



B.TECH

ELECTRICAL AND ELECTRONICS ENGINEERING

ACADEMIC YEAR 2024-25

JOIN THE FUTURE:

WE POWER THE WORLD, BE A PART OF IT



IARE
INSTITUTE OF
AERONAUTICAL ENGINEERING

NAAC
ACCREDITATION

A++
GRADE

NBA
NATIONAL BOARD
OF ACCREDITATION



TOP 200
ENGINEERING RANK
151-200

TOP 100
INNOVATION RANK
51-100

24
YEARS OF
Excellence

VISION AND MISSION OF THE INSTITUTE

VISION

To bring forth students, professionally competent and socially progressive, capable of working across cultures meeting the global standards ethically.

MISSION

To provide students with an extensive and exceptional education that prepares them to excel in their profession, guided by dynamic intellectual community and be able to face the technically complex world with creative leadership qualities.

Further, be instrumental in emanating new knowledge through innovative research that emboldens entrepreneurship and economic development for the benefit of wide spread community.

VISION AND MISSION OF THE DEPARTMENT

VISION

To produce comprehensively trained, socially responsible, innovative electrical engineers and researchers of high quality who can contribute for the nations and global development.

MISSION

The mission of Electrical and Electronics Engineering is to provide academic environment with a strong theoretical foundation, practical engineering skills, experience in interpersonal communication and teamwork along with emphasis on ethics, professional conduct and critical thinking. Further, the graduates will be trained to have successful engagement in research and development and entrepreneurship.

B.Tech

Program Educational Objectives (PEOs)

PEO-I

To provide students with the knowledge of Basic Sciences in general and Electrical and electronics Engineering in particular so as to acquire the necessary skills for analysis and synthesis of problems in generation, transmission and distribution.

PEO-II

To provide technical knowledge and skills to identify, comprehend and solve complex tasks in industry and research and inspire the students to become future researchers / scientists with innovative ideas.

PEO-III

To prepare the students for successful employment in various Industrial and Government organizations, both at the National and International level, with professional competence and ethical administrative acumen so as to handle critical situations and meet deadlines.

PEO-IV

To train the students in basic human and technical communication skills so that they may be both good team-members, leaders and responsible citizen.

Knowledge and Attitude Profile

WK1

A systematic, theory- based understanding of the natural sciences applicable to the discipline and awareness of relevant social sciences.

WK2

Conceptually-based mathematics, numerical analysis, data analysis, statistics and formal aspects of computer and information science to support detailed analysis and modelling applicable to the discipline.

WK3

A systematic, theory- based formulation of engineering fundamentals required in the engineering discipline.

WK4

Engineering specialist knowledge that provides theoretical frameworks and bodies of knowledge for the accepted practice areas in the engineering discipline; much is at the forefront of the discipline.

WK5

Knowledge, including efficient resource use, environmental impacts, whole-life cost, reuse of resources, net zero carbon, and similar concepts, that supports engineering design and operations in a practice area.

WK6

Knowledge of engineering practice (technology) in the practice areas in the engineering discipline.

WK7

Knowledge of the role of engineering in society and identified issues in engineering practice in the discipline, such as the professional responsibility of an engineer to public safety and sustainable development.

WK8

Engagement with selected knowledge in the current research literature of the discipline, awareness of the power of critical thinking and creative approaches to evaluate emerging issues.

WK9

Ethics, inclusive behavior and conduct. Knowledge of professional ethics, responsibilities, and norms of engineering practice. Awareness of the need for diversity by reason of ethnicity, gender, age, physical ability etc. with mutual understanding and respect, and of inclusive attitudes.

B.Tech Program Outcomes (POs)

PO-1 Engineering Knowledge

Apply knowledge of mathematics, natural science, computing, engineering fundamentals and an engineering specialization as specified in WK1 to WK4 respectively to develop to the solution of complex engineering problems.

PO-2 Problem Analysis

Identify, formulate, review research literature and analyze complex engineering problems reaching substantiated conclusions with consideration for sustainable development. (WK1 to WK4)

PO-3 Design/Development of Solutions

Design creative solutions for complex engineering problems and design/develop systems/components/processes to meet identified needs with consideration for the public health and safety, whole-life cost, net zero carbon, culture, society and environment as required. (WK5)

PO-4 Conduct Investigations of Complex Problems

Conduct investigations of complex engineering problems using research-based knowledge including design of experiments, modelling, analysis & interpretation of data to provide valid conclusions. (WK8).

PO-5 Engineering Tool Usage

Create, select and apply appropriate techniques, resources and modern engineering & IT tools, including prediction and modelling recognizing their limitations to solve complex engineering problems. (WK2 and WK6)

PO-6 The Engineer and The World

Analyze and evaluate societal and environmental aspects while solving complex engineering problems for its impact on sustainability with reference to economy, health, safety, legal framework, culture and environment. (WK1, WK5, and WK7).

PO-7 Ethics

Apply ethical principles and commit to professional ethics, human values, diversity and inclusion; adhere to national & international laws. (WK9)

PO-8

Individual and Collaborative Team work

Function effectively as an individual, and as a member or leader in diverse/multi-disciplinary teams.

PO-9 Communication

Communicate effectively and inclusively within the engineering community and society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations considering cultural, language, and learning differences

PO-10

Project Management & Finance

Apply knowledge and understanding of engineering management principles and economic decision-making and apply these to one's own work, as a member and leader in a team, and to manage projects and in multi disciplinary environments.

PO-11 Life-Long Learning

Recognize the need for, and have the preparation and ability for i) independent and life-long learning ii) adaptability to new and emerging technologies and iii) critical thinking in the broadest context of technological change. (WK8)

B.Tech Program Specific Outcomes (PSOs)

PSO-I

Design, Develop, Fabricate and Commission the Electrical Systems involved in Power generation, Transmission, Distribution and Utilization

PSO-II

Focus on the Components of Electrical Drives with its Converter Topologies for Energy Conversion, Management and Auditing in Specific applications of Industry and Sustainable Rural Development.

PSO-III

Gain the Hands-On Competency Skills in PLC Automation, Process Controllers, HMI and other Computing Tools necessary for entry level position to meet the Requirements of the Employe.

"Discover the limitless possibilities of Electrical and Electronic Engineering, where innovation sparks the future of technology and sustainable solutions."



ABOUT Electrical And Electronics Engineering

Electrical and electronics engineering, one of the core courses of engineering discipline deals with the study of design, development, and maintenance of electrical systems and their components, ensuring quality, safety, reliability, and sustainability. The course focuses on the manufacturing of electrical equipment used in several sectors including construction and building and the production and distribution of power.

Why Study EEE@IARE

Quality Education: The department offers structured curriculum designed to provide comprehensive theoretical knowledge and practical skills.

Expert Faculty: The department is staffed by experienced faculty members who are often active researchers or professionals in their respective fields.

State-of-the-art Facilities: The department has well-equipped laboratories, workshops, and research facilities.

Industry Connections: The department has partnerships with industry leaders, which can provide opportunities for internships, projects, and even employment after graduation.

Specialization Options: The department offers opportunities for specialization within EEE, allowing students to focus on areas like power systems, power electronics, renewable energy, or automation based on their interests and career goals.

Career Counseling and Advising: The department facilitate the career counselors in advising the students on career paths, industry trends, and job market opportunities. They provide personalized guidance based on individual career goals, strengths, and interests, helping students make informed decisions about their professional development.

Career Opportunities: The department of EEE is training the students into diverse sectors such as power & energy, telecommunications, automotive, aerospace, healthcare, renewable energy, and more.

Department Specific Laboratories

The research center aims to identify and initiate foundational multi-disciplinary research and applied research projects, create and combine patentable Intellectual Property (IP) components, design and develop prototypes, manage and market products and solutions (through know-how transferred incubated companies), and work to deliver funded research projects. The department is equipped with sophisticated, leading-edge hardware and software facilities of superior quality.

The primary functions of the research center are to

- Provide excellent research culture and infrastructure.
- Serve as a platform for strong interdisciplinary collaborations and knowledge sharing.
- Publish papers in high quality journals of international repute.
- Create quality human resources for scientific research.
- Promote industrial collaborations involving active and mutually beneficial R & D projects

High Voltage Insulation Testing Facilities

A high-Voltage laboratory needs to be established to carry out fundamental studies on insulating materials, to carry out the performance evaluation of proto types and also to assess the condition of High-Voltage power apparatus before their erection and installation.

Benefits

Diagnostic Capability: High voltage testing can reveal insulation degradation trends over time.

Identifying Potential Failures: High voltage Insulation testing helps detect weaknesses or defects in insulation that may lead to electrical breakdowns or faults.

Fault Location: In cases where insulation breakdown has occurred, high voltage testing can help pinpoint the location of the fault. high voltage insulation testing is a critical tool forensuring the reliability, safety, and longevity of electrical equipment and systems across various industries.



Solar PV Training and Research system

The Solar PV Training and Research system is a mini-Solar PV plant prototype which enables students and faculty to understand in-depth concepts about stand-alone PV systems. The product also provides research orientation on several concepts such as MPPT, inverter control etc. The system consists of individual plug-in units each with components for different experimental arrangements.

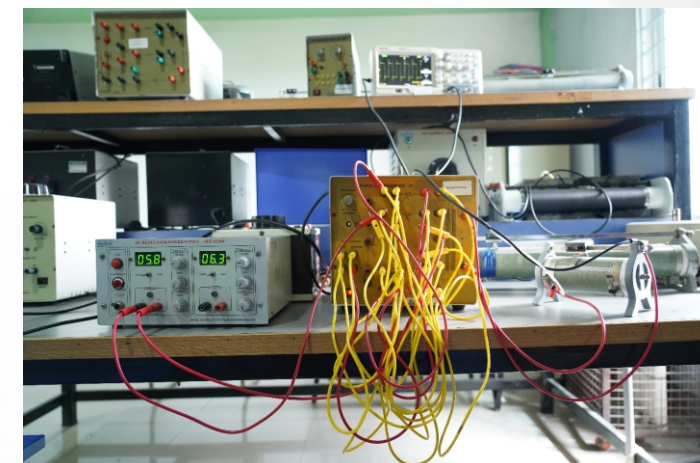
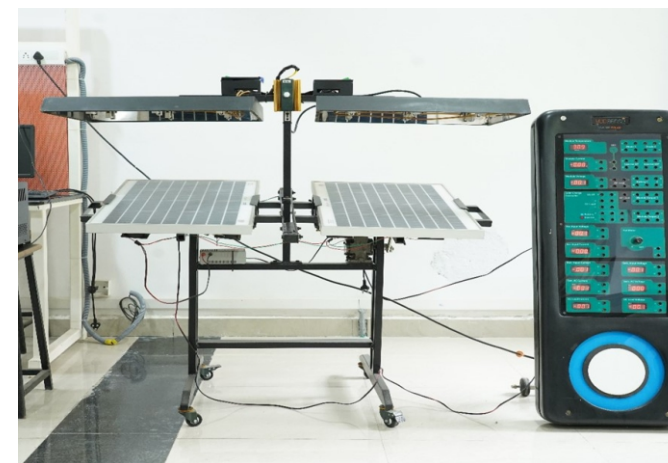
Benefits

Skill Development : Training programs equip individuals with the skills and knowledge needed to design, install, and maintain solar PV systems.

Technological Advancement : Research in solar PV technology drives innovation, leading to improvements in efficiency, durability, and cost-effectiveness of solar panels and related equipment.

Rural Electrification : Solar PV can be deployed in remote or off-grid areas, providing access to electricity where traditional grid infrastructure is impractical or unavailable.

Environmental Benefits : Solar PV systems generate electricity without producing greenhouse gas emissions or other pollutants associated with fossil fuels.



MATLAB

A high-performance language for technical computing. It integrates computation, visualization, and programming in an easy-to-use environment where problems and solutions are expressed in familiar mathematical notation.



Programmable Logic Controller Automation

Industrial PLC programming knowledge has become a fundamental requirement for engineer to be successful in industries. This laboratory facility provides a comprehensive training on hands on skill of programming and management of PLC's and HMI systems. This laboratory facilitates to make aspiring engineers acquainted with conceptual as well as practical knowledge of industrial automation and latest technologies being used to achieve industrial automation and to inculcate fundamentals of automation in students and provide them platform to work on near future.

Benefits

Hands-on Experience: Laboratories allow students to gain practical, hands-on experience in programming PLCs.

Skill Development: Students can develop essential skills in PLC programming, troubleshooting, and maintenance.

Understanding Complex Systems: Working in a PLC programming lab helps students understand the complexities of industrial automation systems.



SCADA

Taking Electrical Engineering to the Next Level! ... It also offers an exhaustive scope of the multi-disciplinary computerization with the help of electrical devices with a focus on Supervisory Control and Data Acquisition (SCADA) systems along with Programmable Logic Controller (PLC).



Lab VIEW

Lab VIEW is the Software that uses graphical programming interfaces for Data Acquisition, Data Analysis, and presentation of results and instrument control. LabVIEW interfaces support the wide variety of hardware applications. It scales across different targets and operating systems. This tool provides the built-in libraries and packages



Advanced Power Engineering Research

It is a leading center to develop and promote research related to the reliable and efficient management of the electric power, including modeling and analysis techniques for transmission and distribution. Here the faculties of the department develop and demonstrates power station modernization technologies and enhance the educational experience of students and help to meet the operational and expansion needs under uncertainties with an increased penetration of distributed renewable generation.

Benefits

Efficiency Improvements: Research in advanced power engineering often focuses on improving the efficiency of power generation, transmission, and distribution systems.

Grid Stability and Reliability: Advanced research helps in developing technologies and strategies to enhance the stability and reliability of power grids.

Renewable Energy Integration: Research in this field often explores better ways to integrate renewable energy sources like solar, wind, and hydroelectric power into existing grids.



Power Systems Computer Aided Design

Power Systems Computer Aided Design (PSCAD) is time domain simulation software for analyzing transients in electrical networks. Together they provide a fast, flexible and accurate solution for the efficient time-domain program for simulating a variety of electrical power system transients and control networks.



Areas of Electrical and Electronics Engineering Expertise

Electrical and Electronics Engineering offers a diverse range of career opportunities and specializations, allowing professionals to work on various projects related to power & energy, power electronics, control engineering, renewable energy systems.

Power Systems

It involves generation, transmission, distribution, and utilization of electrical power. Experts in this area work on power generation methods (such as renewable energy sources), grid integration, stability analysis, and smart grid technologies.

Control Systems

It focuses on designing systems to manage and regulate processes or devices. This includes feedback control systems, automation, robotics, and applications in industries like manufacturing, aerospace, and automotive.

Renewable Energy

It focuses on sustainable energy sources like solar, wind, hydro, and geothermal power. Engineers in this area work on energy conversion, storage, grid integration, and energy efficiency.

Electric vehicles

Electric vehicles (EVs) are a promising technology for achieving a sustainable transport sector in the future, due to their very low to zero carbon emissions, low noise, high efficiency, and flexibility in grid operation and integration.

Electric Drives

Electrical drives deals with the systems that control the motion of electrical machines and especially these will be employed in all the industry applications.

Measurements & Instrumentation

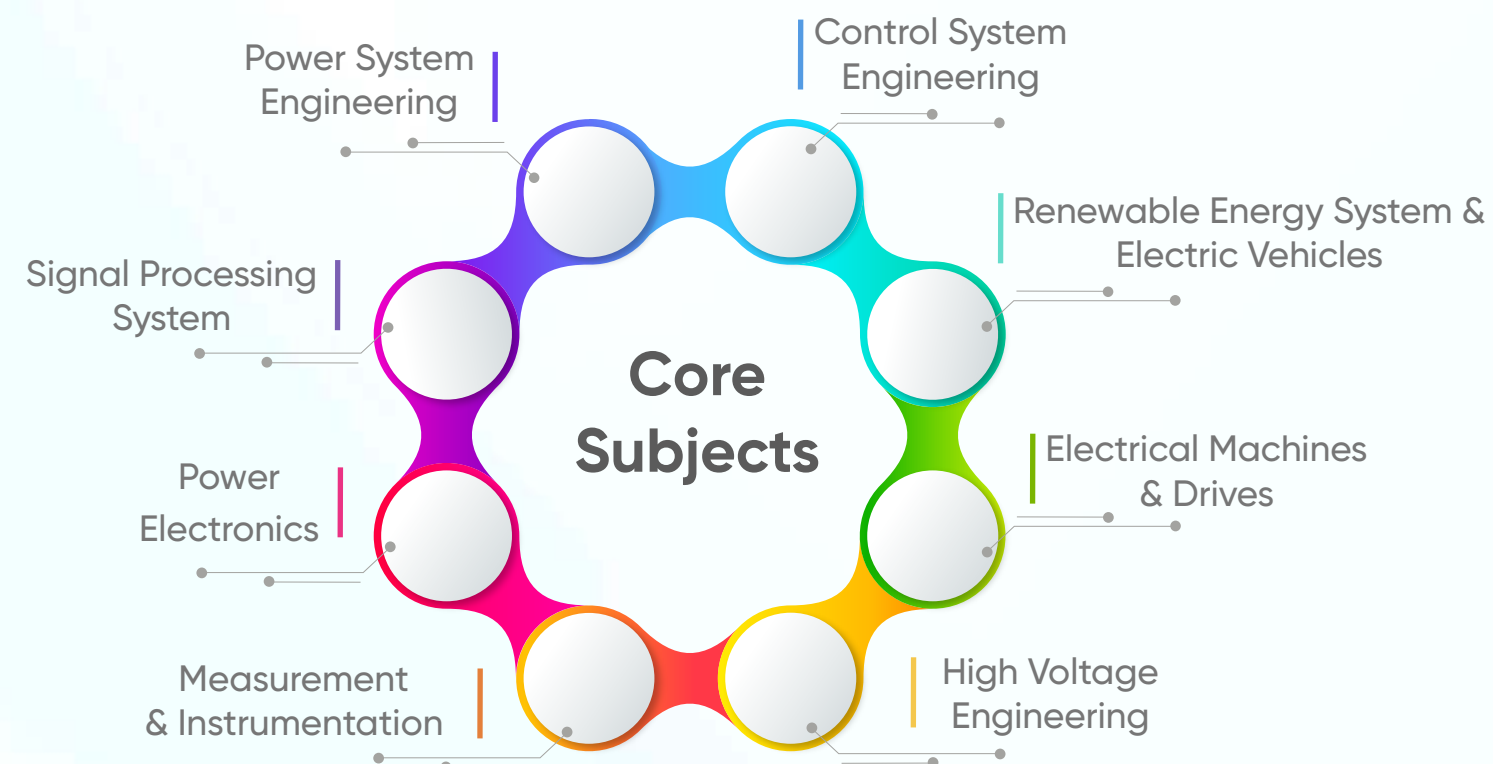
It deals with the design, installation and maintenance of devices used to measure and control physical quantities such as flow, temperature, level, pressure, and chemical composition etc. Instrumentation automation system used are PLC, DCS, RTU, SCADA.

Power Electronics

Focuses on the technology associated with the efficient conversion, control and conditioning of electric power by static means from its available input form into the desired electrical output form.

Signal Processing

It involves analyzing, modifying, and synthesizing signals (such as sound, images, and data) for various applications. This includes digital signal processing (DSP), image processing, and pattern recognition.



Our Students get excellent knowledge about the core subjects of electrical engineering through methodical classroom teaching and hands on experience in the electrical laboratories.

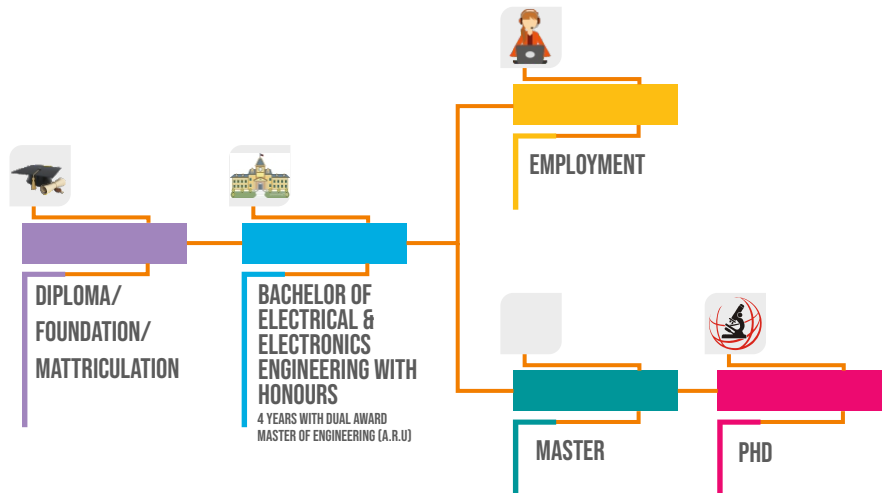
SKILLS OF A SUCCESSFUL ELECTRICAL ENGINEERS POSSES

Successful electrical engineers possess a diverse range of skills that enable them to excel in their profession. Here are some key skills,



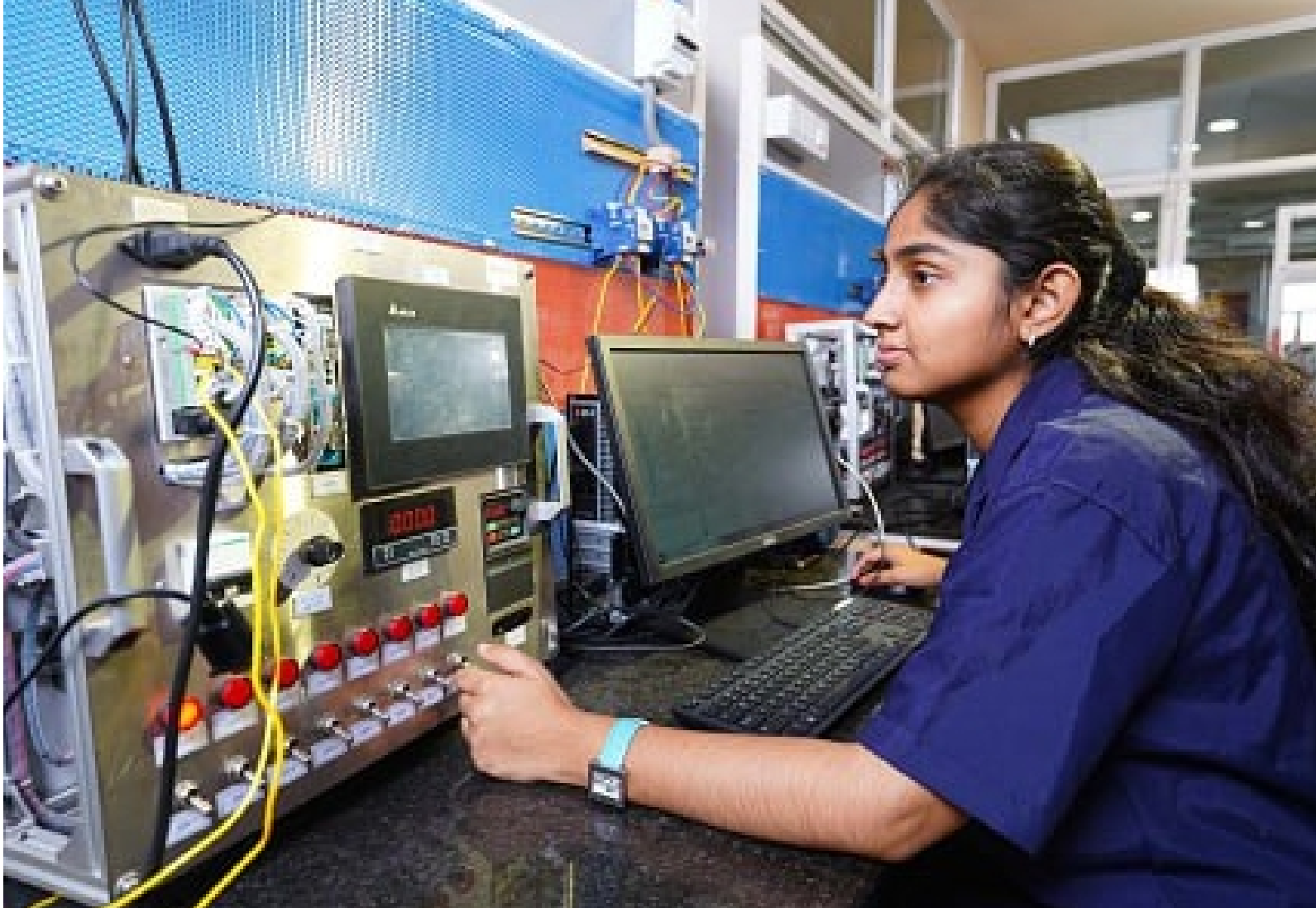
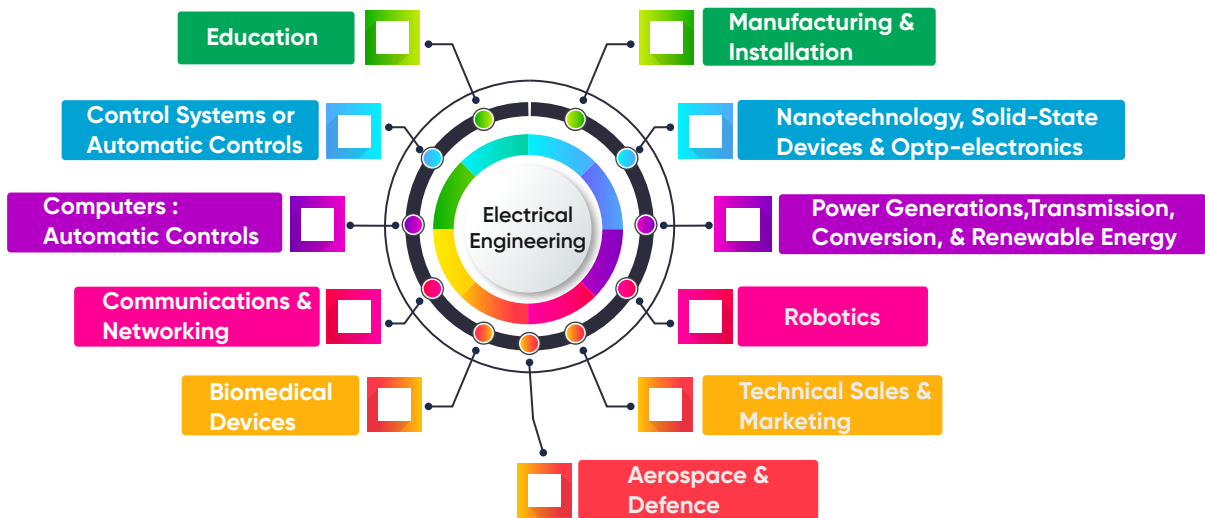
CAREER PATH

Embark on a dynamic career path in Electrical and Electronic Engineering, where innovation, sustainability, and technology converge to shape the future of global industries.



POTENTIAL AREAS OF EMPLOYMENT

Potential areas of employment for Electrical and Electronic Engineering graduates include



Laboratory Details

1 Electrical Circuits Laboratory

The course is designed to provide students with hands-on experience and practical skills in the field of electrical engineering. The course serves as a complement to theoretical concepts learned in the concurrent electrical circuit's course. Through a series of structured experiments, students gain an in-depth understanding of fundamental electrical circuits, components, measurement techniques, and troubleshooting procedures.

Major Equipment

Regulated power supply (0-20V/2A): 5
Digital Voltmeters (0-20 V) MC: 5
Digital Ammeters (0-200 mA) MC: 5
Multi meters (1 kV/ 20 A): 1
Function generator (0-1MHz): 2
Cathode ray oscilloscope (0-20 MHz): 2

2 Electrical Networks And Simulation Laboratory

The Network Analysis and Scientific Computing Laboratory are designed to give hands-on experience on virtual instrumentation through digital simulation techniques. These techniques enable the students in examining characteristics of DC and AC circuits, filters, solution of differential equation, generation of three phase and complex wave forms using MATLAB.

Major Equipment

Hardware:
Desktop Computer Systems: 10
Application Software (Mat Lab): 5 Users
Application Software (Lab View): 5 Users

3

DC Machines Laboratory

This laboratory course is to meet the requirements of practical work meant for basic operation, analysis and design of electrical machines. It provides hands-on experience by examining the electrical and mechanical characteristics of various DC machines. Analyze the characteristics of DC machines and separate the various losses in electrical machines by conducting different tests.

Major Equipment

DC Shunt motor - DC Shunt generator set (3 kW, 220 V, 13.6 A, 1500 rpm): 2
DC Shunt motor - DC Series generator set (3 kW, 220 V, 13.6 A, 1500 rpm): 1
DC Shunt motor - DC Compound generator set (3 kW, 220V, 13.6A, 1500 rpm): 1
Identical DC Shunt machines (3 kW, 220 V, 13.6 A, 1500 rpm): 1
Identical DC Series machines (3 kW, 220 V, 13.6 A, 1500 rpm): 1
DC Shunt motor (3 HP, 220V, 12A, 1500 rpm): 3
DC Compound motor (3 HP, 220V, 17 A, 1500 rpm): 1

4

AC Machines Laboratory

This course is intended to train the students on alternating current machines. It provides hands-on experience by conducting various direct and indirect tests on transformers, synchronous and asynchronous machines to analyze the characteristics of ac machines and separate various losses. This course also enables to develop skills to select, install, operate, and maintain various types of ac machines and transformers.

Major Equipment

Single phase transformer (2 kVA, 115 / 230V): 4
Three phase alternator set (415V, 4.5A, 1500 rpm): 2
Three phase synchronous motor (415V, 6.2A, 1500 rpm): 1
Three phase induction motor (3.5kW, 415V, 7.5A, 1440 rpm): 2
Single phase induction motor (1HP, 230V, 5.8A): 1
Single phase auto transformer (230/ 0-270V, 10A): 3
Three phase auto transformer (415/ 0-470V, 10A): 3

5

Control Systems Laboratory

The Control Systems laboratory course is indeed to train the students practically on the modeling, analysis and design of linear feedback control systems. This course deals with modeling of dynamical systems and the control components and designing the compensator. The hands on training in the laboratory enable students to apply and modeling control principles in various areas of industrial applications.

Major Equipment

Linear System Simulator Kit (40-100 Hz, Sin Wave, Triangle Wave, ± 12 v, 250 Ma): 1
Dc Motor Study Kit (0.5 Hp, 220v, 2.1a, 1500 Rpm): 1
Ac Servo Motor (60v, 1500 Rpm, Pmdc Coupled): 1
Pid Controller Trainer Kit (p, I, D With Tunable Controller, Square And Triangle Wave): 1
Temperature Control System Study Kit (90°C, 220v $\pm 10\%$): 1
Programmable Logic Controller Trainer Unit (di-12, Do-6, Ai-6, Ao-12, Timers - 8, Counters - 8): 1

Opamp Based Pid Controller Setup: 1
Hardware: Desktop Computer Systems: 2
Application Software: Delta Wpl Soft (open Source) Software Installed: 2 Users
Application Software: Matlab: 2 Users

6

Power Electronics Laboratory

This course is intended for practical experience by conduction experiments on rectifiers, inverters, choppers, AC voltage controllers and cyclo converters. It provides hands-on experience by examining the electrical characteristics of various power converters. The power electronic converter applications have been analyzed with simulation tools.

Major Equipment

Single phase half and full controlled bridge converter Trainer kit: 1
Forced commutation study unit: 1
Single phase cyclo converter Trainer kit: 1
Single phase series and parallel inverter: 1
Operation of MOSFET based chopper Trainer kit: 1
APPLICATION SOFTWARE: MATLAB: 2
HARDWARE: Desktop computer systems: 2

7

PLC And Industrial Automation Laboratory

The objective of this laboratory course is to measure the physical input variables and to analyze and control and output variables in an industrial automation process using programmable logic controllers (PLCs). The lab emphasizes on the software and hardware skills to design and realize an automation process. The lab is mainly intended to implement the software timers, counters and their usage in traffic signal control, sequential control, speed control of motors etc.

Major Equipment

Programmable logic controllers demo kits: 10
HARDWARE: Desktop computer systems: 5
APPLICATION SOFTWARE DELTA WPL Soft (Open Source) software installed: 10
APPLICATION SOFTWARE: SCADA: 1

8

Electrical Measurements And Instrumentation Laboratory

The objective of this lab is to teach students to know the procedures for measuring Resistance, Inductance and Capacitance of different ranges. To perform experiments to measure three phase power and frequency. To design experiments for calibration of energy meter and power factor meter.

Major Equipment

Pressure Measurement Trainer Module: 1
Encoders Trainer Module: 1
LVDT Trainer Kit: 1
Single Phase Energy Meter (230V, 10A, Disc type): 1
Transformer Turns Ratio Kit: 1
Kelvin's Double Bridge (0.1 - 1 Ω range, 230V): 1

9

Electrical Power Systems Laboratory

The main objective of the course is to provide an overview of the principles of basic protection circuits such as miniature circuit breaker, High rupturing fuse and protection under thermal overload condition. It provides in depth analysis of Ferranti effect and surge impedance loading of a transmission line. It provides in depth knowledge on working principles of various types of relays. It also deals with earth fault protection and feeder protection schemes

Major Equipment

Transmission line simulation unit (Single phase 230V AC, 50Hz) embedded with impedance relay: 1
Radial feeder protection simulation unit embedded with over current relay: 1
Alternator setup (3kVA, 415V, 3.8A, 1500 rpm): 1
APPLICATION SOFTWARE: Power System Computer Aided Design (PSCAD): 10
HARDWARE: Desktop computer systems: 10

FACULTY INFORMATION



Dr. Damodhar Reddy

Associate Professor & Head

Ph.D (2019), Doctoral Degree, VIT, Vellore, TN.

M.Tech (2013), JNTU, Hyderabad, TS.

B.Tech (2009), JNTU, Hyderabad, TS.

AREA OF SPECIALIZATION

Power Electronics and Renewable Energy Systems



Dr. D Shobha Rani

Professor

Ph.D (2018), Sri Venkateswara University, Tirupathi, AP

M.Tech(1999), Jawaharlal Nehru Technological University, Hyderabad, TS.

B.Tech (1991), Jawaharlal Nehru Technological University, Hyderabad, TS

AREA OF SPECIALIZATION

Electrical Power System



Dr. G Seshadri

Associate Professor

Ph.D (2019), Doctoral Degree, Sri Venkateswara University, Tirupathi, AP

M.Tech (2009), Sri Venkateswara University, Tirupathi, AP

B.Tech (2005), Sri Venkateswara University, Tirupathi, AP

AREA OF SPECIALIZATION

Electrical Power Systems



Dr. SK Abdul Pasha

Assistant Professor

Ph.D (2022), Doctoral Degree,

Andhra University, Visakhapatnam, AP

M.Tech (2011), Jawaharlal Nehru Technological University, Hyderabad, TS

B.Tech (2008), Jawaharlal Nehru Technological University, Hyderabad, TS

AREA OF SPECIALIZATION

Power Systems Engineering

Dr. V C Jagan Mohan

Professor & Deputy Head

Ph.D (2017), Sri Venkateswara University, Tirupathi

M.Tech (2009), Jawaharlal Nehru Technological University, Hyd

B.Tech (2004) Madras University, Chennai

AREA OF SPECIALIZATION

Electrical Power Systems



Dr. L Rajasekhar Goud

Associate Professor

Ph.D (2017), Doctoral Degree,

Rayalaseema University, Pasupula, Andhra Pradesh

M.Tech (1988), Jawaharlal Nehru Technological University, Hyderabad, TS

B.Tech (1983), Osmania University, Hyderabad, TS

AREA OF SPECIALIZATION

Power Systems and High Voltage Engineering



Assistant Professors

Mr. K Lingaswamy

Mr. A Sathish Kumar

Ms. T Saritha Kumari

Mr. T Ravi Babu

Ms. Shaik Ruksana Begam

Mr. G Viswanath

Ms. A Manasa

Ms. M Varalakshmi

Mr. Kumbha Venkata Siva Rao

Mr. S Manohar

Mr. P Mallikarjun

COURSE MENU

The structured curriculum ensures that students receive a balanced education covering foundational concepts, specialized knowledge, practical skills through labs and projects, and exposure to industry standards and professional development. It aims to prepare students for both higher studies and careers in various sectors of Electrical and Electronic Engineering, meeting the requirements set by AICTE, preparing them for GATE examinations, and integrating best practices from IEEE.



I SEMESTER			
Course Code	Course Name	Credits	Prerequisite
THEORY			
AHSD01	Professional Communication	3	--
AHSD02	Matrices and Calculus	4	Basic Principles of Algebra and Calculus
AEED02	Electrical Circuits	3	--
ACSD01	Object Oriented Programming	3	--
PRACTICAL			
AHSD04	Professional Communication Laborator	1	--
ACSD02	Object Oriented Programming with Java Laboratory	2	--
AMED02	Manufacturing Practice	2	--
AEED04	Electrical Circuits Laboratory	1	--
EXPERIENTIAL ENGINEERING EDUCATION (Ex EED)			
ACSD03	Essentials of Innovation	1	--
TOTAL CREDITS		20	
CUMULATIVE CREDITS		20	

II SEMESTER			
Course Code	Course Name	Credits	Prerequisite
THEORY			
AHSD03	Engineering Chemistry	3	Basic principles of chemistry
AHSD07	Applied Physics	3	Basic principles of physics
AHSD08	Differential Equations and Vector Calculus	4	Basic Principles of Matrices and Calculus
ACSD05	Essentials of Problem Solving	3	
PRACTICAL			
AHSD05	Engineering Chemistry Laboratory	1	--
AHSD09	Applied Physics Laboratory	1	--
ACSD06	Programming for Problem Solving Laboratory	2	--
AMED03	Engineering Graphics	2	--
SKILL ENHANCEMENT PROJECT			
ACSD04	Mobile Applications Development	1	--
TOTAL CREDITS		20	
CUMULATIVE CREDITS		40	

III SEMESTER			
Course Code	Course Name	Credits	Prerequisite
THEORY			
AEED05	Analysis of Electrical Networks	4	--
AEED06	DC Machines and Transformers	3	Electrical Circuits, Engineering Physics
AEED07	Electromagnetic Fields	3	Electrical Circuits
ACSD08	Data Structures	3	Essentials of Problem Solving
AECD05	Analog Circuits	3	Electrical Circuits , Linear Algebra and Calculus
PRACTICAL			
AEED08	Electrical Networks and Simulation Laboratory	1	Electrical Circuits, Linear Algebra and Calculus
AEED09	DC Machines Laboratory	1	Electronic Devices and Circuits Laboratory
ACSD11	Data Structures Laboratory	1	Essentials of Problem Solving
EXPERIENTIAL ENGINEERING EDUCATION (Ex EED)			
ACSD12	Prototype and Design Building	1	Essentials of Innovation
TOTAL CREDITS		20	
CUMULATIVE CREDITS		80	

IV SEMESTER			
Course Code	Course Name	Credits	Prerequisite
THEORY			
AEED10	AC Machines	3	DC Machines
AEED11	Power Generation Systems and Economic Aspects	3	--
AEED12	Control Systems	3	Linear Algebra and Calculus, DC Machines and Transformers
AECD13	Digital Circuits	3	Electronic Devices and circuits, Digital System Design
AHSD13	Complex Analysis and Probability Distributions.	3	Basic Principles of Algebra and Calculus
PRACTICAL			
AEED13	AC Machines Laboratory	1	Electrical Circuits, Linear Algebra and Calculus
AEED14	Control Systems Laboratory	1	--
AECD17	Analog and Digital Circuits Laboratory	1	--
SKILL ENHANCEMENT PROJECT			
ACSD18	Dev Ops Engineer	2	Object Oriented Programming
TOTAL CREDITS		20	
CUMULATIVE CREDITS		80	

V SEMESTER			
Course Code	Course Name	Credits	Prerequisite
THEORY			
AEED16	Electrical Measurements and Instrumentation	3	Electrical Circuits, DC Machines and Transformers
AEED17	Power Electronics	3	Network Analysis, Digital Electronics
AEED19	Microprocessors and Microcontrollers	3	Analog Electronics (AECC07), Digital Electronics (AECC16)
AEED18	Performance of Transmission Lines and Cables	3	--
	Program Elective – I	3	
PRACTICAL			
AEED24	Electrical Measurements and Instrumentation Laboratory	1	--
AECD28	Microprocessors and Microcontrollers Laboratory	1	Analog Electronics Digital Electronics
SKILL ENHANCEMENT PROJECT			
ACSD30	Skill enhancement#	2	--
ACSD29	Engineering Design Project	1	--
TOTAL CREDITS		20	
CUMULATIVE CREDITS		100	

VI SEMESTER			
Course Code	Course Name	Credits	Prerequisite
THEORY			
AEED25	Power System Analysis	3	Electrical Power Generation System Electrical Power Transmission System
AEED26	Electric Drives and Static Control	3	Power Electronics, DC Machines and Transformers, AC Machines
	Program Elective- II	3	--
	Program Elective- III	3	--
	Open Elective-I	3	--
PRACTICAL			
AEED39	Power Electronics and Drives Laboratory	1	
AEED40	PLC and Industrial Automation Laboratory	1	DC Machines and Transformers
SKILL ENHANCEMENT PROJECT			
ACSD43	Skill enhancement#	2	--
ACSD44	Development Project	1	--
TOTAL CREDITS		20	
CUMULATIVE CREDITS		120	

VII SEMESTER			
Course Code	Course Name	Credits	Prerequisite
THEORY			
AEED41	Operation and Control of Electrical Power Systems	3	--
AEED42	Switch Gear and Protection of Electrical Apparatus	3	Power system
	Program Elective- IV	3	--
	Program Elective- V	3	--
	Open Elective- II	3	--
PRACTICAL			
AEED55	Power System Simulation Laboratory	1	Power System Analysis
AEED56	Power System Protection Laboratory	1	--
PROJECT WORK			
AEED57	Project Work (Phase I)	3	--
TOTAL CREDITS		20	
CUMULATIVE CREDITS		140	

VIII SEMESTER			
Course Code	Course Name	Credits	Prerequisite
THEORY			
AHSD15	Managerial Economics and Financial Analysis	3	--
	Program Elective- VI	3	--
	Open Elective- III	3	--
PROJECT WORK			
AEED65	Project Work(Phase II)	11	--
TOTAL CREDITS		20	
CUMULATIVE CREDITS		160	

ELECTIVE COURSES

PROGRAM ELECTIVES COURSES (PEC)

The below listed courses are Professional electives and the student has to study six courses as professional electives

Course Code	Name of the Course	Prerequisites	Preferred Semester	Credits
AEED19	Computer Aided Electrical Machines Design	DCMT and AC Machines	V	3
AEED20	Special Electrical Machines	DCMT and AC Machines	V	3
AEED21	High Voltage Engineering	LAC	V	3
AEED22	Electrical Energy Conservation and Auditing	Power System	V	3
AEED23	IOT Architecture and Protocols	-	V	3
AEED27	Principles of Signals and Systems	Complex Analysis and Transform Techniques	VI	3
AEED28	HVDC Transmission	EMI	VI	3
AEED29	Power System Stability	Power System	VI	3
AEED30	Digital Protection of Power System	Power System	VI	3
AEED31	Swarm Intelligence Techniques in Electrical Engineering	Power System	VI	3
AEED32	Power System Dynamics and Control	Power System	VI	3
AEED33	Engineering Optimization	Power System	VI	3
AEED34	EHVAC Transmission	Power System	VI	3
AEED35	Cyber Security in Power Systems	Power System	VI	3
AEED27	Principles of Signals and Systems	Complex Analysis and Transform Techniques	VI	3
AEED43	Grid Instrumentation and Communication	Power System	VII	3
AEED44	Power Quality and FACTS	Power System	VII	3
AEED45	Data Science and Machine Learning in Electrical Engineering	Power System	VII	3
AEED46	Battery Management Systems	Energy Systems and Sustainability	VII	3
AEED47	Utilization of Electric Power	Electrical Machine	VII	3
AEED48	Industrial Electrical Systems	-	VII	3
AEED49	Industrial IOT and Automation	Control System	VII	3
AEED50	Artificial Intelligence and Robotics	Electrical Machine	VII	3
AEED51	Electrical Traction	Power Electronics	VII	3
AEED52	Advanced Instrumentation	EMI	VII	3
AEED58	Modeling Dynamics and control of EVs	Electrical Machine	VIII	3
AEED59	Small Signal Analysis of Power Converters	Power Electronics	VIII	3
AEED60	Advanced Power Systems	Instrumentation	VIII	3
AEED61	Robotics and Mechatronics	Control Systems	VIII	3
AEED62	Process Control and Instrumentation	Control Systems	VIII	3

Open Elective Courses (OEC)

The courses listed below are offered by the Department of Electrical and Electronics Engineering for students of other departments.

Course Code	Course Name	Credits
AEED37	Electrical Estimation and Installation	IV
AEED38	Utilization of Electrical Engineering	IV
AEED53	Electric Power generation and Distribution	VII
AEED54	Renewable Energy Sources	VII
AEED63	Electric Vehicles	VIII
AEED64	Battery Technology	VIII

VALUE ADDED COURSES

Objective

Value added courses are provided to equip the students with knowledge and skills outside of the curriculum or to meet any specific requirements of the industry. The following are the Value- Added Courses provided to students by various departments in our institution.

ANY FOUR FROM THE GIVEN BELOW THROUGH IARE ELRV – AKANKSHA / CERTIFICATE – SWAYAM, e-PG pathshala, NPTEL etc.

- Data Scalability and Distribution (Amazon Web Services, Microsoft Azure, Google Cloud, Platform etc.)
- Software Developer (Restful webservices / Microservices, Rust programming, MEAN, MERN, MEVN)
- Data Science (Data visualization, Data wrangling, Bigdata Technologies, Business Intelligence, etc.)
- Operating Systems (IBM I, Mac OS, Linux, Haiku etc.)
- Debugging
- Testing (Selenium, TestNG)
- Cyber Security (Network Security, Threat Intelligence and Analysis / Risk Assessment and Management)
- Software Architect
- Blockchain Technology

VALUE ADDED COURSES FROM ELECTRICAL AND ELECTRONICS ENGINEERING

- Training on Electrical-CAD
- Certificate Program on PLC And SCADA
- Training on Electric Vehicles
- Certificate Program on Solar Power Design and Installation
- Training on OrCAD – PSpice

Course Component	Curriculum Content (% of total number of credits of the program)	Total Number of Contact hours	Total Number of Credits
Basic Science Courses (BSC)	11.87	21	19
Engineering Science Courses (ESC)	11.25	23	18
Humanities and Social Sciences (HSMC)	2.5	5	4
Professional Core Courses (PCC)	41.87	79	67
Professional Electives Courses (PEC)	11.25	18	18
Open Elective Courses (OEC)	5.62	09	09
Project work	8.95	28	14
Any other (Skill)	6.87	19	11
Total number of Credits			160

COURSE SYNOPSIS

CORE COURSES

ELECTRICAL CIRCUITS

This course deals with the basic concepts of circuit analysis which is the foundation for all subjects of the electrical and electronics engineering. It includes the fundamental laws of electricity and magnetism with an emphasis on resistors, inductors, and capacitors (RLC) circuits applied to alternating current (AC) or direct current (DC) of electrical networks. Further This course provides network theorems with different excitations, two-port network, and network topology to solve for real-time applications.

ANALYSIS OF ELECTRICAL NETWORKS

This course deals with the basic concepts of network theory which is the foundation for all subjects of the electrical engineering discipline. The emphasis of this course is laid on the basic analysis of circuits which includes three phase circuits, transient analysis of DC and AC circuits, network functions, and two port network parameters, Fourier analysis of AC circuits, design and analysis of filters.

DC MACHINES AND TRANSFORMERS

This course deals with the basic theory, construction, operation, performance characteristics and application of electro-mechanical energy conversion devices such as DC generators and motors. It also gives an in-depth knowledge on the operation of single phase and three phase transformers and it's testing. It also focuses on the auto-transformers, on-load, off-load tap changers which are widely used in real time applications.

ELECTROMAGNETIC FIELDS

This course deals with the students with good understanding of underlying principles and laws in electromagnetic fields and waves. The concepts of vector algebra, principles and basic laws of electro-statics, characteristics and properties of conductors and dielectrics, behavior of static magnetic field and application of Ampere's law, determination of force in magnetic field and magnetic potential, concept of time varying fields and propagation of electro-magnetic waves.

ANALOG CIRCUITS

This course deals with the knowledge over the principles and construction of analog electronics. It covers the characteristics of electronic devices such as diodes, transistors, operational amplifiers and analyzing amplifier circuits using small signal model and hybrid pi model, linear and nonlinear wave shaping. It focuses on applications in the area of power electronics, digital electronics and VLSI design.

AC MACHINES

This course deals with the basic theory, construction, operation, performance characteristics and application of electro-mechanical energy conversion devices such as synchronous and asynchronous machines. It also facilitates the study of the alternating machines which are the major part of industrial drives and agricultural pump sets.

POWER GENERATION SYSTEMS AND ECONOMIC ASPECTS

This course deals with the different elements in electric power generation systems. It deals with conventional energy systems like thermal and nuclear power stations. This course also introduces non-conventional energy systems like solar energy, Hydro and Wind energy. This course will also discuss some environmental impacts of power generation and also look at alternative and sustainable energy resources.

CONTROL SYSTEMS

This course deals with the basic concepts of block diagram reduction technique, time response analysis of first order and second order systems. It deals with various time and frequency domain analysis. It elaborates the concept of stability and its assessment for linear time invariant systems.

DIGITAL CIRCUITS

This course deals with the logic gates, various logic families. Design of digital circuits using logic gates, combinational circuits and sequential circuits. Apply op-amp characteristics to design analog to digital converters and digital to analog converters. Classification and characteristics of memories such as Read-only memory, Random access memory and programmable logic devices such as programmable logic array and programmable array logic

ELECTRICAL MEASUREMENTS AND INSTRUMENTATION

This course deals with the basic understanding of measurement principles and measuring instruments used in numerous electrical applications. The course provides the concept of measurement, analysis of errors and various specification parameters used to judge and compare measuring instruments. It provides an insight to develop advanced instruments in industries.

POWER ELECTRONICS

This course deals with the concepts of conversion, control and monitoring of electrical energy using power semiconductor devices. Methods for analyzing power electronic converters suitable for DC/AC, DC/DC, AC/AC and AC/DC electrical energy conversions including regulators are presented. Additionally, principles for designing power electronic converters, including their power semiconductors and passive elements are established.

MICROPROCESSORS AND MICROCONTROLLERS

This course deals with the in-depth understanding of the structure and operations of microprocessor and micro-controllers, machine language programming and interfacing techniques. Through understanding of hardware and software interaction and integration.

PERFORMANCE OF TRANSMISSION LINES AND CABLES

Electrical Power Transmission Systems deals with the modeling, analysis and design of electrical power transmission lines. It gives an emphasis on overhead line insulators, underground cables, transient behavior of the lines, corona phenomena, Extra High Voltage Alternating Current (EHVAC) and High Voltage Direct Current (HVDC) transmission systems.

POWER SYSTEM ANALYSIS

This course deals with the students to study the performance of interconnected power system under steady state and transient stability conditions. The course deals with formation of impedance and admittance matrices for various configurations, finding unknown electrical quantities at various buses, symmetrical and unsymmetrical fault analysis, power system using per unit representation.

ELECTRIC DRIVES AND STATIC CONTROL

This course deals with the operation of electric drives controlled from a power electronic converter. This also deals with design concepts of controllers for motor drives. The development of compact thyristor power converters has made this possible by smooth speed control of both AC and DC motors which are employed for several applications such as AC drives, DC drives, vehicles and renewable energy.

OPERATION AND CONTROL OF ELECTRICAL POWER SYSTEMS

This course deals with the analysis techniques for the operation and control of power systems. Load dispatch and scheduling of energy are discussed. Power system security and state estimation are introduced. This course serves as the most important prerequisite of many advanced courses in power systems.

SWITCH GEAR AND PROTECTION OF ELECTRICAL APPARATUS

This course deals with the overview of the principles and schemes for protecting power lines, transformers, buses, generators. It provides in depth knowledge of various types of relays and circuit breakers. It includes protection against over voltages in power system using lightning arrestors and insulation coordination.

PROFESSIONAL ELECTIVES

COMPUTER AIDED ELECTRICAL MACHINES DESIGN

This course deals with the design of electrical machines using an analytical and a computer-aided approach. The course covers the detailed design of various machines derived using fundamental electromechanical equations.

SPECIAL ELECTRICAL MACHINES

This course deals with the basic design principles of electrical machines including synchronous reluctance motor, switched reluctance, permanent magnet synchronous motors and permanent magnet brushless DC motors. It also facilitates the study of special machines which are the major part of industrial applications

HIGH VOLTAGE ENGINEERING

This course deals with the planning, operation, and testing of High voltage Electrical devices. High voltage engineering deals with different mediums of insulation and break down Phenomenon, generation of high DC and AC voltage, measurement Techniques of high AC and DC voltages, testing of insulation under all types of conditions using generated high DC and AC voltages.

ELECTRICAL ENERGY CONSERVATION AND AUDITING

This course deals with the basic understanding of energy audit and management. The consumption of energy is increasing day by day. One way to cope up with the increase in energy demand is to increase the production of energy which demands more investment and the other way is to conserve the energy as energy conserved/saved is twice the energy generated. Energy conservation means reduction in energy consumption but not compromising with the quality or quantity of energy production.

IOT ARCHITECTURE AND PROTOCOLS

This course deals with various layers and protocols that facilitate the communication and interaction between devices and systems. The IoT architecture and protocols are designed to provide flexibility, scalability, and interoperability across various IoT ecosystems and applications.

PRINCIPLES OF SIGNALS AND SYSTEMS

This course deals with the fundamental principles of signals and system analysis. These concepts form the building blocks of modern digital signal processing, communication, and control systems. Hence, a sound understanding of these principles is necessary for all students of Electrical and Electronics Engineering.

HVDC TRANSMISSION

This course deals with the importance of HVDC transmission, analysis of HVDC Converters, Harmonics and Filters, Reactive power control and Power factor improvements of the system. It also deals with basic modeling and analysis of HVDC system power flow regulation.

POWER SYSTEM STABILITY

This course deals with the various problems encountered in power systems related to reliability, stability and quality power. The course involves assessment of stability of a power system, improvement in stability and prevention of the system becoming unstable. The course would enable the students to figure out power system problems.

DIGITAL PROTECTION OF POWER SYSTEMS

This course deals with the fundamental concepts to design various electronic circuits to implement various relaying functions. The relays such as Static Relays, Microprocessor based protective relays, Digital relay Travelling wave-based protection and adaptive relaying is comprehensively covered in this course. It should be also useful to practicing engineers and the research community.

SWARM INTELLIGENCE TECHNIQUES IN ELECTRICAL ENGINEERING

This course deals with the application of swarm intelligence techniques in solving complex problems in electrical engineering. And deals with various swarm algorithms, their principles, and applications in power systems, control systems, optimization, and other relevant areas.

POWER SYSTEM DYNAMICS AND CONTROL

This course deals with the fundamental dynamic behavior and controls of power systems to perform basic stability analysis. Comprehend concepts in modeling and simulating the dynamic phenomena of power systems Interpret results of system stability studies.

ENGINEERING OPTIMIZATION

This course deals with the fundamentals of optimization methods that can be used during a design process. Considering the computational aspect of the subject especially in higher dimensions, the course will involve significant number of computational assignments and a term project in the general area of engineering optimization.

EHVAC TRANSMISSION

This course deals with the topics that are considered essential for understanding the operation and design of EHV ac overhead lines and underground cables. Theoretical analyses of all problems combined with practical application are dealt here.

CYBER SECURITY IN POWER SYSTEMS

This course deals with an in-depth exploration of the intersection between cyber security and power systems. Students will learn about the unique challenges, threats, and vulnerabilities facing power systems infrastructure, as well as the strategies and technologies employed to mitigate cyber risks and ensure the reliability and security of critical energy infrastructure.

GRID INSTRUMENTATION AND COMMUNICATION

This course deals with the application of swarm intelligence techniques in solving complex problems in electrical engineering. And deals with various swarm algorithms, their principles, and applications in power systems, control systems, optimization, and other relevant areas.

POWER QUALITY AND FACTS

This course deals with the basic concepts power quality problems in distribution system, mitigation techniques for compensating devices to improve power quality in distribution system. It deals with the principle, operation and applications in power systems with respect to active/reactive power control. This course also concludes with applications of FACTS devices.

DATA SCIENCE AND MACHINE LEARNING IN ELECTRICAL ENGINEERING

This course deals with the basic concepts of descriptive, perspective, and predictive analytics. Adapt programming language or software to apply statistics/mathematics concepts and machine learning for energy analytics. And application of machine learning techniques in the energy sector. Also discover and experiment prediction/forecasting in emerging topics – customer and utilities outage.

BATTERY MANAGEMENT SYSTEM

This course deals with the batteries and demonstrate Lithium-Ion Battery Fundamentals, measure different battery parameters and analyze battery performance to identify Battery Management System Functionality. Detail the need of Charge Balancing and state of charge estimation using various algorithms, Estimate the state of health of the battery and discuss battery fault detection.

UTILIZATION OF ELECTRICAL POWER

This course deals with effective utilization of electrical power. It describes the basic principles and Performance characteristics of drives, electric traction and illumination; it also facilitates the use of electrical power for domestic industrial consumers.

INDUSTRIAL ELECTRICAL SYSTEMS

This course deals with the overview of Electrical Systems in Manufacturing, Chemical, Metallurgical, Process Industries, Electric Traction, Electric Heating, Electric Welding, Electroplating, Illumination and case studies.

INDUSTRIAL IOT AND AUTOMATION

This course deals with the transformation of industrial processes through the integration of modern technologies such as sensors, communication, and computational processing. It deals with various an application of IOT in industries to modify the various existing industrial systems.

ARTIFICIAL INTELLIGENCE AND ROBOTICS

This course deals with the fundamentals of AI and expert systems and its application in Robotics and also the topics that are includes Machine learning, Deep learning, and advanced topics in AI and Robotics.

ELECTRIC TRACTION

This course deals with the understanding of underlying fundamentals of electric traction system by acquiring knowledge on track. The concepts of fundamentals of illumination, types of lamps, photometry, control of light. may explain different types of heating like resistance, induction, dielectric, their working principles and application,

ADVANCED INSTRUMENTATION

This course deals with the advanced instrumentation and measurement techniques. Topics include system-level design, fabrication, and evaluation with emphasis on systems involving concepts and technology from mechanics, optics, electronics, chemistry, and biology. Simulation, modeling, and design software.

MODELLING, DYNAMICS AND CONTROL OF EV'S

This course deals with the areas that come under the umbrella of electric vehicles such as vehicle dynamics, Motors, Power Electronics, PWM, Control etc. The most important part of this course will be that each topic will be analyzed and demonstrated through Matlab Simulink, so that the grip of the course will be strong and the knowledge acquired will be useable in real time applications.

SMALL SIGNAL ANALYSIS OF POWER CONVERTERS

This course deals with the understanding of working principles and analysis of the different types single phase rectifiers. The concepts of different configurations of DC-DC converters, the static magnetic field, thereby obtaining the inductance for different configurations of wires and energy stored in the coil, various types of Inverters and Examine the harmonics and power electronic converters

ADVANCED POWER SYSTEMS

This course deals with comprehensive treatment towards understanding of the new dimensions associated with the power systems. It deals with power system stability and control, protection and power quality.

ROBOTICS AND MECHATRONICS

This course deals with the fundamentals of Micro Electro Mechanical Systems (MEMS). To understand different materials used for MEMS, semiconductors, and Solid mechanics to fabricate MEMS devices.

PROCESS CONTROL AND INSTRUMENTATION

The course deals with the fundamentals of process control along with instrumentation and its applications. The course introduces P, PI, and PID controllers and their applications. The instrumentation for process control is also focused along with hands-on practical experience. Principles of operation of different measuring devices for temperature, level, pressure, flow, pH, humidity, density, and viscosity

OPEN ELECTIVES

BATTERY TECHNOLOGY

This course deals with the basics of the batteries, their working principles, and the battery management system including the design of the thermal management and cooling system while providing a hands-on approach to gaining skills in computational tools such as MATLAB and Altair etc.

ELECTRICAL ESTIMATION AND INSTALLATION

This course deals with the understanding of estimation and costing by acquiring knowledge. The concepts of market survey, estimates, purchase enquiries, tenders, comparative statement and payment of bills. The estimation of overhead transmission and distribution system and its components.

ELECTRIC VEHICLE

This course deals with the understanding of underlying fundamentals of electric Vehicle Technology by acquiring knowledge on Vehicle. The concepts of fundamentals of illumination, types of hybrid vehicle, the issues related to batteries and remedial measures, their working principles and application, Different correlate the advancement in e-vehicles.

ELECTRIC POWER GENERATION AND DISTRIBUTION

This course deals with the importance of generation and distribution systems. It also deals with economic aspects of power generation.

RENEWABLE ENERGY SOURCES

This course deals with the understanding of green energy concepts and applications. This knowledge can be employed to advance in our current work, to move into the green energy field, and to promote sustainability at home and in our community. This course will lay the groundwork for understanding and implementing important green technologies such as wind, solar, geothermal, biomass, and various energy storage technologies.

UTILIZATION OF ELECTRICAL ENGINEERING

This course deals with effective utilization of electrical power. It describes the basic principles and performance characteristics of drives, electric traction, and illumination, it also facilitates the use of electrical power for domestic and industrial consumers



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