

# **ST.JOSEPH'S COLLEGE OF ENGINEERING**

**CHENNAI-119**

## **MAINTENANCE OF LABORATORIES**

The campus holds well established standard systems and procedures for maintaining the physical, academic and support facilities that are governed by the supervision of faculty incharges in college level. They ensure the various aspects of utilization and maintenance of the physical, academic and support facilities such as maintenance of buildings, laboratories, classrooms, library, sports complex, computers, etc.

The proper function of equipment in all laboratories is ensured in every semester by the lab technicians and minor repairs such as installing replacement parts are carried out by them as and when they are needed. Then it is recoded in service register. When there is a major repair work, the purchase committee handles the service and maintenance request appropriately by placing an order to the corresponding engineering experts during summer vacation. Stock register is maintained in all laboratories and audits are conducted by stock verification committee to check the availability and working of the equipment in every year.

First aid kits are kept in all laboratories and department to meet out any eventuality. Fire extinguishers of ISI mark of adequate capacity and numbers are provided in eye catching spots in the college buildings especially in all laboratories. Fire extinguishers are well maintained and checked periodically and refilling is done well before the due date.

*The maintenance of laboratories for various departments is furnished below.*

## **COMPUTER PROGRAMMING LABORATORIES**

- Set up weekly updates or automatic updates for computer software
- All the PCs and related equipment like printers, scanners, etc. are backed by UPS
- Installation of anti-virus program on the computers
- Back up of computers on a regular basis
- Hard disc cleanup and defragmentation utilities regularly
- All computers are checked for applications at start of semester
- Turn off all computers by selecting the shutdown option on the desktop
- Frequent maintenance of computers, AC, Printer and other equipment for every 6 months or as and when required.
- Software license renewal is done as per the license period.
- Turn off all computers by selecting the shutdown option on the desktop

## **ELECTRICAL AND ELECTROICS ENGINEERING**

### **Daily maintenance:**

- Lab technician checks the working condition of the equipment/systems on daily basis.
- ‘Apparatus required’ form is maintained in each lab to track the breakage and working of equipment’s.
- Every day cleaning of equipment and work tables are done by the lab technicians.
- Floor cleaning of labs are done on daily basis by housekeeping department of the college.

### **Weekly maintenance:**

- Floor mopping of labs are done twice in a week by housekeeping department of the college.
- The proper working of all the equipment is checked in all the laboratories with the help of the lab assistants and corrective measures are carried out.

### **Monthly maintenance:**

- The monthly maintenance report is maintained for all the laboratories by the concerned lab in charges.
- Once in three months UPS in charge checks the water level, voltage level and backup of the UPS.

### **Yearly maintenance:**

- Scrap items in the laboratories are identified with the concern of the lab in charges, HOD and inspection committee.
- After decision by the inspection committee members the scrap items are sent to the scrap yard.
- Maintenance of battery & UPS in all the laboratories is carried out quarterly.
- All the 5S (Sort, Set in order, Shine, Standardize, and Sustain) is conducted by a team of members to verify cleanliness.
- Calibration of equipment are done and a report is maintained

### **Preventive maintenance:**

- The working conditions of the equipment are periodically checked.
- The students are given instruction in handling the equipment before doing the experiments.
- Laboratory manual is given to the students which include list of experiments and the procedure of doing the experiments.

- Stock register is maintained in laboratories and audits are conducted by stock verification committee to check the availability and working of the equipment.
- Suitable thickness of the wire based on current rating is used in the fuses to avoid the malfunctioning.
- The working condition of passive elements and transistors is checked by using multi-meter and LCR Meter in all laboratories.
- The working condition of the ICs is checked using IC tester.
- UPS back up is provided for all system based laboratories.

**Breakdown maintenance:**

- Minor repairs are carried out by the lab technicians. When a major repair occurs, service report is obtained from industry person. Approval for service of equipment is obtained from concerned in charges.
- Service register is maintained in each laboratory.
- Breakdown maintenance of the personal computer is done by concerned in charges.

**Ambience:**

The infrastructure and added facilities in the laboratories create the right ambience for the students to conduct experiments in the laboratories.

- Spacious and well-furnished laboratories with good ventilation and lighting facilities are available.
- All laboratories are equipped with essential equipment to meet the requirements of the curriculum.
- For maintaining the overall good ambience, weekly cleaning of equipment and 5S audits are carried out with regular inspection by teams.
- Equipment specification for all machines is displayed.
- Identification Number for each equipment is marked on the devices/Equipment/furniture's/tables.
- Working models and devices in the form of charts are displayed in the laboratories.
- Do's and Don'ts are displayed in all the laboratories.
- List of experiments are displayed in all the laboratories.
- The laboratory manuals prepared are available in both soft and hard copies.
- Laboratories are utilized beyond the college hours for the convenience of the students and the faculties.

## **ELECTRONICS AND INSTRUMENTATION ENGINEERING**

The laboratories of EIE department are classified under two divisions such as Process Control Laboratory and Measurements and Instrumentation Laboratory. Maintenance and overall ambience for these laboratories are specified below:

### **(i) Process Control Laboratory**

The process control laboratory are comprises of Process stations and Computers.

- In Uninterrupted power supply (UPS) the battery is recharged with water as solvent. Control valve and I to P converter consist of wires and connectors and their connections is checked every month.
- Programmable Logic controller setup contains Continuity of wires and LED's and it is checked every month.
- In Pressure Process station the Leakage of air signal through connectors is checked every month. In Flow level Process station Water is changed every month to avoid dirt in pipe line.
- In Feed forward controller setup Connectors is checked every month to avoid leakage of air signal.
- In Temperature Process station Continuity of wires is checked every month. In Cascade flow level controller, the Leakage of water signal through connectors is checked every month.
- Second order liquid level system contains Water line and connection wires and it is checked every month.
- In Control valve Trainer setup Leakage of air signal through connectors is checked every month. In Computers the virus content is checked and removed every month.
- In Pneumatic trainer kit setup the Leakage of air signal through connectors is checked every month.
- The PC systems are regularly updated. All the PCs and printers are backed by UPS. Installed an anti-virus program on the computers, back up of computers on a regular basis is done. Hard disc cleanup and defragmentation utilities regularly
- Stock Verification is done each year to confirm the availability and working condition of the equipment's.

## **(ii) Measurements and Instrumentation Laboratory**

The Linear & digital Integrated circuits lab, Transducer lab, Industrial Instrumentation lab, Microprocessor and microcontroller lab, Instrumentation System Design Laboratory are comprised under a single topic as Measurements and Instrumentation Laboratory.

- In Dead weight Pressure gauge (Calibration Tester) setup the oil used to lubricate the gauge and it is replaced monthly.
- In Viscometer (Saybolt viscometer) setup to get accurate viscosity it is cleaned every month. In Multi-meter to improve the precision of the measurement its battery is replaced every month. L&T make Dual Trace Oscilloscope and it is checked for square waveform for proper functioning of oscilloscope.
- In Schering Bridge kit to get the proper balance of the bridge the damaged resistors is replaced every month.
- In Anderson Bridge kit to get the proper balance of the bridge the damaged capacitors is replaced every month. In Calibration of single phase energy meter setup to get the proper balance of the bridge the revolution is tested every month.
- In loading arrangement setup to maintain its accuracy its performance is tested monthly. In Photo Electric Tachometer to improve the precision of the Tachometer its battery is replaced monthly.
- In Hall Effect Trainer setup to maintain its accuracy the IC is calibrated for every Month. In LVDT position trainer setup to get proper output working condition is checked every month. In Vacuum Gauge tester Performance is tested monthly to maintain its performance.
- Stock Verification is done each year to confirm the availability and working condition of the equipment's.

## MECHANICAL ENGINEERING

All the labs in the department are very well equipped with all the equipment/instruments/ machines required to conduct every experiment given in the curriculum and beyond.

All the labs are equipped with good technical support staff available during working hours and beyond (as and when required).

S. no	NAME OF LABORATORY	MAINTENANCE		AMBIENCE
		DETAILS OF CHECK	FREQUENCY	
1	GE6162 Engineering Practices Laboratory	All electrical equipment's and installations are checked at start of semester	Half yearly	<ul style="list-style-type: none"> <li>• Proper Flooring</li> <li>• Proper Ventilation</li> <li>• Proper lighting and Ceiling fan provided for easy working.</li> <li>• High quality machines and equipment are used</li> </ul>
		All mechanical & electrical machines are inspected at start & mid semester	Half yearly & quarterly	
		Fire extinguishers are recharged after expiry date.	Due date on fire extinguisher	
2	GE6261 Computer Aided Drafting and Modelling Laboratory	All computers are checked for applications at start of semester	Half yearly	
		License renewal is done for the software as per the license period.	As per requirement	
		Fire extinguishers are recharged after expiry date of constituents.	Due date on fire extinguisher	
3	ME6311 Manufacturing Technology Laboratory - I	All electrical equipment and installations are checked at start of semester	Half yearly	
		All mechanical & electrical machines are inspected at start & mid semester	Half yearly & quarterly	
		Fire extinguishers are recharged after expiry date of constituents.	Due date on fire extinguisher	
4	CE6461 Fluid Mechanics and Machinery Laboratory	All electrical equipment and installations are checked at start of semester	Half yearly	

		All mechanical & electrical machines are inspected at start & mid semester	Half yearly & quarterly
		Fire extinguishers are recharged after expiry date of constituents.	Due date on fire extinguisher
		Water sump is cleaned at the regular interval	Weekly
5	ME6411 Manufacturing Technology Laboratory–II	All electrical equipment and installations are checked at start of semester	Half yearly
		All mechanical & electrical machines are inspected at start & mid semester	Half yearly & quarterly
		Fire extinguishers are recharged after expiry date of constituents.	Due date on fire extinguisher
6	ME6412 Thermal Engineering Laboratory - I	All electrical equipment and installations are checked at start of semester	Half yearly
		All mechanical & electrical machines are inspected at start & mid semester	Half yearly & quarterly
		Fire extinguishers are recharged after expiry date of constituents.	Due date on fire extinguisher
		Water sump is cleaned at the regular interval	Weekly
7	CE6315 Strength of Materials Laboratory	All electrical equipment and installations are checked at start of semester	Half yearly
		All mechanical & electrical machines are inspected at start & mid semester	Half yearly & quarterly
		Fire extinguishers are recharged after expiry date of constituents.	Due date on fire extinguisher
8	ME6511 Dynamics Laboratory	All electrical equipment and installations are checked at start of semester	Half yearly



		All mechanical & electrical machines are inspected at start & mid semester	Half yearly & quarterly
		Fire extinguishers are recharged after expiry date of constituents.	Due date on fire extinguisher
9	ME6512 Thermal Engineering Laboratory-II	All electrical equipment and installations are checked at start of semester	Half yearly
		All mechanical & electrical machines are inspected at start & mid semester	Half yearly & quarterly
		Fire extinguishers are recharged after expiry date of constituents.	Due date on fire extinguisher
		Water sump is cleaned at the regular interval	Weekly
10	ME6513 Metrology and Measurements Laboratory	All electrical equipment and installations are checked at start of semester	Half yearly
		All measuring instruments are inspected at start & mid semester	Half yearly & quarterly
		Fire extinguishers are recharged after expiry date of constituents.	Due date on fire extinguisher
		Calibration is done every academic year	Yearly
11	ME6611 C.A.D. / C.A.M. Laboratory	All computers are checked for applications at start of semester	Half yearly
		License renewal is done for the software as per the license period.	As per requirement
		Fire extinguishers are recharged after expiry date of constituents.	Due date on fire extinguisher
12	ME6711 Simulation and Analysis Laboratory	All computers are checked for applications at start of semester	Half yearly

		License renewal is done for the software as per the license period.	As per requirement
		Fire extinguishers are recharged after expiry date of constituents.	Due date on fire extinguisher
13	ME6712 Mechatronics Laboratory	All electrical equipment and installations are checked at start of semester	Half yearly
		All mechanical & electrical machines are inspected at start & mid semester	Half yearly & quarterly
		Fire extinguishers are recharged after expiry date of constituents.	Due date on fire extinguisher
		All computers are checked for applications at start of semester	Half yearly
		License renewal is done for the software as per the license period.	As per requirement

## CIVIL ENGINEERING

All the labs in the department are very well equipped with all the equipment /instruments/ machines required to conduct every experiment given in the curriculum and beyond.

All the labs are equipped with good technical support staff available during working hours and beyond (as and when required).

S. No	Name of Laboratory	Maintenance		Ambience
		Details of check	Frequency	
1	Computer Aided Building Drawing/ Structural Design and Drawing Laboratory	All computers are checked for application at start of semester  License renewal is done for the software's as per the license period.	Half Yearly	<ul style="list-style-type: none"> <li>• Ambient lighting provided</li> <li>• High quality machines and equipment are used</li> </ul>
2	Strength of Materials Laboratory	Calibrations of dial gauges are done for every academic year.  The Equipment's are tested for its working condition in starting and mid of the academic year.  Fire Extinguishers are recharged after expiry date.	Yearly and semester beginning	
3	Survey Practical Laboratory	The equipment's are periodically serviced and maintained in every semester.  All the equipment is tested before going to work in field.	Half Yearly	
4	Construction Material Laboratory / Highway Engineering Laboratory	The equipment's are periodically serviced and maintained in every semester.  Each and every equipment's are tested before going to work in field	Half Yearly	
5	Soil Mechanics Laboratory	Calibration of dial gauge & proving ring were done once in a year  Equipment was tested for its working conditions during the start of odd semesters and if any problems found it was rectified by servicing.	Yearly and Semester beginnings	

6	Hydraulic Engineering Laboratory	<p>Machines are inspected at start and mid semester</p> <p>The painting to the equipment done to prevent from corrosion.</p> <p>The machines were run frequently to check the working condition.</p> <p>Fire Extinguishers are recharged after expiry date.</p>	Half Yearly and Quartely	
7	Environmental Engineering Laboratory	<p>Machines are inspected at start and mid semester</p> <p>Expiry dates for Chemicals were checked periodically.</p>	Yearly and semester beginning	

## ELECTRONICS AND COMMUNICATION ENGINEERING

Students are given instruction in handling the equipment/system/component before the conduct of experiment during their lab sessions so as to maintain equipment/system/component in good condition and the maintenance of labs is depicted as follows

S.N	Name of the Laboratory	Area (square meter)	Maintenance	Ambiance
1.	EPL /Electronic Devices	250	Regular checking of Meters, Cathode Ray Oscilloscope (CRO) and Function Generator (FG) are being carried out and calibration is also done for every month.  Components are tested using Digital Multi Meter (DMM) and faulty components are replaced.	Air Conditioned  Ambient Lighting  Fans for Air Circulation
2.	Analog and Digital Circuits / Electronic Circuits& Simulation	250	Regular checking of Dual Power Supply, Digital Storage Oscilloscope (DSO) and FG are done for every month.  Linear & Digital ICs are checked using IC Testers and faulty components are replaced.	Good flooring and ceiling
3.	Linear and Digital Integrated Circuits	250	Regular checking of Digital trainer Kit, Linear and Digital Power Supply will be done for every month.  Linear & Digital ICs are checked using IC Testers and faulty components are replaced.	
4.	Microprocessor and controller	250	Regular checking of ICs in trainer kits 8085, 8086 and 8051 are done for every two weeks. Then faulty ICs are replaced.	
5.	Digital Signal Processing/ Computer Network	125	All the PCs are backed by UPS  Hard disc cleanup and defragmentation utilities are done regularly  Maintenance of computers, AC and DSP kits are done for every month	

6.	Communication Systems	250	At regular intervals checking and maintenance of trainer kits are done.
7.	VLSI design	125	<p>All the PCs and related equipment like printers, scanners, etc. are backed by UPS</p> <p>Back up of computers on a regular basis</p> <p>Hard disc cleanup and defragmentation utilities are done regularly</p> <p>Turning off all computers by selecting the shutdown option on the desktop</p> <p>Maintenance of computers, AC, Printer and FPGA trainer kits are done for every 6 months</p>
8.	Optical and Microwave	250	Faulty diodes are replaced by checking up klystron set up for every week.
9.	Embedded Lab	250	<p>Turning off all computers by selecting the shutdown option on the desktop</p> <p>Regular checking and scanning of systems are being carried out for every two weeks.</p> <p>Hard disc cleanup and defragmentation utilities are done regularly</p>

**Service of Major Equipment:**

- The regular servicing of major equipment will be done for every year.
- Maintenance of AC, Printers and scanner are being done for every 6 months
- Stock Verification is done for every year to confirm the availability and working condition of the equipment.

# BIOTECHNOLOGY

## General Maintenance And Overall Ambience

1. The students are not allowed to wear shoes inside the laboratory to maintain cleanliness.
2. The students are instructed to wash hands with a soap solution or a hand wash or a sterile solution before they leave the laboratory.
3. Personal protective equipment's like gloves, lab coats and sharp line markers are used while working with organisms and specific chemicals.
4. The bench top is cleaned before and after use with a disinfectant.
5. The work surfaces are disinfected to decontaminate after a spill and after each work session.
6. Handling of microbial cultures is carried out under expert supervision.
7. All regulated wastes are decomposed by an approved method usually by autoclaving.
8. Mouth pipetting of cultures and Broth is strictly prohibited. Pipetting is carried out with the aid of mechanical pipetting device.
9. The inoculation loops and syringes are handled carefully to avoid self-inoculation.
10. Fumigation is carried out once in 6 months in order to maintain sterility.
11. Each laboratory is equipped with first aid kit. In the event of any emergency the Physician and a trained nurse attend to the medical needs of the students and staff in the campus.
12. Eatables are strictly not allowed inside the laboratory.
13. Portable fire extinguishers of class A:B:C type is installed in all laboratories.
14. Fire extinguishers are well maintained and checked periodically and refilling is done at every due date.
15. The doors and windows are kept closed during laboratory session to prevent contamination from air currents.
16. Usage of self-stick labels for the identification of experimental cultures.

## Maintenance of Equipment:

1. The microscopes are cleaned regularly and lenses are replaced as and when required.
2. pH meters are calibrated before each use and the electrodes are immersed in pH – 4 buffer solution .
3. The laminar flow units are cleaned with a disinfectant before and after use.
4. The autoclaves are drained after use and for every load run they are checked for steam leaks from around the gasket.

5. The incubator doors are closed during use to prevent heat loss to environment. The racks of the incubators are cleaned regularly and are checked for overload.
6. The centrifuges are cleaned with a mild soap solution in case of spills. It is ensured that the rotor is properly placed in the centrifuge before use. It is ensured that the load is done at the opposite inserts with the same accessories and fills to avoid imbalance.
7. At the end of each semester the equipment are checked for their working condition and service carried out.
8. Timely maintenance of centrifuges and spectrophotometer is carried out as they are in constant use.
9. Computer and UPS maintenance is done regularly.
10. Fire extinguishers are filled and checked for their expiry regularly.



## CHEMICAL ENGINEERING

Laboratories are spacious to meet the norms. Periodic maintenance of this equipment is done. The following maintenance routines are followed with the help of technicians:

- Washing buffers are used for washing.
- Magnetic stirrers are maintained by applying oil.
- All the water related experiment machines are washed by distilled water.
- Auto claves are cleaned with steam.
- Lubricants are used in heavy equipment such as ball mill roll crusher, sieve shaker etc., to reduce wear and tear.
- Connecting belts in motors are checked periodically.
- laboratories housing computers, electronic equipment, process control equipment, etc., are serviced periodically,
- Air-conditioners are also serviced by the service personnel by the Cooling System Section of our college.
- Firefighting equipment is periodically checked and the way of using and importance has been taught to students.