lab.

- Ensure the cleaning done by housekeeping staff to provide hygienic and safe environment of Laboratory before commencement of Laboratory class.
- The teacher in-Charge has to take necessary initiatives to achieve external funding from the Government and industry collaboration.

Responsibility of Technical Assistant:

The primary responsibility of a technical assistant is to assist students for setting up an experiment in consultation with the teacher in-Charge. The various jobs to be performed by a technical assistant are as follows

- Daily inspection of all the Equipments before the schedule lab.
- Demonstration of experiments to the students to be performed under the supervision of the teacher in-Charge.
- Minor maintenance and repair of Laboratory equipment.
- Preparation of the Laboratory manual of each experiment under the guidance of Teacher in-Charge.
- Report any malfunction or fault found during daily inspection or conduction of Laboratory class to the teacher in-Charge and make an entry in the unserviceability record register.
- Maintenance of the stock register for Equipments and consumables.
- Regular monitoring of computers and peripherals and software updates in computer-based Lab.

Role of Head of The Department:

- The requisition raised by the teacher in-Charge of any Laboratory is to be approved and forwarded to the Principal/Administrator for necessary approval of procurement/repair of subject item.
- For a new Laboratory set up he has to raise requisition for man and materials with consultation with department academic committee.
- Guide the departmental Purchase committee in consultation with the academic committee for the preparation of Laboratory budget.

Do's and Don'ts in a Lab:

Do's:

- Student should come in schedule time and in proper uniform.
- Student should put on shoes with insulated sole.
- Student should keep their bags at the designated area.
- Student should properly check the wiring and electrical connection before switching on the electrical equipment.
- Student should handle delicate instruments very gently.

- Student should take extra precaution while working with high voltage (above 50 V rms AC and 50 V DC).
- Student should perform experiments with proper guidance from teacher or technical assistant.
- Student must switch off the equipment or trainer kits immediately in the event of any unusual sparks or fire.
- Student should bring any malfunctioning or damaged to any equipment to the notice of teacher or technical staff.

Don'ts:

- Student should not leave the laboratory without the permission of teacher.
- Student should not consume any eatables inside the laboratory.
- Student should not transfer equipment to other workbench or other Laboratory without permission.
- Student should not be unmindful while using any electronic equipment or tools.
- Student should not keep the equipment in ON condition after finishing the experiment.

Laboratory Safety Measures:

- At least two people should be always there in the laboratory while students are working on live circuits.
- All conductive jewelry should be removed while entering the laboratory.
- Confine long hair and loose clothing when in the laboratory to keep them from catching fire, dipping into chemicals, or becoming entangled in moving machinery.
- Avoid wrist-bands, rakhees, rings and wrist-watches, and other wrist ornaments. These may become contaminated with chemicals, react with chemicals, or be caught in the moving parts.
- Protective aprons to be worn wherever it is required.
- Equipment should be properly arranged so that there is no contact of the Equipments with the body parts.
- Circuits should be considered 'hot' unless proven otherwise.
- Power switch should be always checked before and after the experiment.
- During disassembling a circuit, the power source should be removed first.
- No unearthed electrical or electronics apparatus should be used in the laboratory unless it is double insulated or battery operated.
- Student should be asked to be more careful about hot spots such as soldering irons etc.
- The students should be asked to report any type of hazards or damages immediately to the instructor.
- After completion of an experiment student must tidy up and leave the laboratory.

Conclusion:

The Standard Operating Procedure for laboratories and workshops has been prepared to accomplish an effective total quality management system. The implementation of SOP will ensure the credibility and reliability of the training and learning activities in the laboratories. Also, effective utilization of the resources, time and space can be achieved. Strict adherence to the rules and regulations will help in maintaining safety and health of end-users and Equipments. Proper follow-up and monitoring activities based on SOP will help to bring up the laboratory in all respect to the desired degree of quality performance and higher standards.