IARE

INSTITUTE OF AERONAUTICAL ENGINEERING

NAAC ACCREDITATION A++ GRADE

24 YEARS OF Excellence

nirf INDIA RANKINGS ENGINEERING CATEGORY RANK 151-200 INNOVATION CATEGORY RANK 51-100

NBA NATIONAL BOARD OF ACCREDITATION

B.TECH

ELECTRONICS AND COMMUNICATION ENGINEERING

EMPOWERING INNOVATION: EXPLORE THE WORLD OF ECE

ACADEMIC YEAR 2024-25

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 professionally competent engineers, innovators and entrepreneurs capable of effectively addressing the technical challenges with social responsibility and professional ethics.

MISSION

To provide an academic environment that will ensure high quality education, training and research by keeping students abreast of latest research and innovations in science and technology aimed at promoting employability, entrepreneurship, leadership qualities with ethics and research attitude.

Program Educational Objectives (PEOs)

PEO-I

Success in Professional career:

To make the students to excel in professional career in applied research by acquiring the knowledge in electronics, basic sciences and professional skills through rigorous learning.

PEO-II

Design/Development of Solutions:

To prepare the students to analyze real life problems and design socially accepted and economically feasible solutions in the chosen field of engineering or other fields.

PEO-III

Lifelong learning and Research:

To involve the students in lifelong learning and professional development by pursuing higher education and participation in research and development activities to integrate engineering issues to broader social contexts.

PEO-IV

Communication skills and Leadership:

To exhibit effective communication skills in their professional career, lead a team with good leadership traits and good interpersonal relationship with the members related to other engineering streams.

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.

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)

Program Specific Outcomes (PSOs)

PSO-I

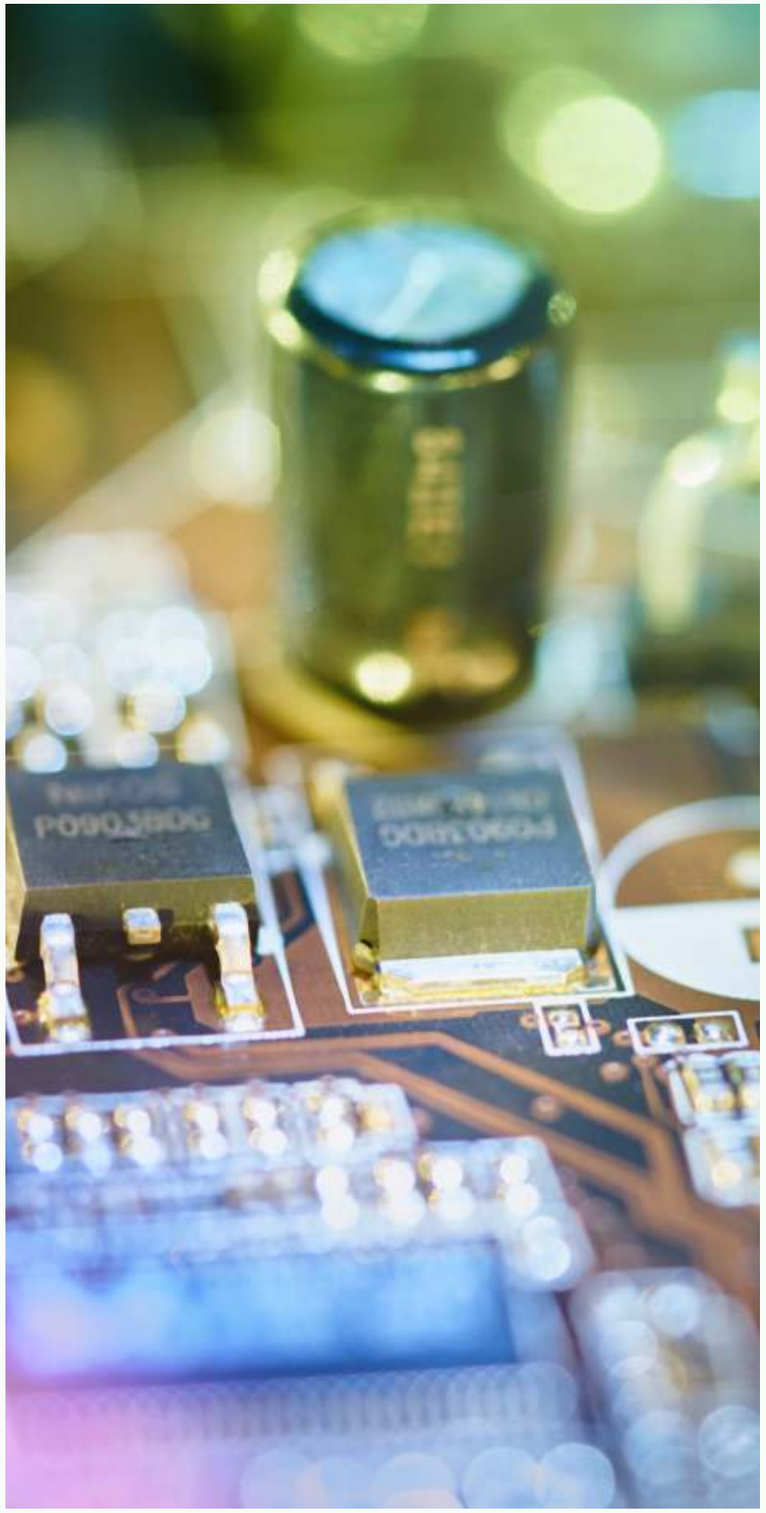
Build Embedded Software and Digital Circuit Development platform for Robotics, Embedded Systems and Signal Processing Applications.

PSO-II

Focus on the Application Specific Integrated Circuit (ASIC) Prototype designs, Virtual Instrumentation and System on Chip (SOC) designs.

PSO-III

Make use of High Frequency Structure Simulator (HFSS) for modeling and evaluating the Patch and Smart Antennas for Wired and Wireless Communication Applications.



ABOUT **ELECTRONICS AND COMMUNICATION ENGINEERING**

Electronics and Communication Engineering contributes to shaping the future of technology, driving economic growth, and improving the well-being of individuals and communities around the world.

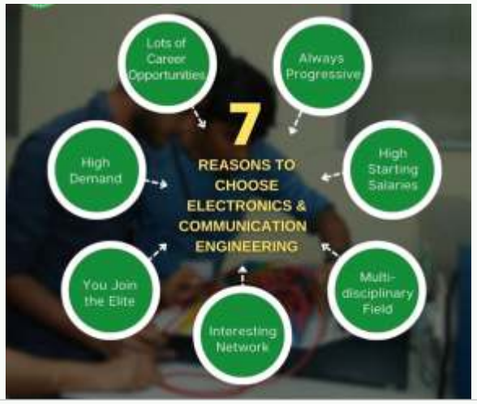
Electronics and Communication Engineering (ECE) department is to impart knowledge and skills related to the design, development, and application of electronic systems and communication technologies. This field focuses on the study of electronic devices, circuits, communication systems, and their integration to create innovative solutions for various industries and sectors. Provide students with a strong foundation in electronic principles, digital and analog circuits, signal processing, communication systems, and related areas

The goals of Electronics and Communication Engineering (ECE) revolve around advancing technology, fostering innovation, and addressing societal needs.

Why study ECE @ IARE

"We are connecting the world" with the evolution of technology, Electronics and Communication has become an essential discipline that is required by every other industry. Hence, ECE is one of the most sought-after branches by students. It requires strong problem solving and analytical skills, as well as a solid understanding of mathematics and computers in relation to electrical and electronic devices. This course focuses on four key areas in electronics: circuits and systems, signal processing, computing, and communication.

- One of the TOP highest demand bachelor program
- Well trained experts in areas of Advance Communications, IoT & Embedded Systems, VLSI Design, Signals and Image processing, Digital Systems, Virtual Instrumentation, Antennas wave propagation.
- Well-equipped laboratory facilities and conductive environment for students.
- International Exposure for students via mobility program and student exchange.
- Industry supported
- Continuous Learning and Growth
- Global Impact
- Diverse Career Paths
- ECE is at the heart of the rapidly evolving technology sector. With the increasing integration of electronics and communication systems in various industries, there is a high demand for skilled ECE professionals in areas such as telecommunications, consumer electronics, automotive, aerospace, healthcare, and beyond.
- Innovation and Creativity: ECE offers a dynamic and innovative environment where you can contribute to ground breaking discoveries and technological advancements. From designing next-generation electronic devices to developing cutting-edge communication systems, ECE provides endless opportunities for creativity and innovation.
- Financial Stability: ECE professionals are in high demand and often command competitive salaries and benefits. With a strong foundation in ECE, you'll have the opportunity to build a rewarding career with excellent earning potential and job stability.



Expertise and focus:

In Electronics and Communication Engineering (ECE), expertise and focus areas can vary based on individual interests, career goals, and industry demands.

"We are dedicated to upholding the highest standards of quality and excellence in our research endeavors. Our focus spans both fundamental exploration and applied research, aiming to tackle real-world challenges and issues. We prioritize the creation of new knowledge and innovative products that have a meaningful impact on society, academia, government, industry, and the environment."

Relevant high demands of research focus:

- Internet of Things (IoT) Security and Reliability
- 5G and Beyond
- Quantum Computing and Quantum Information Processing
- Wireless Sensor Networks (WSNs)
- Nano electronics and Nanotechnology
- Flexible and Wearable Electronics
- Machine Learning and Artificial Intelligence (AI)
- Image, Speech and Video Processing
- Biologically-Inspired Electronics

DEPARTMENT **SPECIFIC LABORATORIES**

To innovate at the systems level and have impact in the real world, the discipline of electronics and communication engineering sits on strong technological and theoretical foundations. The outcome is the papers published by the students and faculty in National and International conferences and journals. Some of the research areas of focus are

VLSI Design

The VLSI design is well for challenging analog, digital and mixed signal IC design and validation. The laboratory also has a very rich wealth of state-of-art server, systems and EDA tools, Software and Library. While retaining the salient features of Microelectronics & VLSI stream, the courses includes lecture and laboratory based courses specially designed to cater to the needs of the industry both in the core subjects and through electives. In laboratory sessions, students are trained to design system level project to physical layout of ICs through available tools and hardware in the laboratory.

To familiarize students with the realities of design complexities and IC layout environments they will get exposure to VLSI CAD tools in the following levels – system level behavior analysis, logic verification, schematic, layout, parasitic extraction, Physical design, Synthsis, Design verification and circuit simulation through the laboratory experiments and projects with focus on technology, and techniques to analyze and optimize performance matrices, such as: power, area and signal integrity

Outcome

The course should enable the students:

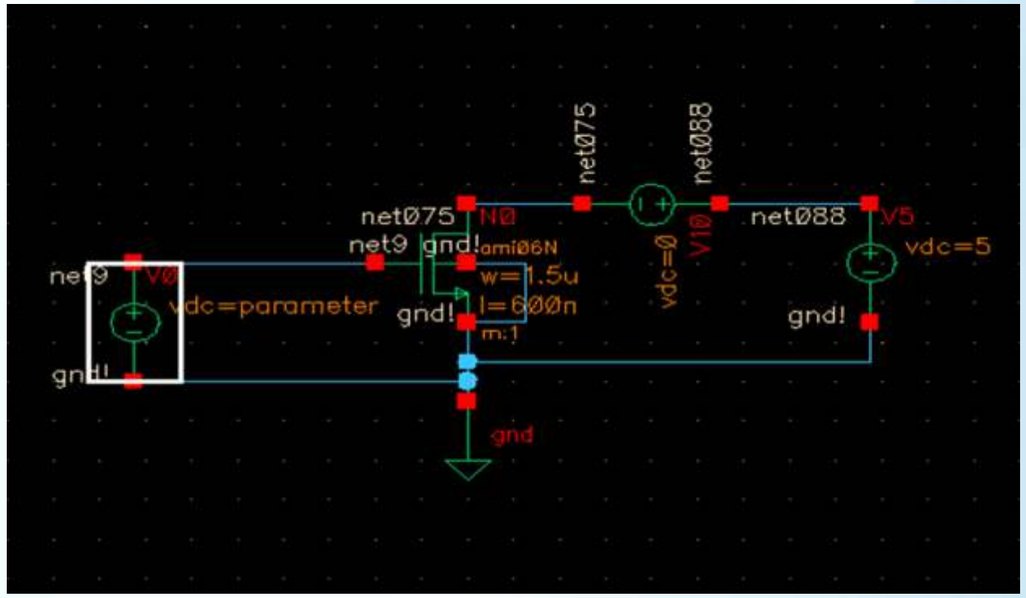
- To familiarize the basics of circuit design
- To familiar with cadence tools used to develop in different applications.
- To study about combinational and sequential circuits.
- To study about various memory devices and its applications.
- To study the functional behavior of combinational and sequential

Objective

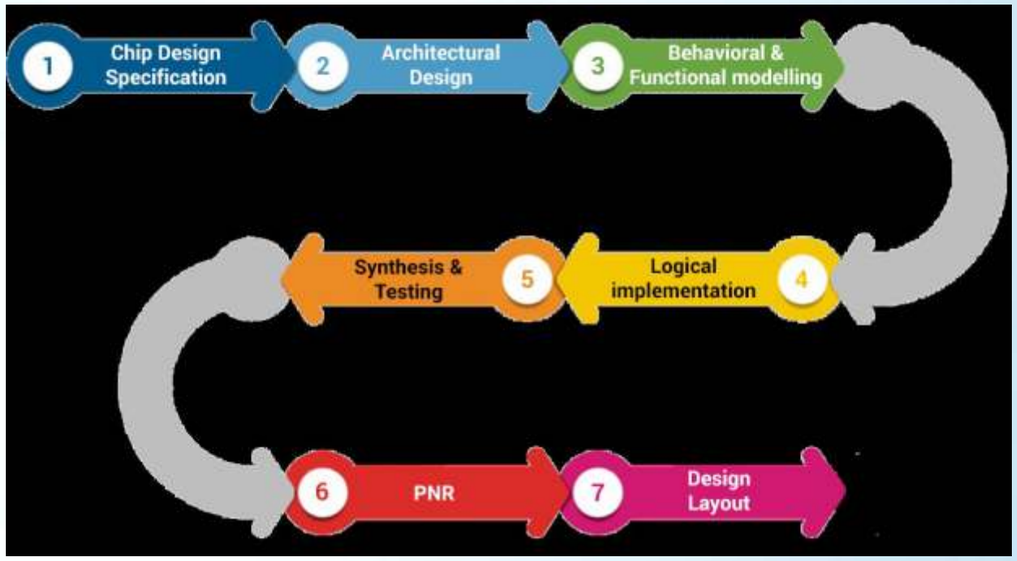
At the end of the course the students will be able to:

- Develop low power VLSI circuits.
- Develop arithmetic sub systems.
- Develop data path function units for real time applications.

Logic Gate Design Using Cadence



ASIC Design Flow in VLSI Engineering



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.

Lab VIEW Laboratory is based on simulation software with 30 licensed users and hardware bundles (mY DAQ, mY RIO and USRP) each of 10 units.

Levels of National Instruments LabVIEW Certifications:

1. CLAD : Certified Lab VIEW Associate Developer
2. CLD : Certified LabVIEW Developer
3. CLA : Certified LabVIEW Architect

Outcome

The course should enable the students:

- Familiarize the basics and interfacing of VI.
- Familiar with NI Lab VIEW tools used to develop in different applications.
- Study about programming techniques.
- Study about sensors and transducers for given applications.
- Study about data acquisition and interfacing techniques.
- Do programming for process control and other applications.

Objective

At the end of the course the students will be able to:

- Develop real time applications.
- Gain experience in interpreting technical specifications and selecting sensors and transducers for given application.
- Use the data acquisition software and hardware to collect and analyze data from physical system.

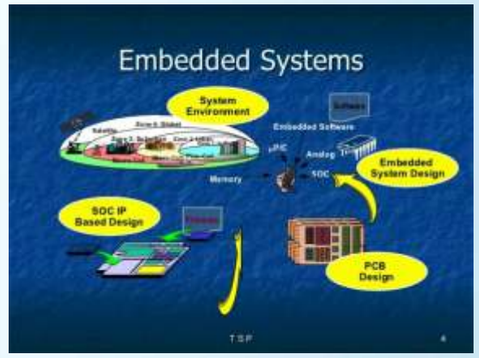
Embedded Systems Design

Embedded systems Design is continuous of the Microprocessor and Microcontrollers, and is intended to Design, Implementation, Developing and Test of embedded applications. The topics covered are definition of embedded systems, history, classification, characteristics and major applications, Quality attributes of embedded systems, types of processors, ASICs, PLDs, COTS, Memory Interface, communication interface, embedded firmware design and development, RTC, RTOS, Task scheduling, threads, multi-tasking, Task communication, Task synchronization, techniques, device drivers. Embedded Systems Design includes ARM cortex M3, ARM9, ARM7, PSOC-FT-kit-M3 and 8051 Based development boards, Aurdino, Raspberry Pi boards.

Outcome

The course should enable the students:

- Have knowledge about the basic functions, structure, concepts and applications of embedded systems.
- Develop an understanding of the technologies behind the embedded computing systems
- Develop familiarity with 8051 Microcontrollers and their applications in an embedded Environment
- Learn the method of designing and program an Embedded Systems for real time applications.
- Understand operating system concepts, types and choosing RTOS.
- Have knowledge about the development of embedded software using RTOS and Implement small programs to solve well-defined problems on an embedded platform.
- Develop familiarity with tools used to develop in an embedded environment.
- Implement Real time applications on embedded platform



Digital System Design

The Digital System Design lab provides the experimental platform for the students to code and implement the RTL level design using VHDL language. In this laboratory, students design and implement various combinational and sequential circuits starting from low-level modules such as AND, OR gates to high-level modules such as adders, decoders, multiplexer, ALU etc. The prerequisite for this lab is a complete understanding of digital electronics.

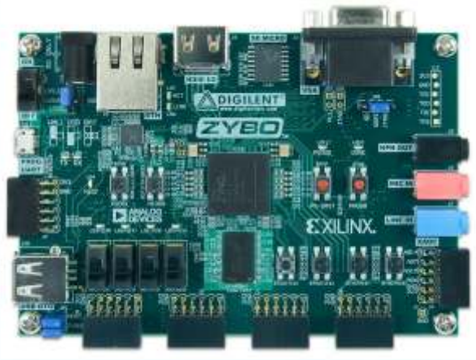
Digital System Design Lab based on simulation software with 50 Licensed users and hardware FPGA kits (Zybo and ZED development kits) at Institute of Aeronautical Engineering.

Xilinx Vivado Tool

Vivado Design Suite is a software suite for synthesis and analysis of hardware description language (HDL) designs, superseding Xilinx ISE with additional features for system on a chip development and high-level synthesis. Vivado represents a ground-`up rewrite and re-thinking of the entire design flow (compared to ISE).

Zybo FPGA Boards

The ZYBO (ZYnq BOard) is a feature-rich, ready-to-use, entry-level embedded software and digital circuit development platform built around the smallest member of the Xilinx Zynq-7000 family, the Z-7010. It is a combination of the capabilities and power characteristics of an ASIC, the flexibility of an FPGA, and the ease of programming associated with microprocessors, all within a single device. Since Zynq is a fully integrated system, it is both more reliable and more secure than a 2-chip solution.



Zybo Board

Zed Board

Internet of Things

One of the newest laboratory on campus, the IoT laboratory hosts planning, prototyping, implementation and testing of IoT systems. It also hosts various research activities in areas related to the Internet of Things. This laboratory is used by undergraduates, postgraduate students and research scholars working on collaborative and interdisciplinary projects.

Internet of Things Lab based on simulation software with 20 Licensed users and hardware boards and various more than 10 types of sensors at Institute of Aeronautical Engineering.

The Internet of Things (IoT) is a concept in which sensors and actuators are interconnected and accessible remotely. It is becoming an increasingly important research field, as sensor costs decrease while the importance of data for decision-making increases. The IoT-Lab focuses on a number of research topics, such as low-power sensors, data-transmission technologies, resilient runtime environments and middleware software components as well as data analysis and data visualization tools.

Communications and Signal Processing

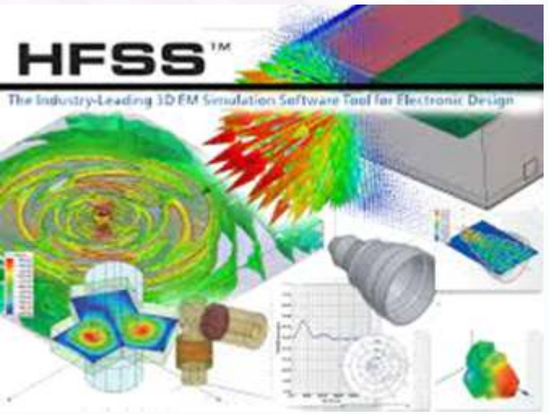
Center for Communications and Signal Processing is actively involved in theoretical and applied research in the broad areas of communications, Signals and image Processing. The center provides an umbrella environment for faculty, under graduate and post graduate students to carry out research in various aspects related to the respective fields.

Center for Communications and Signal Processing is based on simulation software with 20 licensed users and NI ELVIS hardware boards at Institute of Aeronautical Engineering.

NI ELVIS COMMUNICATIONS BOARD

The NI Engineering Laboratory Virtual Instrumentation Suite (NI ELVIS) provides a project-based learning experience using online measurements and practical, embedded design. Engineering students must learn the concepts that are taught in the context of real systems.They must explore fundamental topics used in engineering systems, while working in teams, and apply them in practical designs quickly and effectively. With NI ELVIS software, hardware, instrumentation, and control in a collaborative environment to prepare the next generation of engineers.

Antenna design using Ansys HFSS



Antenna design using Ansys HFSS supports intermediate and advanced courses in Electromagnetics and Microwave Engineering. Students can do experiments with transmission line propagation, antennas and microwave circuit components. The microwave laboratories provide the necessary hardware & software support for training the students in the area of RF and Microwave Engineering. It offers design, analysis and simulation of various components and devices to understand the basics of RF and microwave engineering, to boost the quality of engineering education, deepen understanding, and provide the necessary practical skills to young minds

MATLAB

MATLAB® is a programming platform designed specifically for engineers and scientists to analyze and design systems and products that transform our world. MATLAB and Simulink are used to teach fundamental electrical and computer engineering concepts spanning theory to hands-on projects. For ECE explores the role of MATLAB, Simulink, and their related toolboxes for an electronics engineering curriculum. The text uses the software to promote modeling, simulation, and virtual experimentation, with emphasis on analysis, design, and simulation study. The chapters have been written to reflect on the accessibility of the various functions and tools. With domain-specific toolboxes and apps, MATLAB makes it easy for students to learn and perform domain-specific tasks involving signal processing, image processing, and communications. Educators can use MATLAB live scripts to create lectures that combine explanatory text, mathematical equations, code, and results.

MATLAB®
SIMULINK®

Laboratory **Details**

1 Electronic Devices and Circuits Laboratory

The Electronic Devices and Circuits Laboratory provides students with hands-on experience in designing, analyzing, and testing electronic circuits. Electronic Devices and Circuits Laboratory provides students with valuable hands-on experience, reinforcing theoretical concepts learned in lectures and preparing them for careers in electronics engineering, research, and development.

Major Equipment

NI Analog Discovery trainer kit- 36 Nos
Desktop Computer Systems – 36 Nos

Make: Dell
Model: Vostro 3250
Configuration: Intel Core I3-8100 Processor, 64-bit Operating System, 4 GB DDR4 RAM, 500 GB HDD, Bluetooth, WiFi, 22" Monitor, Keyboard, Mouse
Software: Simulation software

2 Digital System Design Laboratory

The Digital System Design Laboratory is a dedicated space where students gain practical experience in designing, implementing, and testing digital circuits and systems. Equipped with cutting-edge tools and software, this laboratory offers hands-on learning opportunities in digital logic design, FPGA programming, and system-level integration and preparing them for careers in digital hardware design, embedded systems development, and digital signal processing.

Major Equipment

Zybo Boards-30 Nos
Zynq-Zed Development boards-18 Nos
Desktop Computer Systems – 24 Nos

Make: Dell
Model: Vostro 3470
Configuration: Intel Core I3-8100 Processor, 64-bit Operating System, 4 GB DDR4 RAM, 500 GB HDD, Bluetooth, WiFi, 22" Monitor, Keyboard, Mouse
Software: Xilinx Vivado software-50 licensed users

3 Communication Systems Laboratory

The Analog and Digital Communication Systems Laboratory serves as a practical learning environment for students to explore and understand the principles, techniques, and technologies used in analog and digital communication systems. Equipped with specialized equipment and software, this laboratory facilitates hands-on experimentation, simulation, and analysis of communication systems.

Major Equipment

Analog and Digital Communication application experimental boards- 06 boards for each experiment NI ELVIS EMONA Communication board-01 No Spectrum Analyzer-01 No
RF Analyzer-01 No
Digital Storage Oscilloscope-12Nos
Function Generators-12 Nos
Desktop Computer Systems – 15 Nos

Make: Dell **Model:** Vostro 3250/3268
Configuration: Intel Core I3-8100 Processor, 64-bit Operating System, 4 GB DDR4 RAM, 500 GB HDD, Bluetooth, WiFi, 22" Monitor, Keyboard, Mouse
Software: XMATLAB software-50 licensed users

4 Linear IC Applications Laboratory

The Linear IC Applications Laboratory is a specialized facility dedicated to providing students with practical experience in designing, analyzing, and testing linear integrated circuits (ICs) and their applications. Equipped with advanced instrumentation and software tools, this laboratory enables hands-on learning in the design and implementation of linear IC-based circuits and systems.

Major Equipment

IC trainer kit Boards-30 Nos
NI Analog Discovery trainer kit- 36 Nos
Digital Storage Oscilloscope-12Nos
Function Generators-12 Nos
Desktop Computer Systems – 24 Nos

Make: Dell
Model: Vostro 3470
Configuration: Intel Core I3-8100 Processor, 64-bit Operating System, 4 GB DDR4 RAM, 500 GB HDD, Bluetooth, WiFi, 22" Monitor, Keyboard, Mouse
Software: Xilinx Vivado software-50 licensed users

5 Microprocessor and Microcontrollers Laboratory

The Microprocessor and Microcontrollers Laboratory is a dedicated facility where students gain hands-on experience in designing, programming, and interfacing microprocessors and microcontrollers. Equipped with state-of-the-art hardware and software tools, this laboratory enables students to explore the principles, techniques, and applications of microprocessor-based systems and preparing them for careers in embedded systems, IoT (Internet of Things), robotics, automation, and related fields.

Major Equipment

8086 Microprocessor Boards- 30Nos
8051 Microcontroller Boards- 30Nos
Microprocessor and Microcontrollers experimental interfacing cards- 06 boards for each experiment
Desktop Computer Systems – 36 Nos

Make: Dell **Model:** Vostro 3470/3268
Configuration: Intel Core I3-8100 Processor, 64-bit Operating System, 4 GB DDR4 RAM, 500 GB HDD, Bluetooth, WiFi, 22" Monitor, Keyboard, Mouse
Software Required: WIN862 simulation software / MASAM software

6 Digital Signal Processing Laboratory

The Digital Signal Processing Laboratory is a specialized facility where students explore and experiment with digital signal processing (DSP) and image processing techniques using advanced software and hardware tools. This laboratory provides hands-on experience in designing, implementing, and analyzing digital signal and image processing algorithms for a wide range of applications and preparing them for careers in areas such as telecommunications, multimedia processing, biomedical imaging, remote sensing, and computer vision.

Major Equipment

DSP Application Development trainer kits-15Nos
Desktop Computer Systems – 24 Nos

Make: Dell
Model: Vostro 3902/3268
Configuration: Intel Core I3-8100 Processor, 64-bit Linux Operating System, 4 GB DDR4 RAM, 500 GB HDD, Bluetooth, WiFi, 22" Monitor, Keyboard, Mouse
Software: MATLAB software -24 Users

7 Embedded System Design and IoT Laboratory

The Embedded System Design and IoT (Internet of Things) Laboratory is a specialized facility where students gain hands-on experience in designing, prototyping, and testing embedded systems and IoT devices. Equipped with a range of hardware platforms, sensors, actuators, and communication modules, this laboratory provides a practical learning environment for exploring the integration of hardware and software in embedded systems and IoT applications.

Major Equipment

Microcontrollers Application Development trainer kits-10Nos
ARM7/ARM 9 kits-03Nos
ARM cortex M3 kits-05Nos
IoT Hardware Setup with sensors and accessories -05Nos
Desktop Computer Systems – 24 Nos

Make: Dell
Model: Vostro 3470/3268
Configuration: Intel Core I3-8100 Processor, 64-bit Linux Operating System, 4 GB DDR4 RAM, 500 GB HDD, Bluetooth, WiFi, 22" Monitor, Keyboard, Mouse
Software: Keil software Micro vision 4 -24 Users and Python Software

8 Antennas and Microwave Engineering Laboratory

The Antennas HFSS (High-Frequency Structure Simulator) Laboratory is a specialized facility where students gain hands-on experience in designing, simulating, and analyzing antennas using HFSS software from Ansys. This laboratory provides a practical learning environment for exploring the principles, techniques, and applications of antenna design and electromagnetic simulation.

The Microwave Laboratory is a specialized facility dedicated to conducting experiments and research in the field of microwave engineering. Equipped with state-of-the-art instruments and equipment, this laboratory provides students with hands-on experience in designing, testing, and analyzing microwave circuits and systems.

Major Equipment

Gunn diode Microwave Bench setup-03Nos
Reflex Klystron Microwave Bench setup-03Nos
Desktop Computer Systems – 12 Nos

Make: Dell
Model: Vostro 3470/3268
Configuration: Intel Core I3-8100 Processor, 64-bit Linux Operating System, 4 GB DDR4 RAM, 500 GB HDD, Bluetooth, WiFi, 22" Monitor, Keyboard, Mouse
Software: Ansys HFSS software -20 licensed users

FACULTY
INFORMATION

Dr. P Munaswamy
Professor and Head

Ph.D (2014), Doctoral Degree, JNTUH, Hyd

M.Tech (2001), SV University, Tirupati

B.Tech (1999), VRSCE , Vijayawada

AREA OF SPECIALIZATION

Electronic instrumentation control system, Image Processing, System order reduction techniques for stability analysis of LTI systems like control systems, signal processing systems

Dr. V R Seshagiri Rao
Assistant Professor & Deputy Head

Ph.D (2023), Doctoral Degree, JNTUH, Hyderabad

M.Tech (1991), OU, Hyderabad

B.Tech (1984), JNTUK, Kakinada

AREA OF SPECIALIZATION

Digital Systems Engineering
Fault Tolerance Systems for Semiconductor Memories,
Build in Redundancy analysis using Global and Local spares for RAM

Dr. V Padmanabha Reddy
Professor

Ph.D (2014), Doctoral Degree, JNTUH, Hyderabad

M.Tech (2002), JNTUH, Hyderabad

B.Tech (1993), NIT, Warangal

AREA OF SPECIALIZATION

VLSI, Digital Systems & Computer Electronics
•Area Efficient motion estimation
•Low power circuit design
•Footed Quasi resistance
•GDI Technology & VLSI Architecture

Dr. S China Venkateswarlu
Professor

Ph.D (2018), Doctoral Degree, JNTUK, Kakinada

M.Tech (2005), JNTUH, Hyderabad

B.Tech (1997), Nagarjuna University, Guntur

AREA OF SPECIALIZATION

Green Communications, IoT based Speech Enhancement, Digital Communications
•Speech Enhancement Objective Quality Measures Using Hybrid Wavelet Thresholding Green communication in wireless power consumption

Dr. V Siva Nagaraju
Professor

Ph.D (2017), Doctoral Degree, Nagarjuna University, Guntur

M.Tech (2006), Nagarjuna University, Guntur

B.Tech (2003), JNTUH, Hyd

AREA OF SPECIALIZATION

Microwave Engineering,
A hybrid non data aided SNR estimation for MIMO OFDM System

Dr. J Mohan
Professor

Ph.D (2014), Doctoral Degree, Anna University, Chennai

M.Tech (2005), Satyabhama University, Chennai

B.Tech (1999), Bharathidasan University, Tiruchirapalli

AREA OF SPECIALIZATION

Applied Electronics,
Medical Image Processing,
VLSI Signaling, Embedded Systems,
Machine Learning, IoT.
Certain Investigations on Magnetic Resonance image denoising methods based on Neutrosophic set theory

Dr. Y Pandu Rangaiah
Associate Professor

Ph.D (2021), Doctoral Degree, JNTUH, Hyderabad

M.Tech (2006), OU, Hyderabad

B.Tech (1999), Gulbarga University, Karnataka

AREA OF SPECIALIZATION

Microwave & Radar Engineering, Reconfigurable Antennas
Design and Analysis of Semi-Compound Reconfigurable Antennas

Dr. B Ravi Kumar
Associate Professor

Ph.D (2021), Doctoral Degree, SV University, Tirupati

M.Tech (2011), JNTUA, Anantapur

B.Tech (2006), JNTUH, Hyderabad

AREA OF SPECIALIZATION

VLSI System Design,
Signal and Image Processing
Assessment of convective clouds from NOAA satellite data using spatial and spectral analysis

Dr. V Kishen Ajay Kumar
Associate Professor

Ph.D (2021), Doctoral Degree, JNTUA, Anantapur

M.Tech (2007), JNTUA, Anantapur

B.Tech (1984), Sri Krishnadevaraya University, Anantapur

AREA OF SPECIALIZATION

Digital Systems and Computer Electronics,
Optical Networks, Communication Networks, Scalable and Robust Burst scheduling strategies for optical switching in WDM Networks

Dr. Surekha Reddy B
Assistant Professor

Ph.D (2021), Doctoral Degree, NIT Warangal

M.Tech (2015), Cochin University, Kerala

B.Tech (2012), JNTUH, Hyderabad

AREA OF SPECIALIZATION

VLSI &Embedded Systems
Signal Processing, Speech Processing, Machine Learning and Pattern Recognition,
Image Processing,
Embedded Systems.

Dr. Prashant Bachanna
Assistant Professor

Ph.D (2023), Doctoral Degree, Visvesvaraya Technological University, Karnataka

M.Tech (2012), Visvesvaraya Technological University, Karnataka

B.Tech (1984), Visvesvaraya Technological University, Karnataka

AREA OF SPECIALIZATION

Optimization Techniques,
Machine Learning

FRAME WORK OF ECE

ECE VERTICAL

Microelectronics

Microelectronics is a subfield of electronics that focuses on the design, fabrication, and application of tiny electronic components and systems. These are used to create integrated circuits (ICs) and other small-scale electronic devices that are essential in state of the art VLSI technology.

Embedded Systems

Embedded systems are specialized computing systems that perform dedicated functions or tasks within larger mechanical or electrical systems. They are embedded as part of a complete device, often with real-time computing constraints. Unlike general-purpose computers, embedded systems are designed to handle specific applications, optimizing their performance, power consumption, and reliability for those tasks.

Communication Systems

Communication systems are integral to modern technology, facilitating the transfer of information across various distances and mediums. These systems encompass a broad range of technologies and methodologies used to transmit data, voice, and video between devices and locations.

Signal processing

Signal processing is involves the analysis, manipulation, and interpretation of signals. Signals, in this context, refer to functions that convey information about a physical phenomenon, often represented as time-varying quantities. Signal processing techniques are essential in a wide range of applications, from telecommunications and audio processing to medical imaging and control systems.

ECE Verticals			
Microelectronics	**Embedded Systems**	**Communication Systems**	**Signal Processing**
I Year			
Electrical Circuits			
Electrical Circuits Laboratory			
II Year			
Electronic Devices and Circuits		Communication systems	Signals and Stochastic
Digital System Design		Electromagnetic Waves and Transmission Lines	
Electronic Devices and Circuits Laboratory		Communication Systems Laboratory	
Digital System Design Laboratory			
Linear IC Applications			
Analog Electronics			
System Simulation and Modeling			
Analog Electronics Laboratory			
System Design and Modeling			
Linear IC Applications Laboratory			
III Year			
VLSI Design	Microprocessor and Microcontrollers	Antenna and Wave Propagation	Control Systems
VLSI Design Laboratory	Microprocessor and Microcontrollers Laboratory	High Speed Communications	Digital Signal and Image Processing
RF Circuit Design	Embedded Systems	Cellular and Mobile Communications	Digital Signal and Image Processing Laboratory
Digital Design Through VHDL	Microprocessors and Interfacing	Optical Communications	Artificial Neural Networks
Scripting Languages for VLSI Design		Satellite Communications	Digital Image Processing
Microelectronics		Networks and Protocols	Signal Processing for Communication and Biomedical Applications
Digital Electronics for Engineering		5G Communications	Wavelets and Applications
			Digital Signal Processors and Architectures
			Digital Signal Processing for Wireless Communication

IV Year			
Digital Electronics	Embedded System Design and Development	Microwave and Radar Engineering	Speech and Image Processing
Low Power VLSI Circuits	Embedded System Design and IoT Laboratory	Microwave and Radar Engineering Laboratory	Principles of Signals and Systems
Nano Electronics	Electronic Measurements and Instrumentation	Network Security and Cryptography	Image Processing and Applications
CMOS VLSI Design	Embedded and Real Time Operating Systems	ADHOC Wireless Networks	
Mixed Signal VLSI Design	Sensors and Actuators	Microwave Components and Circuits	
Nano Technology		High Speed System Design	
		Wireless Communications and Networks	
		Networks and Protocols	

CAREER OPPORTUNITIES:

COURSE MENU

REGULATIONS: BT-23
ELECTRONICS AND COMMUNICATION ENGINEERING

I SEMESTER

Course Code	Course Name	Subject Area	Category	Preequsites
INDUCTION PROGRAM	**TWO WEEKS MANDATORY AUDIT COURSE**			
THEORY				
AHSD01	Professional Communication	HSMC	Foundation	--
AHSD02	Matrices and Calculus	BSC	Foundation	Basic Principles of Algebra and Calculus
AEED02	Electrical Circuits	ESC	Foundation	--
ACSD01	Object Oriented Programming	ESC	Foundation	--
PRACTICAL				
AHSD04	Professional Communication Laboratory	HSMC	Foundation	--
ACSD02	Object Oriented Programming with Java Laboratory	ESC	Foundation	--
AMED02	Manufacturing Practice	ESC	Foundation	--
AEED04	Electrical Circuits Laboratory	ESC	Foundation	--
EXPERIENTIAL ENGINEERING EDUCATION (ExEED)				
ACSD03	Essentials of Innovation	Skill	Skill	--
MANDATORY COURSE				
AHSD06	Environmental Science	MC	MC - I	Basic Principles of earth science.
TOTAL				

II SEMESTER

Course Code	Course Name	Subject Area	Category	Prerequisite
THEORY				
AHSD03	Engineering Chemistry	BSC	Foundation	Basic principles of chemistry
AHSD07	Applied Physics	BSC	Foundation	Basic principles of physics
AHSD08	Differential Equations and Vector Calculus	BSC	Foundation	Basic Principles of Matrices and Calculus
ACSD05	Essentials of Problem Solving	ESC	Foundation	--
AHSD05	Engineering Chemistry Laboratory	BSC	Foundation	Basic Principles of Chemistry
AHSD09	Applied Physics Laboratory	BSC	Foundation	Basic principles of physics
ACSD06	Programming for Problem Solving Laboratory	ESC	Foundation	--
AMED03	Engineering Graphics	ESC	Foundation	Fundamentals of Geometry
SKILL ENHANCEMENT PROJECT				
ACSD07	Mobile and Web Applications Development	Skill	Skill	--
MANDATORY COURSE				
AHSD10	Gender Sensitization	MC	MC - II	--
FIELD PROJECT				
TOTAL				

III SEMESTER

Course Code	Course Name	Subject Area	Category	Prerequisite
THEORY				
AHSD12	Complex Analysis and Special Functions	BSC	Foundation	Basic Principles of Algebra and Calculus
AECD01	Electronic Devices and Circuits	PCC	Core	Applied Physics
AECD02	Signals and Stochastic Process	PCC	Core	Electrical Circuits
ACSD08	Data Structures	PCC	Core	Essentials of Problem Solving
AECD03	Digital System Design	PCC	Core	--
PRACTICAL				
AECD06	Electronic Devices and Circuits Laboratory	PCC	Core	Applied Physics, Electrical Circuits Laboratory
AECD07	Digital System Design Laboratory	PCC	Core	--
ACSD11	Data Structures Laboratory	PCC	Core	Essentials of Problem Solving
SKILL ENHANCEMENT PROJECT				
ACSD12	Prototype and Design Building	Skill	Skill	Essentials of Innovation.
TOTAL				

IV SEMESTER

Course Code	Course Name	Subject Area	Category	Prerequisite
THEORY				
AECD08	Liner IC Applications	PCC	Core	Digital System Design, Electronic Devices and Circuits
AECD09	Analog Electronics	PCC	Core	Electronic Devices and Circuits
AECD10	Communication Systems	PCC	Core	Signals and Stochastic Process
AECD11	Electromagnetic Waves and Transmission Lines	PCC	Core	Applied Physics
AECD12	System Simulation and Modeling	PCC	Core	Digital System Design
PRACTICAL				
AECD14	Analog Electronics Laboratory	PCC	Core	Electronic Devices and Circuits
AECD15	Communication Systems Laboratory	PCC	Core	Signals and Stochastic Process
AECD16	Linear IC Applications Laboratory	PCC	Core	Electronic Devices and Circuits, Digital System Design
SKILL ENHANCEMENT PROJECT				
AECD18	System Design and Modeling	Skill	Skill	Digital System Design
VALUE ADDED COURSE				
INTERNSHIP				
TOTAL				

#The course would consist of talks by working professionals from industry, government, academia & research organizations.

V SEMESTER

Course Code	Course Name	Subject Area	Category	Prerequisites
THEORY				
AECD19	Microprocessor and Microcontrollers	PCC	Core	Digital System Design
AECD20	VLSI Design	PCC	Core	Electronic Devices and Circuits, IC applications
AECD21	Antenna and Wave Propagation	PCC	Core	Electromagnetic Waves and Transmission Lines
AECD22	High Speed Communications	PCC	Core	Digital communications
	Program Elective – I	PEC	Elective	
PRACTICAL				
AECD28	Microprocessor and Microcontrollers Laboratory	PCC	Core	Digital System Design
AECD29	VLSI Design Laboratory	PCC	Core	Linear IC Applications
SKILL ENHANCEMENT PROJECT				
	Skill#	Skill	Skill	--
	Engineering Design Project	Skill	Skill	--
VALUE ADDED COURSE				
TOTAL				

#The course would consist of talks by working professionals from industry, government, academia & research organizations

VI SEMESTER

Course Code	Course Name	Subject Area	Category	Prerequisite
THEORY				
AECD30	Control Systems	PCC	Core	Mathematical Transform Techniques
AECD31	Digital Signal and Image Processing	PCC	Core	Applied Mathematics
	Program Elective – II	PCC	Core	
	Program Elective – III	PEC	Elective	
	Open Elective – I	OEC	Elective	
PRACTICAL				
AECD44	Advanced Computational Engineering Laboratory	PCC	Core	--
AECD45	Digital Signal and Image Processing Laboratory	PCC	Core	Applied Mathematics
SKILL ENHANCEMENT PROJECT				
	Skill#	Skill	Skill	--
	Development Project	Skill	Skill	--
VALUE ADDED COURSE				
INTERNSHIP				
TOTAL				

#The course would consist of talks by working professionals from industry, government, academia & research organizations

VII SEMESTER

Course Code	Course Name	Subject Area	Category	Prerequisite
THEORY				
AECD46	Microwave and Radar Engineering	PCC	Core	Electromagnetic Waves and Transmission Lines
AECD47	Embedded System Design and Development	PCC	Core	Microprocessors and Microcontrollers
	Program Elective – IV	PEC	Elective	
	Program Elective – V	PEC	Elective	
	Open Elective – II	OEC	Elective	
PRACTICAL				
AECD60	Microwave and Radar Engineering Laboratory	PCC	Core	Electromagnetic Waves and Transmission Lines
AECD61	Embedded System Design and IoT Laboratory	PCC	Core	Microprocessors and Microcontrollers
PROJECT WORK				
AECD62	Project Work (Phase - I)	PROJ	Project	--
MANDATORY COURSE				
AHSD14	Essence of Indian Traditional Knowledge	MC	MC - II	--
TOTAL				

VIII SEMESTER

Course Code	Course Name	Subject Area	Category	Prerequisite
THEORY				
AHSD15	Managerial Economics and Financial Analysis	BSC	Foundation	--
	Program Elective – VI	PEC	Elective	
	Open Elective – III	OEC	Elective	
PROJECT WORK				
AECD70	Project Work (Phase - II)	PCC	Project	
TOTAL				

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
AECD23	Cellular and Mobile Communications	Analog and Digital Communications	V	3
AECD24	Optical Communications	Applied Physics	V	3
AECD25	Satellite Communications	Analog and Digital Communications	V	3
AECD26	Networks and Protocols	Analog and Digital Communications	V	3
AECD27	5G Communications	Analog and Digital Communications, High Speed Communications	V	3
AECD32	Artificial Neural Networks	Probability and Statistics	VI	3
AECD33	RF Circuit Design	Analog and Digital Communications	VI	3
AECD34	Digital Design Through VHDL	Digital System Design	VI	3
AECD35	Scripting Languages for VLSI Design	Digital System Design and Python Programming	VI	3
AECD36	Microelectronics	Electronic Devices and Circuits, VLSI Design	VI	3
AECD37	Digital Image Processing	Signals and Systems, Digital Signal Processing	VI	3
AECD38	Signal Processing for Communication and Biomedical Applications	Signals and Systems, Analog and Digital Communications	VI	3
AECD39	Wavelets and Applications	Signals and Systems, Digital Signal Processing	VI	3
AECD40	Digital Signal Processors and Architectures	Signals and Systems, Digital Signal Processing	VI	3
AECD41	Digital Signal Processing for Wireless Communication	Signals and Systems, Analog and Digital Communications	VI	3
AECD48	Network Security and Cryptography	Digital Signal Processing, Image Processing	VII	3
AECD49	Electronic Measurements and Instrumentation	Electronic Devices and Circuits, Electrical Circuits	VII	3
AECD50	Embedded and Real Time Operating Systems	ARM system architecture	VII	3
AECD51	ADHOC Wireless Networks	Wireless Communication Networks	VII	3
AECD52	Digital Electronics	Electronic Devices and circuits, Digital System Design	VII	3
AECD53	Low Power VLSI Circuits	Digital System Design, VLSI Design	VII	3
AECD54	Microwave Components and Circuits	Microwave and radar engineering	VII	3
AECD55	High Speed System Design	Digital System Design	VII	3
AECD56	Nano Electronics	Electronic Devices and Circuits	VII	
AECD57	CMOS VLSI Design	VLSI Design, Electronic Devices and Circuits	VII	3
AECD63	Speech and Image Processing	Signals and Systems	VIII	3
AECD64	Mixed Signal VLSI Design	Digital System Design, Electronic Devices and Circuits , VLSI Design	VIII	3
AECD65	Wireless Communications and Networks	Analog and Digital Communications	VIII	3
AECD66	Sensors and Actuators	Analog and Digital Electronics, Linear algebra, Statistics and Probability	VIII	3
AECD67	Networks and Protocols	Computer architecture and organization	VIII	3

OPEN ELECTIVE COURSES (OEC)

The courses listed below are offered by the Department of CSE (AI&ML) for students of other departments.

Course Code	Course Name	Prerequisite	Credits
AECD42	Embedded Systems	Computer Organization and Architecture, Operating Systems	3
AECD43	Principles of Signals and Systems	Electrical Circuits	3
AECD58	Digital Electronics for Engineering	Electronic Devices and circuits	3
AECD59	Microprocessors and Interfacing	Computer Architecture	3
AECD68	Nano Technology	--	3
AECD69	Image Processing and Applications	Digital Image Processing	3

OPEN ELECTIVES COURSES

OPEN ELECTIVES – I

Course Code	Course Title
ACSC24	Computer Architecture
ACSC25	Advanced Data Structures
ACSC26	Artificial Intelligence
AITC19	Cyber Crime and Computer Forensics
AITC20	Ethical Hacking
AITC21	Mobile Computing

OPEN ELECTIVE - II

Course Code	Course Title
AHSC15	Soft Skills and Interpersonal Communication
AHSC16	Cyber Law and Ethics
AHSC17	Economic Policies in India
AHSC18	Global Warming and Climate Change
AHSC19	Intellectual Property Rights
AHSC20	Entrepreneurship

OPEN ELECTIVE - III

Course Code	Course Title
AAEC30	Flight Control Theory
AAEC31	Airframe Structural Design
AMEC34	Industrial Management
AMEC35	Elements of Mechanical Engineering
ACEC30	Modern Construction Materials
ACEC31	Disaster Management

VALUE ADDED COURSES / MANDATORY COURSES

Course Code	Course Title
AHSC10	Essence of Indian Traditional Knowledge (MC)
ACSC18	Fundamentals of Database Systems (VAC)
ACSC23	Object Oriented Programming Development and Languages (VAC)
ACSC29	Design of Algorithms (VAC)

COURSE **SYNOPSIS**

CORE **COURSES**

AECD01 ELECTRONIC DEVICES AND CIRCUITS

Prerequisite: Applied Physics

The course introduces the physics of semiconductor materials, constructional features and principle of operation of the semiconductor devices and its applications. It includes the biasing configurations of the semiconductor devices to provide temperature stability. Further this course provides to analyze the properties of semiconductor materials to build amplifier devices with voltage gain and current gain.

AECD02 SIGNALS AND STOCHASTIC PROCESS

Prerequisite: Electrical Circuits

This course introduces students to learn the fundamental concepts and techniques used in the analysis and processing of signals. The second part focus on the basic concepts of random processes, random signals, and their interaction with the electrical or electronic systems. The course forms the basis for the next level courses of an electronics engineer such as communications, digital signal processing, radar systems, machine learning and data science.

ACSD08 DATA STRUCTURES

Prerequisite: Essentials of Problem Solving

The course covers some of the general-purpose data structures and algorithms, and software development. Topics covered include managing complexity, analysis, static data structures, dynamic data structures and hashing mechanisms. The main objective of the course is to teach the students how to select and design data structures and algorithms that are appropriate for problems that they might encounter in real life. This course reaches to student by power point presentations, lecture notes, and lab which involve the problem solving in mathematical and engineering areas.

AECD03 DIGITAL SYSTEM DESIGN

Prerequisite: Matrices and calculus

The course will make them learn the basic theory of switching circuits and their applications in detail. Starting from a problem statement they will earn to design circuits of logic gates that have a specified relationship between signals at the input and output terminals. They will be able to design combinational and sequential circuits. They will learn to design counters, adders, sequence detectors. This course provides a platform for advanced courses like Computer architecture, Microprocessors & Microcontrollers and VLSI design. Greater Emphasisis placed on the use of programmable logic devices and State machines.

AECD06 ELECTRONIC DEVICES AND CIRCUITS LABORATORY

Prerequisite: Applied Physics, Electrical Circuits Laboratory

This course provides the hands-on experience on designing circuits using Diodes, Bipolar Junction Transistors, Field Effect Transistors, UJTs and SCRs. Determine the gain, bandwidth and input output impedances of BJT and FET amplifiers. Provides the capability to extract the characteristics of semiconductor devices with simulation tools.

AECD07 DIGITAL SYSTEM DESIGN LABORATORY

The digital system design laboratory introduces the hardware description language for the design and development of digital integrated circuits and field programmable devices. It provides VHDL language elements, synthesizable register transfer logic models in structural, dataflow, behavioral modeling of combinational and sequential circuits. Includes applications in the area of VLSI system design.

ACSD11 DATA STRUCTURES LABORATORY

Prerequisite: Essentials of Problem Solving

The course covers some of the general-purpose data structures and algorithms, and software development. Topics covered include managing complexity, analysis, static data structures, dynamic data structures and hashing mechanisms. The main objective of the course is to teach the students how to select and design data structures and algorithms that are appropriate for problems that they might encounter in real life. This course reaches to student by power point presentations, lecture notes, and lab which involve the problem solving in mathematical and engineering areas.

AECD08 LINEAR IC APPLICATIONS

Prerequisite: Digital System Design, Electronic Devices and Circuits

This course deals with the fundamental concepts of operational amplifiers, linear & nonlinear application of op- amp and digital Integrated circuits. It covers design and analysis of frequency selective and tuning circuits like oscillators, active filters, phase-locked loops and its use for communication applications. Along with switching applications like that of comparators, learn IC based design of voltage regulators, and digital IC's for combination and sequential circuit designs. This course forms the basis for the next level of course VLSI Design.

AECD09 ANALOG ELECTRONICS

Prerequisite: Electronic Devices and Circuits

This course provides circuit analysis to design high frequency amplifiers and wave shaping circuits using discrete components. It covers multistage amplifiers, power amplifiers, feedback concepts, sampling gates and multi vibrators. Analog electronics are widely used in radio and audio equipment and in many applications where signals are derived from analog sensors and transducers.

AECD10 COMMUNICATION SYSTEMS

Prerequisite: Signals and Stochastic Process

Communications emphasize on generation, transmission and reception of audio, video, and telephony signals. The course is intended to understand various analog and pulse modulation schemes. Further, its emphasis the knowledge on various digital modulation techniques and linear block codes. Communication system principles are used for real world applications of radio and TV broadcasting systems.

AECD11 ELECTROMAGNETIC WAVES AND TRANSMISSION LINES

Prerequisite: Applied Physics

Electromagnetic Waves and Transmission Lines gives the necessary information about the formation of magnetic fields when electric current flows and structures to conduct electromagnetic waves. It covers the fundamental concepts of electro-magnetic wave theory and introduces the basic laws of electromagnetic fields, time varying Maxwell's equations, wave propagation and transmission lines. It provides a platform for advanced courses such as antennas and wave propagation, microwave engineering, transmission via wired links and optical fiber networks.

AECD12 SYSTEM SIMULATION AND MODELLING

Prerequisite: Applied Physics

System simulation and modeling involve creating computer-based representations of real-world systems to understand, analyze, and predict their behavior. This process helps in gaining insights into the system's dynamics, making informed decisions, and optimizing system performance.

AECD14 ANALOG ELECTRONICS LABORATORY

Prerequisite: Electronic Devices and Circuits

This course provides hands-on experience in designing electronic circuits and pulse circuits using transistors. The course aims at practical experience with the characteristics and theoretical principles of linear and nonlinear devices and pulse circuits. It provides the capability to design and simulate amplifiers and wave-shaping circuits. Design power amplifiers, feedback amplifiers, clippers, and clampers, and end determine the gain, bandwidth of amplifiers, and calculation of distortion in power amplifiers.

AECD15 COMMUNICATION SYSTEMS LABORATORY

Prerequisite: Signals and Stochastic Process

Communication engineering is the field of study concerned with the transmission of information either in analog or digital form. The objective of this lab course provides a platform to the students to understand the basics of analog and digital communication systems, modulation techniques, data transmission, multiplexing, etc. There are a wide variety of applications for communications like outdoor broadcasting transmissions and long distance telephone calls.

AECD16 LINEAR IC APPLICATIONS LABORATORY

Prerequisite: Digital System Design, Electronic Devices and Circuits

This course imparts hands-on knowledge for integrated circuit applications. It enables the students to design linear and non-linear applications using op-amp and pulse generation circuits using timer IC. Provide the capability to use vivado tool for performing the combinational and sequential circuits.

AECD19 MICROPROCESSOR AND MICROCONTROLLERS

Prerequisites: Digital System Design

Processor and controller cores are the key components in most of the modern embedded and system on-chip designs. This course outlines the architecture and signal description of Intel microprocessor and microcontrollers. The instruction set and assembly language programming along with I/O and memory interfacing techniques are covered. The knowledge acquired from this course will enable the students in development of embedded hardware projects and models for engineering and scientific applications.

AECD20 VLSI DESIGN

Prerequisites: Electronic Devices and Circuits

This course introduces the students to fabrication techniques, rapid design and implementation of very large scale (VLSI) circuits. Specific topics include: CMOS logic, MOSFET theory, selection of technology and logic, design process, design rules and layout procedure, design aidfor layout, rule checking, logic and circuit simulation, timing and testability are the main aspects ofthis course. The course further gives information on data path subsystems, several PLD's performance parameters and testing approaches for the circuits.

AECD21 ANTENNAS AND WAVE PROPAGATION

Prerequisites: Electromagnetic Waves and Transmission Lines

This course will cover the fundamentals of antenna, radiation phenomenon, antenna theory, different types of antennas, antenna arrays, design and measurements, concepts of antenna wave propagation (influence of earth's atmosphere on radio waves). Antennas had wide range of application in government and commercial fields and able to design the antennas like Yagi-Uda and Microstrip. The course presents fundamental theory together with techniques for the practical design, measurement and application of antennas over the RF (radio-frequency) to millimeter wave frequency range.

AECD22 HIGH SPEED COMMUNICATIONS

Prerequisites: Communication Systems

This study line covers the field of high-speed communication over optical fibres, from transmission systems and networking perspectives. It also aims at providing a sound understanding of the physical concepts that have enabled the numerous breakthroughs in this technology over the past decades, as well as the current limitations that will have to be overcome by future generations of engineers. Consequently, the study line includes a balance of courses on optical components, optical transmission systems and optical networks that reflect the nature of this speciality at the crossroad between many technologies. Applications include terabit-per-second capacity transcontinental links, core networks, metropolitan area networks, the fast moving field of access networks (FTTS, FTTC, FTTB, FTTH etc) and mobile backhaul networks.

AECD28 MICROPROCESSOR AND MICROCONTROLLERS LABORATORY

Prerequisites: Digital System Design

This laboratory course will facilitates the students to program 8086 microprocessor and 8051 microcontroller. Win862 software will be used for writing and debugging assembly language programs. The course includes performing arithmetic and logical operations, string manipulations, code conversions and interfacing of I/O devices to processor/controller. The hands-on experience acquired by the student's during the course makes them to carry out processor/controller based projects and extend their knowledge on the latest trends and technologies in the field of embedded system.

AECD29 VLSI DESIGN LABORATORY

Prerequisites: Digital System Design

The art of VLSI circuit design is dynamic with advances in process technology and innovations in the electronic design automation (EDA) industry. The objective of this laboratory course is to demonstrate the various stages in VLSI design flow using cadence software. Hands on training on logic and circuit simulations of MOSFETS, ring oscillators, multiplexers, analog amplifiers etc are included. The course also covers physical layout of complex logic gates for chip design.

AECD30 CONTROL SYSTEMS

Prerequisites: Mathematical Transform Techniques

This course deals with the basic concepts of block diagram reduction technique, time response analysisof 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. This course addresses the various real time issues and how the control strategies are used in automation areas associates with variety of engineering streams.

AECD31 Digital Signal and Image Processing

Prerequisites: Signals And Stochastic Process

The field of signal and image processing encompasses the theory and practice of algorithms and hardware that convert signals produced by artificial or natural means into a form useful for a specific purpose. The signals might be speech, audio, images, video, sensor data, telemetry, electrocardiograms, or seismic data, among others; possible purposes include transmission, display, storage, interpretation, classification, segmentation, or diagnosis. Faculty members in this field span the areas of digital signal processing, statistical signal processing, image/video compression, analysis & processing, speech processing, music information retrieval and computer audition.

AECD45 Digital Signal and Image Processing Laboratory

Prerequisites: Signals and Stochastic Process

This course is concerned with the implementation of digital signal and image processing algorithms using different computational platforms such as MATLAB and DSP tools that give core knowledge to develop the real time applications in the area of signal and image processing. It focuses on the convolution, discrete Fourier transform, fast Fourier transform algorithms, digital filter design and multi rate signal processing. Digital signal and image processing applications are used in speech processing, image processing, audio and video data compression, communication systems.

AECD46 MICROWAVE AND RADAR ENGINEERING

Prerequisites: Electromagnetic Waves and Transmission Lines

This course allows students to study and analyze microwave and radar systems at high frequencies, typically in the MHz and GHz range where lumped elements (e.g., resistors, capacitors, inductors) are no longer appropriate. It introduces the concepts waveguides, components, microwave tubes and radar transmitters & receivers. The applications include cellular communications, high-speed digital and analog circuits, wireless networks and radar.

AECD47 EMBEDDED SYSTEM DESIGN AND DEVELOPMENT

Prerequisites: Microprocessors and Microcontrollers

This course allows students to learn the fundamentals of embedded system hardware and firmware design. It focus on embedded system design process, embedded C, interfacing modules, software development tools for debugging and testing of embedded applications, ARM & SHARC processor architectures and memory organization. It provides hands-on experience on implementation of embedded application prototype design using embedded C.

AECD60 MICROWAVE AND RADAR ENGINEERING LABORATORY

Prerequisites: Electromagnetic Waves and Transmission Lines

The Antennas and Microwave Engineering Laboratory supports intermediate and advanced courses in Electromagnetic and Microwave Engineering. Students experiment with transmission line propagation, antennas and microwave circuit components. The microwave laboratories provide the necessary hardware software support for training the students in the area of RF and Microwave Engineering. It offers design, analysis and simulation of various components and devices to understand the basics of RF and microwave engineering, to boost the quality of engineering education, deepen understanding, and provide the necessary practical skills to young mind.

AECD61 EMBEDDED SYSTEM DESIGN AND IOT LABORATORY

Prerequisites: Microprocessors and Microcontrollers

This laboratory course is intended to train the students on various embedded modules and embedded C language. This course provides hands-on experience of programming on input/output (I/O) devices and Keil µVision tool and Ardunio. The lab allows students to learn the interfacing of input/output (I/O) devices to increase student interest and develop skills to build embedded systems and IoT Applications.

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