# 3. Infrastructure

# Experimental Laboratory:

### 1.Electrical Machine Lab:

Understanding the fundamental of DC machines and transformer is the scope of this lab. Electrical Machine lab is equipped with DC machines, transformer and induction machines for academics and for research work .Motor-generator set, induction motor, compound machines, DC motors, Single phase, three phase transformers and auto transformers are in available for the conduction of experiments.

The experiments which are carried out in this lab are Open circuit and load characteristics of DC generators, Load test on different DC motors, Speed control on DC motors, Load test and determining equivalent circuit on single phase transformer and Load test on single phase and three phase induction motor.

R & D work on these machines are also widely carried out by Post Graduate students and by research scholars.

### 2. Special Machinea and Electric Drives Laboratory:

Special Machines and Electric Drives Laboratory swank of state of art equipment and modern software tools and hardware like labview, Magnet 6.0, and work bench for real time drive applications, Students are exposed to the best experimental practices under the leadership of specialist faculty members.

- Automation of electrical Machines through labview, magnet 6.0 helps students to carry out their mini project and main project .

- This lab supports the research and development activities in postgraduate level and research level.

### 3.Electric Circuit Lab:

Electric Circuits laboratory is to impart hands on experience in verification of circuit laws and theorems, measurement of circuit parameters, study of circuit characteristics and simulation of time response. It also gives practical exposure to the usage of CRO, power sources, function generator etc

## 4. Control system Lab:

Control system laboratory is to provide sound knowledge in the basic concepts of linear control theory and design of control system, to understand the methods of representation of systems and getting their transfer function models, to provide adequate knowledge in the time response of systems and steady state error analysis, to give basic knowledge is obtaining the open loop and closed–loop frequency responses of systems and to understand the concept of stability of control system and methods of stability analysis. It helps the students to study the compensation design for a control system. This lab consist of DC,AC servomotor, synchros, DC position control, PID controller kit with temperature control, lead lag compensator kit, PLC kit, Stepper ,process control simulator.

## 5. Mesurement and Instrumentation Lab:

Measurements and Instrumentation Laboratory is to reinforce the students with an adequate work experience in the measurement of different quantities and also the expertise in handling the instruments involved. It also helps to train the students in the measurement of displacement, resistance, inductance, torque and angle etc., and to give exposure to AC, DC bridges and transient measurement

## 6. Power Electronics Lab:

Power Electronics laboratory is to study the characteristics of switching devices and its applications in rectifier inverter, chopper and resonant converter. It also introduces the application of electronic devices for conversion, control conditioning of electric power. Further it helps the students to get an overview of different types of power semi-conductor devices and their switching characteristics and to understand the operation, characteristics and performance parameters of controlled rectifiers, to study the operation , switching techniques, modulation techniques of pulse width modulated inverters and to understand the harmonic reduction method.

**Electronic Devices And Circuits Lab:**

Electronic Devices & Circuits(EDC) Laboratory seeks to develop basic understanding and intellectual means to study and model the characteristics of various semiconductor devices. This EDC Lab creates a foundation for the students in developing skills in simulation and design of Electronic circuits using P-Spice and MATLAB. This Laboratory is aimed to meet the requirements of practical work meant for active components basic analysis, designing and testing of amplifier and oscillators. Fundamentals of EDC Lab are thoroughly studied through the following experiments like Verification of Kirchoff`s Laws, Verification of Thevenin`s theorem,Norton`s theorem and Superposition theorem. Experimental exposure on P-N junction diode, Zener Diode, Assembling and study of rectifiers and filters, transistor biasing, voltage regulators and their characteristics in different modes. Electronic Devices & Circuits Laboratory is the host to major research focus areas which emphases the students to do mini and major projects by providing fabrication support and testing of semiconductor devices devices and Power control/regulator devices. It also gives an exposure to the practical applications of different types of oscillators and thermostats.

**Computer Lab for U.G:**
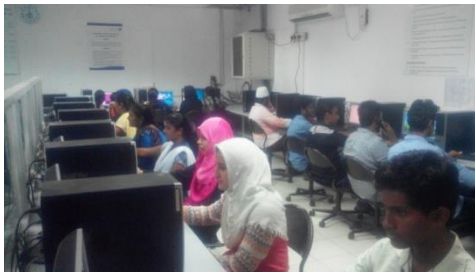
Computer Lab for U.G is adequate, well-equipped laboratories are available in the department to meet the curriculum requirements

- The There are 18 latest software packages namely, EUROSTAG, CASPOC, FEADMOS,CYME, VISSIM, Code Composer Studio, MATLAB, PSCAD, ETAP, PSIM, MAGNET, LABVIEW, PSPICE, MATHCAD, ANSYS, POWER WORLD SIMULATOR, AUPOWER LAB,PSAT, GAMS, EMTP, AUTOCAD are available in the Department.

- Experiments in Power System Analysis, Power System Operation & Control, De-regulated Power System, Wind Energy Conversion System, etc., are being conducted in the Power System Simulation Lab with the available software.

## LIST OF SOFTWARE

| SL. NO | DESCRIPTION | USERS | DATE | COST (in lakhs) |
|---|---|---|---|---|
| 1 | MATLAB R2012a | 15 | 25.09.2012 | 4.87 |
| 2 | AUPOWER LAB | MULTI | 27.05.2004 | 0.75 |
| 3 | MATHCAD V14 | 25 | 03.07.2007 | 1.5 |
| 4 | PSIM 7.0 | 5 | 23.01.2008 | 4.26 |
| 5 | EUROSTAG 4.3 | 1 | 31.08.2005 | 8.64 |
| 6 | MAGNET 7.1.1 | MULTI | 26.12.2007 | 4.11 |
| 7 | PSPICE 10.3 | 2 | 15.04.2005 | 4.26 |
| 8 | PSCAD 3.0.4 | 1 | 20.06.2000 | 1.56 |
| 9 | ETAP 4.7.0 | 1 | 20.06.2000 | |
| 10 | LABVIEW (NI) | 5 | 28.03.2013 | 0.85 |
| 11 | CASPOC V2007 | 16 | 24.03.2009 | 3.8 |
| 12 | FEDMOS (Rel 1.0.32) | 5 | 24.03.2009 | 3.4 |
| 13 | VISSIM- DSP V 7.0 | 1 | 21.03.2009 | 2.8 |
| 14 | MICROTRON V3.22 (EMTP) | 1 | 20.07.2009 | 0.24 |
| 15 | CYME - V5.0 Rev .8 | 1 | 03.05.2010 | 16.91 |
| 16 | ANSYS | 1 | 18.11.2011 | 0.26 |
| 17 | CST MICROWAVE STUDIO 2013 | 11 | 28.02.2014 | 2.25 |
| 18 | MATLAB 6.5 | 5 | 16.09.2002 | 5.05 |

**Availability of computing facilities in the department**

- All the students of UG programme are provided with individual systems in UG computer lab so as to enhance their academic and project works in a determined manner.
- Laser printers and scanners are also made available.
- Wi-Fi enabled campus to access e-journals and other subscribed journals.
- The computer lab is kept open 24x7 for the students.
- A 10 kVA UPS is available as backup for the Computer Lab.

**Computer Lab for P.G**



Computer Lab for PG is to become familiar with different aspects of modeling of components and system and different methods of analysis of power system planning and operation. It aims to fulfill the objectives such as to model steady-state operation of large-scale power systems and to solve the power flow problems using efficient numerical methods suitable for computer simulation, to model and analyze power systems under abnormal (fault) conditions, to model and analyze the dynamics of power system for small-signal and large signal disturbances and design the systems for enhancing stability. It also aims to become familiar with the preparatory work necessary for meeting the next day's operation and the various control actions to be implemented on the system to meet the minute-to-minute variation of system load, to get an overview of system operation and control, to understand & model power-frequency dynamics and to design power-frequency controller, to understand & model reactive power-voltage interaction and different methods of control for maintaining voltage profile against varying system.

The lab is equipped with 23 numbers of systems with latest configurations software computing packages such as.

## Availability of computing facilities in the department

- All the students of P.G and Research scholar are provided with individual systems in PG computer lab so as to enhance their academic and project works in a determined manner.
- Laser printers is  available.
- Wi-Fi enabled campus to access e-journals and other subscribed journals.
- The computer lab is kept open 24x7 for the students.
- A 10 kVA UPS is available as backup for the Computer Lab.

**Industrial Automation Lab:**



Industrial Automation Lab at department of EEE is active since January 2016.The lab has multiple workstations equipped with PC's and PLC's. The major equipment are Siemens Step 7 Basic PLC and Allen Bradley PLC with supporting software and hardware. The objective of the lab is to give the students hands on experience about PLC based industrial automation systems. The students are trained with Functional block diagram(FBD) and  ladder logic (LL) programming to control applications like Two conveyor system, Pressure and level controller, traffic light control, counting and separating the objects in the conveyor and many more. These are offered to the students with the following experiments.

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- Development of ladder program for simple ON-OFF application

- Ladder logic program for verification of logic gates

- Two conveyor control with stepper motor

- Development of ladder program for timing application

- Development of ladder program for counting application

- Automated stacking process

- Counting and controlling of objects in a conveyor

# Research Laboratory :

**Industrial automation Lab and Drives lab:**

Industrial Automation Lab at department is equipped with PC's and PLC's. The major equipment are Siemens Step 7 Basic PLC and Allen Bradley PLC with supporting software and hardware. The objective of the lab is to give the students hands on experience about PLC based industrial automation systems. Research work related to PLC, SCADA and DCS with electrical drives can be undertaken.

- ♦ Development of ladder program for timing application
- ♦ Development of ladder program for counting application
- ♦ Automated stacking process
- ♦ Counting and controlling of objects in a conveyor

**Special Machinea and Electric Drives Research Laboratory:**



- Special Machines and Electric Drives Laboratory swank of state of art equipment and modern software tools and hardware like labview, Magnet 6.0, and work bench for real time drive applications, Students are exposed to the best experimental practices under the leadership of specialist faculty members

Following are few research activities carried out in this lab:

- Flux reversal machines has been modeled and developed for this lab during Nov 2016.
- Torque ripple minimization in SRM using MAGNET software.
- Modeling of BLDC using MAGNET and PSIM software.
- Power converter topology for standalone and grid connected PV, fuel cells and wind energy systems.
- Modeling of electric vehicle PV, fuel cells and wind energy sources.
- Nearly 12 ideal journal publication work printed in reputed journal due to the establishment of SMED lab.

## R&D Lab:



The department of EEE has excellent facilities to carry out research work in all the areas of Electrical Engineering. The R&D laboratory has been set up to utilize the research potential of the students and thereby to bring out the research publications. This lab is fortified with state of the art equipment like Harmonic Analyzer and Electroporator etc.

## Mini High Voltage Lab:

The Mini High Voltage Laboratory is to conduct research experiments so as to find out the suitability of polymeric material for outdoor insulation as well as to study the life period and ageing of polymeric outdoor insulators. The lab consist of tracking resistance measurement, volume resistivity, surface resistivity measurement, measurement of dielectric strength, comparative tracking index etc.



## .Facilities Available:

Some of the major facilities include,

1. HV testing transformer (for dielectric strength determination – 100kV transformer)

2. Measurement of tracking resistance, experimental setup as per IEC 60587 standard.

3. Comparative tracking Index setup.

4. Volume resistivity setup

5. Surface resistivity setup

6. Measurement of tan $\partial$ (or dielectric constant)
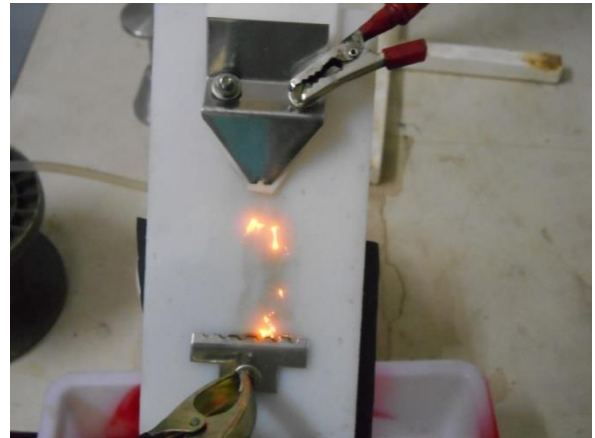
# Additional ambience

# DEPARTMENT LIBRARY



The Department Library was established with an initial number of 100 books and 60 titles. Now the Department Library caters to the need of U. G, P.G students and Research Scholars seeking specific specialization materials such as handbooks, newsletters, project reports, Technical Magazines and such. The Department Library acts as the store house of specific materials which enhance the students thirst and search for his domain specific knowledge. We the members of the faculty, students and researchers are also the proud contributors to this niche knowledge space by keeping our Conference Proceedings, Ph. D thesis, Consultancy reports, Project Reports, Internship Reports and such.

| | | |
|---|---|---|
| No. of books | : | 845 |
| No. of UG Project Reports | : | 415 |
| No. of PG Project Reports | : | 253 |
| No. of Ph.D. Thesis Reports | : | 06 |
| No. of Lab Manuals | : | 68 |
| No. of Company Catalogues | : | 38 |
| No. of other Technical Magazines | : | 117 |
| No. of Internship Reports | : | 134 |

Accessibility to Department Library is provided for U.G, P.G, Research Scholars and Faculty members. A Log book is maintained and students can borrow books

through a faculty members' account. On an average 40 Faculty and 60 students access

the library per year.

## Department Digital Library:

The E drive of this Computer is dedicated with videos for enhancement of students' and Staffs' learning experience. This document has the list of all the videos and lecture.
(Click on the Title of the Subject to open the specific folder.)

| S.no | Title of the Video | Total number of Videos |
|------|-------------------|------------------------|
| 1 | 8085: | 8 |
| | a. Microprocessor 8085(2003) | 4 |
| | b. Microprocessor 8085(2013) | 4 |
| | c. Animation of working of 8085* | 1 |
| 2 | Adaptive Signal Processing | 41 |
| 3 | BroadBand Network | 32 |
| 4 | Chaos, Fractions & dynamic System | 40 |
| 5 | Control System | 26 |
| 6 | Digital Image Processing | 40 |
| 7 | Digital System Design | 40 |
| 8 | Data Voice & picture Communication | 40 |
| 9 | Electrical Machines | 18 |
| 10 | Energy Resources & technology | 40 |
| 11 | Illumination Engineering | 20 |
| 12 | Power System Analysis | 15 |
| 13 | Synchronous Machines | 13 |
| 14 | VLSI design | 40 |

**The following videos are from MIT OPENWARE**

| S.no | Title of the Lecture | Total number of videos |
|------|---------------------|------------------------|
| 1 | Circuits and Electronics | 25 |
| 2 | Digital Signal Processing | 22 |
| 3 | Electrical Feedback Systems | 20 |
| 4 | Introduction to MATLAB | 6 |

**In addition to the subject videos, the EEE Digital-Library has the following videos:**

1.Animation videos of Various Electrical Machines

| S.No | Title of Lecture | Lecture Length |
|------|------------------|----------------|
| 1 | Alternator (Working) | 2-3 minutes |
| 2 | DC Generator (Construction) | 2-3 minutes |
| 3 | DC Motor (Construction & working) | 2-3 minutes |
| 4 | Induction Motor (1 phase Working) | 2-3 minutes |
| 5 | Induction Motor (Working) | 2-3 minutes |
| 6 | Single Phase Machines (RMF and Sync Speed) | 2-3 minutes |
| 7 | Synchronous Motor (Working) | 2-3 minutes |
| 8 | Synchronous Speed (Rotating Magnetic Field) | 2-3 minutes |

2.GATE preparation Videos:Lectured by Amir Hussain

| S.No | Title of Lecture | Lecture Length |
|------|------------------|----------------|
| 1 | Power Electronics | ~75 minutes |
| 2 | Control System Controller And Root Locus | ~60 minutes |
| 3 | Control System Gain Margin- Phase Margin | ~60 minutes |
| 4 | Electromagnetic Theory Wave Guide | ~60 minutes |
| 5 | Electromagnetic Theory Transmission Line | ~60 minutes |
| 6 | Control System Nyquist Plot | ~60 minutes |
| 7 | Power Electronics Transient In Ac Circuit | ~60 minutes |
| 8 | Gate Ee Lecture Wattmeter | ~60 minutes |
| 9 | Power Electronics Switching Characteristics | ~60 minutes |
| 10 | Network Theorems | ~60 minutes |
| 11 | Dc Transient Circuit | ~60 minutes |
| 12 | Preparation Average And Rms Value | ~60 minutes |
| 13 | Preparation Average And Rms | ~60 minutes |
| 14 | Network Theory Basics Of Ac Circuit | ~60 minutes |
| 15 | Sampling Theorem 3 | ~60 minutes |
| 16 | Sampling Theorem 2 | ~60 minutes |
| 17 | Sampling Theorem 1 | ~60 minutes |
| 18 | Digital Electronics Flip Flop And Counters | ~60 minutes |
| 19 | 2015 Solution Paper- I Communication System | ~60 minutes |
| 20 | Principles Of Measuring Instruments | ~60 minutes |

## Video Lectures from NPTEL's Youtube Page.

The various subjects and no of videos is given below

**(To Open subject video List, click on the Blue Text with Ctrl Key pressed)**

| S.no | Topic of the Lecture | Total Videos (lectures) | File location | Total run Time |
|---|---|---|---|---|
| 1 | Nonlinear Dynamical Systems | 35 | E:\Videos | |
| 2 | Digital System Design | 27 | E:\Videos | |
| 3 | High Voltage DC transmission | 37 | E:\Videos | |
| 4 | Advanced Control System | 40 | E:\Videos | |
| 5 | Power System Analysis | 40 | E:\Videos | |
| 6 | Embedded Systems | 37 | E:\Videos | |
| 7 | Communication Engineering | 32 | E:\Videos | |
| 8 | Power System operation & control | 35 | E:\Videos | |
| 9 | Control engineering | | E:\Videos | |
| 10 | Power System Dynamics | | E:\Videos | |
| 11 | Power System Dynamics & Control | | E:\Videos | |
| 12 | Signals & systems | 45 | | |
| 13 | | | | |

## Department Seminar



Various department seminars, workshops, lectures are conducted. Though our university have separate hall for conduct of conference, seminar, workshops , the department of EEE is having an exclusive seminar hall with state of art facilities including air conditioning room, smart board, LCD Projector, OHP, Public addressing system and USB connection etc.