



**UG Curriculum**  
**Department of Electrical Engineering (EE)**

# Vision and Mission Statements

## **Vision**

To generate & disseminate knowledge and develop technologies in emerging domains of Electrical Engineering to meet the national & global needs.

## **Mission**

- To impart education with emphasis on fundamental knowledge & its applications through pedagogical innovations including experiential learning, synchronous & asynchronous instructional delivery.
- To advance research and innovation in Electrical Engineering in areas such as power systems and smart grids, electrical machines and power electronics, control and cyber-physical systems, and signal processing with augmented and virtual reality applications, with a focus on sustainable energy and intelligent infrastructure.
- To contribute towards innovation, technology development, IP generation, and entrepreneurship involving the thrust areas of Electrical Engineering.
- To collaborate with various organizations for research, teaching and technology development to synchronize and contribute towards the transformational changes in the Electrical Engineering landscape.
- To enhance the perception of the Department through different avenues and contribute towards continuing education and upskilling programs.

## **1. Introduction**

The Department of Electrical Engineering aims to develop a strong academic and research environment focused on advancing modern electrical technologies and energy systems. The program is aligned with national priorities such as energy transition, smart grid development, electric mobility, and sustainable infrastructure. It seeks to prepare graduates who can contribute effectively to the evolving needs of the power and energy sector, as well as related interdisciplinary domains.

The undergraduate program is built on three essential components: a solid foundation in mathematics, science, and engineering principles; discipline-specific technical training through core and elective courses; and broader education to support communication, ethics, and critical thinking. The curriculum is designed to provide both depth and flexibility, enabling students to engage with core areas of Electrical Engineering while exploring emerging technologies.

The program covers key areas such as power systems, electrical machines, power electronics, control systems, cyber-physical systems and signal processing. Students develop a strong understanding of circuit theory, electromagnetics, system modelling, and analysis, along with practical skills in design and implementation. Emphasis is placed on problem-solving, system-level thinking, and the ability to work across hardware and software domains.

To reflect current developments in the field, the curriculum is organized around three broad focus areas:

- 1. Power Systems and Power Electronics**
- 2. Cyber Physical Systems**
- 3. Signal Processing and Augmented-Virtual Reality**

These focus areas support applications in renewable energy integration, smart grids, electric vehicles, industrial automation, and energy-efficient technologies. The program also includes opportunities for interdisciplinary learning, project work, and industry exposure through internships and design-based courses.

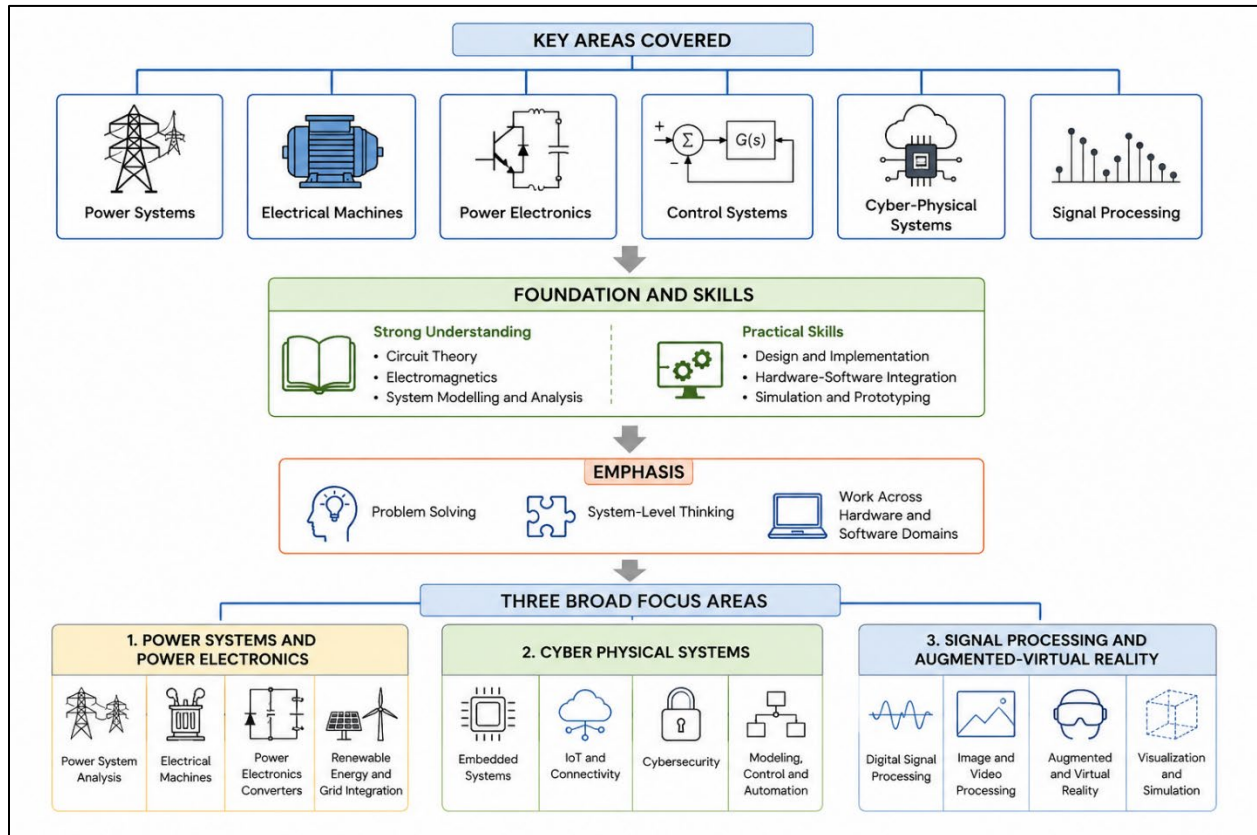


Fig 1. Structured curriculum overview with focus areas

## 2. Program Objectives

The program aims to provide students with a strong foundation and practical skills in Electrical Engineering, preparing them for multiple career pathways:

**I. Industry:** Roles in power systems, renewable energy, power electronics, electric mobility, control systems, automation, and related sectors.

**II. Entrepreneurship:** Apply the acquired knowledge for the development of electrical engineering related products and technologies.

**III. Higher Studies and Research:** Advanced studies in electrical engineering and allied areas, leading to careers in research and academia.

### **3. Expected Graduate Attributes**

Graduates of the program are expected to:

- Demonstrate sound knowledge of electrical engineering fundamentals and their applications
- Analyze and design electrical systems considering technical and practical constraints
- Work effectively in multidisciplinary teams and adapt to evolving technologies
- Apply engineering practices with awareness of safety, sustainability, and societal impact
- Communicate technical ideas clearly in written and oral forms
- Engage in continuous learning to keep pace with technological developments

### **4. Learning Outcomes**

Students completing the program will be able to:

- Apply knowledge of mathematics, science, and engineering to solve electrical engineering problems
- Analyze circuits, machines, power systems, and control systems using appropriate methods

- Design and implement electrical and energy systems to meet specified requirements
- Use modern tools for modeling, simulation, and testing
- Conduct experiments, interpret results, and validate system performance
- Understand contemporary developments in areas such as renewable energy, smart grids, and automation
- Work independently and collaboratively on engineering projects
- Demonstrate professional responsibility and ethical practice
- Communicate technical work effectively
- Pursue self-learning in response to new technologies

## **5. Course Categories, Credit Distribution, and Structure of the B.Tech. Program**

As outlined in Table I, the B.Tech. program in Electrical Engineering requires a total of 154 credits for the award of the degree. The curriculum is organized into four components: Institute Core, Programme Core, Open Electives, and Essential Audit courses.

### **a) Institute Core (39 credits):**

These courses provide a broad foundation in mathematics, sciences, basic engineering, humanities, and communication. Primarily offered during the first year, they help students develop the analytical, scientific, and professional skills essential for engineering education and practice.

**b) Programme Core (91 credits):**

The Programme Core forms the technical foundation of the curriculum and covers major areas of Electrical Engineering such as circuits, electrical machines, power systems, power electronics, control systems, and related advanced topics. Offered mainly from the second to the third year, these courses combine theoretical understanding with practical and design-oriented learning.

**c) Open Electives (12 credits):**

Open Elective courses enable students to explore subjects beyond the discipline of Electrical Engineering, encouraging interdisciplinary learning and broader academic exposure. These courses are generally taken during the third and fourth years of the program.

**d) Essential Audit (12 non-graded credits):**

This component includes audit courses, internships, project and design activities, and other professional development requirements. Distributed across the duration of the program, these elements provide industry exposure, experiential learning, and opportunities for skill development beyond the formal graded curriculum.

The proposed B.Tech. curriculum structure for Electrical Engineering, developed in accordance with the institute-wide curriculum framework, is presented in Table 1 followed by the list of institute-wide courses in Table 2. Table 3 provides the list of Programme Core courses proposed for the B.Tech. in Electrical Engineering. Table 4 summarizes the overall credit distribution of the program based on contact hours. Table 5 lists the courses required to obtain a minor in Electrical Engineering. Semester-wise plan for B. Tech in Electrical Engineering is given in Table 6.

**Table 1:** Proposed B. Tech Curriculum Structure for Electrical Engineering

S.N.	Course Type	Course Category	Credits	Minimum Total
1	Institute Core (I)	Engineering (IE)	16	39
		Science (IS)	17	
		HSS (IH)	06	
2	Programme Core (P)	Programme Compulsory (PC)	67	91
		Programme Electives (PE)	18	
		(B.Tech.) Project (PP)	6	
3	Open (O)	Electives (OE)	12	12
<b>Total (Graded)</b>				<b>142</b>
4	Essential Audit	Humanities (NH)	3	12
		Engineering (NE)	3	
		Industry-Academia Summer Internship outside IIT Jodhpur (two summers, minimum 45 days)	4	
		Design Credit	2	
<b>Total for award of Degree (Graded + non-graded)</b>				<b>154</b>

**6. List of Institute-wide Courses for Engineering (IE), Science (IS) and Essential Audit courses in Engineering (NH) and Humanities (NH)**

**Table 2.** Institute-wide Course List

Course Category	Course Name	L-T-P	Contact Hours	Credit
Institute-wide Engineering (IE) Courses (16 credits)	Engineering Mechanics	3-0-0	3	3
	Introduction to Computer Science	3-0-2	5	4
	Introduction to Machine Learning	3-0-2	5	4
	Engineering Workshop	0-0-2	2	1
	Engineering Drawing	0-0-2	2	1
	Environment and Sustainability	3-0-0	3	3
Institute-wide Science (IS) Courses (17 credits)	Physics	3-0-0	3	3
	Physics Lab	0-0-2	2	1
	Chemistry	3-0-0	3	3
	Chemistry Lab	0-0-2	2	1
	Mathematics I	2-1-0	3	3
	Mathematics II	2-1-0	3	3
	Introduction to Bioengineering	2-0-2	4	3
Institute-wide Humanities & Social Science (IH) Courses (6 credits)	HSS I	3-0-0	3	3
	HSS II	3-0-0	3	3

Institute-wide NH courses (3 credits)	Communication Skills	0-0-2	2	1
	Introduction to Professional	1-0-0	1	1
	Performing Arts /Sports	0-0-1	1	0.5
	Social Connect and Responsibilities	0-0-1	1	0.5
Institute-wide NE courses (3 credits)	Engineering Design I	0-0-2	2	1
	Engineering Design II	0-0-2	2	1
	Introduction to Profession II	0-0-2	2	1
Total				45

*\*\*Note: Physics and Chemistry courses will be offered in both semesters. Other institute-wide courses will be offered once a year, as per the semester-wise plan mentioned in Table II & III.*

### **List of Programme Compulsory Courses for Electrical Engineering**

**Table 3.** Programme Core Courses

Sr. No.	Course Name	L–T–P	Contact Hours	Credit
1	Introduction to Electrical Engineering	3–0–0	3	3
2	Circuit Theory	3–0–0	3	3
3	Data Structures and Algorithms (DSA)	3–0–0	3	3
4	Signals and Systems	3–1–0	4	4
5	Measurements and Instrumentation	3–0–0	3	3
6	Engineering Electromagnetics	3–0–0	3	3

<b>7</b>	Digital Design	3-0-0	3	3
<b>8</b>	Engineering Optimization	3-0-0	3	3
<b>9</b>	Electrical Machines	3-0-0	3	3
<b>10</b>	Statistical Inference and Modeling	3-0-0	3	3
<b>11</b>	Electrical Engineering Lab I	0-0-6	6	3
<b>12</b>	Control Systems	3-0-0	3	3
<b>13</b>	Analog Circuits	3-0-0	3	3
<b>14</b>	Power Generation, Transmission & Distribution	3-0-0	3	3
<b>15</b>	Communication Systems	3-0-0	3	3
<b>16</b>	Power Electronics	3-0-0	3	3
<b>17</b>	Electrical Engineering Lab II	0-0-6	6	3
<b>18</b>	Power System Analysis	3-0-0	3	3
<b>19</b>	Robotics and Automation	3-0-0	3	3
<b>20</b>	Embedded Systems	3-0-0	3	3
<b>21</b>	Digital Signal Processing	3-0-0	3	3
<b>22</b>	Electrical Engineering Lab III	0-0-6	6	3
	Total			67

**Table 4:** Credit Structure for B.Tech. Programme Based on Contact Hours

Component	Contact Hour Basis	L-T-P	Credits
1 hour of Lecture (L)	1 hour	1-0-0	1
1 hour of Tutorial (T)	1 hour	0-1-0	1
1 hour of Lab/Project (P)	1 hour	0-0-1	0.5

## 7. Minor in Electrical Engineering

The B.Tech. programme offers students the opportunity to pursue a Minor in Electrical Engineering in addition to their major discipline. The Minor programme consists of a set of Programme Compulsory (PC) courses. The minimum credit requirement for a minor in EE is 18. Students may opt for the Minor at the end of the 2nd, 3rd, or 4th semester, subject to eligibility criteria and the intake capacity notified by the department. The proposed Minor in Electrical Engineering is designed to provide students with fundamental knowledge in core areas of the discipline, including circuits, electrical machines, measurements, control systems, and power systems. The following courses are prescribed for the Minor in Electrical Engineering:

**Table 5.** List of courses for minor in EE

Sr. No.	Course Name	L-T-P	Contact Hours	Credit
1	Introduction to Electrical Engineering	3-0-0	3	3
2	Measurements and Instrumentation	3-0-0	3	3
3	Signals and Systems*	3-1-0	4	4
4	Electrical Machines	3-0-0	3	3

<b>5</b>	Power Generation, Transmission and Distribution	3-0-0	3	3
<b>6</b>	Control Systems*	3-0-0	3	3
	<b>Total</b>		<b>19</b>	<b>19</b>

### Course Substitution Policy

\*Students who have already earned credits in Signals and Systems or Control Systems during their academic programme shall register for the approved substitute course(s) listed below in lieu of the corresponding programme requirement.

Course Already Completed	Substitute Course(s)
Signals and Systems	Digital Signal Processing
Both Signals and Systems & Digital Signal Processing	Statistical Inference and Modeling
Control Systems	Robotics and Automation

**Table 6.** Semester-wise plan for B. Tech in Electrical Engineering

Cat	Course	LTP	CH	NC	GC	Cat	Course	LTP	CH	NC	GC
	I Semester						II Semester				
IE	Engineering Mechanics	3-0-0	3	-	3	IE	Introduction to Machine Learning	3-0-2	5	-	4
IE	Introduction to Computer Science	3-0-2	5	-	4	IS	Chemistry	3-0-0	3	-	3
IS	Physics	3-0-0	3	-	3	IS	Introduction to Bioengineering	2-0-2	4	-	3
IH	HSS I	3-0-0	3		3	IS	Chemistry Lab	0-0-2	2	-	1
IS	Physics Lab	0-0-2	2	-	1						
IS	Mathematics I	2-1-0	3	-	3	IS	Mathematics II	2-1-0	3	-	3
IE	Engineering Drawing	0-0-2	2	-	1	IE	Engineering Workshop	0-0-2	1	-	1
NE	Engineering Design I	0-0-2	2	1	-	NE	Engineering Design II	0-0-2	2	1	-
NH	Communication Skills	0-0-2	2	1	-	IH	HSS II	3-0-0	3	-	3
NH	Social Connect and responsibilities	0-0-1	1	0.5	-	NE	Introduction to Profession	0-0-2	2	1	
NH	Performing Arts /Sports	0-0-1	1	0.5	-						-
Total					18	Total					18

III Semester						IV Semester					
<b>Cat</b>	<b>Course</b>	<b>LTP</b>	<b>CH</b>	<b>NC</b>	<b>GC</b>	<b>Cat</b>	<b>Course</b>	<b>LTP</b>	<b>CH</b>	<b>NC</b>	<b>GC</b>
PC	Introduction to Electrical Engineering	3-0-0	3	-	3	PC	Engineering Electromagnetics	3-0-0	3	-	3
PC	Circuit Theory	3-0-0	3	-	3	PC	Digital Design	3-0-0	3	-	3
PC	Data Structures and Algorithms (DSA)	3-0-0	3	-	3	PC	Engineering Optimization	3-0-0	3	-	3
PC	Signals and Systems	3-1-0	4	-	4	PC	Electrical Machines	3-0-0	3	-	3
PC	Measurements and Instrumentation	3-0-0	3	-	3	PC	Statistical Inference and Modeling	3-0-0	3	-	3
IE	Environment and Sustainability	3-0-0			3	PC	Electrical Engineering Lab I	0-0-6	6	-	3
Total					19	Total				-	18
Summer Semester Internship (Minimum 45 days, Outside IIT Jodhpur)											

V Semester						VI Semester					
<b>Cat</b>	<b>Course</b>	<b>LTP</b>	<b>CH</b>	<b>NC</b>	<b>GC</b>	<b>Cat</b>	<b>Course</b>	<b>LTP</b>	<b>CH</b>	<b>NC</b>	<b>GC</b>
PC	Control Systems	3-0-0	3	-	3	PC	Power Systems Analysis	3-0-0	3	-	3
PC	Analog Circuits	3-0-0	3	-	3						
PC	Power Generation, Transmission & Distribution	3-0-0	3	-	3	PC	Robotics and Automation	3-0-0	3	-	3
PC	Communication Systems	3-0-0	3	-	3	PC	Embedded Systems	3-0-0	3	-	3
PC	Power Electronics	3-0-0	3	-	3	PC	Digital Signal Processing	3-0-0	3	-	3
PC	Electrical Engineering Lab II	0-0-6	6	-	3	PC	Electrical Engineering Lab III	0-0-6	6	-	3
PE	Programme Elective 1	3-0-0	3	-	3	OE	Open Elective 1	3-0-0	3	-	3
NH	Professional Ethics I	1-0-0	1	1	-						
Total					21	Total					18
Summer Semester Internship (Minimum 45 days, Outside IIT Jodhpur)											

VII Semester						VIII Semester					
<i>Cat</i>	<i>Course</i>	<i>LTP</i>	<i>CH</i>	<i>NC</i>	<i>GC</i>	<i>Cat</i>	<i>Course</i>	<i>LTP</i>	<i>CH</i>	<i>NC</i>	<i>GC</i>
PP	B. Tech Project 1	0-0-3	9		3	PP	B. Tech Project 2	0-0-3	9		3
PE	Program Elective 2-4				9	PE	Program Elective 5-6				6
OE	Open Elective 2				3	OE	Open Elective 3-4				6
				-							
Total					15	Total				-	15
											142
Essential Audit											12
Grand Total											154

**Table 7.** List of Stream-wise Electives

<b>Focus Area</b>	<b>Programme Electives</b>	<b>Course Level</b>
<b>Power Systems and Power Electronics</b>	Computational Methods in Power System Analysis	700
	Power System Protection	700
	Introduction to Smart Grid	700
	Renewable Energy Systems	700
	Cyber Security in Smart Grid	700
	Electric Drive Systems	700
	Power Electronic Converters	700
	Industrial Drives	400
	Introduction to High Voltage Engineering	700
	AI applications for Electrical Systems	400
<b>Cyber Physical Systems</b>	Foundations of Cyber-Physical Systems	400
	Advanced Control Systems	700
	Modern Control	400
	Network Dynamical Systems and Control	700
	Robust and Optimal Control	400

<b>Signal Processing and Augmented-Virtual Reality</b>	Computer Vision	400
	Introduction to Augmented and Virtual Reality	700
	Multimedia Techniques and Systems	700
	Signal Processing on Graphs	700
	Introduction to Haptics	700
	Spatial Audio	700
	System Identification	400

**Table 8.** Description of Programme Core Courses

Category	Course Name	Description
<b>PC</b>	Introduction to Electrical Engineering	Introduces the fundamental concepts of electrical engineering, including basic electrical quantities, circuit elements, electrical energy systems, and engineering applications. Provides an overview of major areas in electrical engineering and their practical relevance.
<b>PC</b>	Circuit Theory	Covers analysis techniques for electrical circuits using network theorems and circuit laws. Topics include DC and AC circuit analysis, transient response, resonance, and two-port networks, forming the foundation for advanced electrical engineering subjects.
<b>PC</b>	Data Structures and Algorithms (DSA)	Introduces fundamental data structures and algorithmic techniques used in engineering and computational problem-

		solving. Covers arrays, linked lists, stacks, queues, trees, sorting, searching, and basic algorithm analysis.
<b>PC</b>	Signals and Systems	Introduces representation and analysis of continuous-time and discrete-time signals and systems. Covers linear time-invariant systems, convolution, Fourier and Laplace transforms, and system response, forming the foundation for signal processing and control applications.
<b>PC</b>	Measurements and Instrumentation	Covers principles of electrical measurements and instrumentation techniques. Topics include sensors, transducers, measurement systems, signal conditioning, and performance characteristics of measuring instruments used in engineering applications.
<b>PC</b>	Engineering Electromagnetics	Covers fundamental concepts of electromagnetic fields and waves, including electrostatics, magnetostatics, and Maxwell's equations. Emphasizes field analysis, wave propagation, and their applications in electrical engineering systems.
<b>PC</b>	Digital Design	Introduces digital logic design and analysis using Boolean algebra and logic gates. Topics include combinational and sequential circuits, finite state machines, and basic digital system design.
<b>PC</b>	Engineering Optimization	Introduces optimization techniques for engineering problems. Topics include linear and nonlinear programming, constrained optimization, and numerical methods, enabling formulation and solution of design and operational problems.

<b>PC</b>	Electrical Machines	Covers principles and operation of electrical machines, including transformers, DC machines, and AC machines. Emphasizes performance characteristics, modeling, and applications in power and energy systems.
<b>PC</b>	Statistical Inference and Modeling	Introduces probabilistic modeling and statistical inference techniques. Topics include random variables, estimation, hypothesis testing, regression, and data-driven modeling, supporting analysis of engineering systems under uncertainty.
<b>PC</b>	Electrical Engineering Lab I	Provides hands-on experiments covering the fundamentals of electrical engineering, electric circuit analysis, basic electronic circuits, measurement techniques, and introductory data structures and algorithms. The laboratory emphasizes practical understanding, experimentation, problem-solving, and validation of theoretical concepts through guided exercises and hardware-based investigations.
<b>PC</b>	Control Systems	Introduces modeling and analysis of dynamic systems using time and frequency domain techniques. Covers feedback control, stability analysis, root locus, and frequency response methods, enabling design and evaluation of control systems.
<b>PC</b>	Analog Circuits	Covers analysis and design of analog electronic circuits using semiconductor devices. Topics include diodes, transistors, amplifiers, operational amplifiers, and analog signal conditioning circuits.
<b>PC</b>	Power Generation, Transmission & Distribution	Covers the fundamentals of electric power systems, including generation, transmission, and distribution of electrical energy. Topics include power system components, load

		characteristics, transmission lines, and distribution networks, providing an overview of modern power infrastructure.
<b>PC</b>	Communication Systems	Introduces principles of analog and digital communication systems. Topics include modulation techniques, signal transmission, noise analysis, multiplexing, and basic wireless communication concepts.
<b>PC</b>	Power Electronics	Covers analysis and design of power electronic converters. Topics include semiconductor devices, rectifiers, inverters, DC-DC converters, and control techniques, enabling efficient energy conversion and control.
<b>PC</b>	Electrical Engineering Lab II	Provides hands-on experience in power electronics, digital design, and electrical machines. Emphasizes practical understanding of power converters, digital circuits, machine characteristics, and experimental validation of theoretical concepts through laboratory investigations.
<b>PC</b>	Power Systems Analysis	Covers analysis of power systems under steady-state conditions. Topics include power flow analysis, fault analysis, and stability considerations, enabling evaluation and planning of electrical power networks.
<b>PC</b>	Robotics and Automation	Introduces fundamentals of robotics and industrial automation. Topics include robotic manipulators, sensors, actuators, motion control, programmable automation, and applications in intelligent systems.
<b>PC</b>	Embedded Systems	Covers design and development of embedded systems using microcontrollers and embedded platforms. Topics include hardware-software integration, real-time operation,

		interfacing, and applications in automation and intelligent systems.
<b>PC</b>	Digital Signal Processing	Covers analysis and processing of discrete-time signals. Topics include sampling, discrete-time systems, Z-transform, digital filter design, and spectral analysis, enabling implementation of signal processing algorithms.
<b>PC</b>	Electrical Engineering Lab III	Provides hands-on experience in power system analysis, power system protection, control systems, and embedded systems. The laboratory emphasizes power flow and fault studies, protection schemes, feedback control principles, system response analysis, microcontroller-based system design, interfacing, and experimental validation of theoretical concepts through simulation and hardware-based implementation.

**Table 9.** Description of Programme Elective Courses

Category	Course Name	Description
<b>Power Systems &amp; Smart Grids</b>		
PE	Computational Methods in Power System Analysis	Covers numerical and computational techniques for power system analysis. Topics include load flow methods, fault analysis, optimization algorithms, and simulation tools for solving large-scale power system problems.
PE	Power System Protection	Covers principles and techniques for protection of power system components. Topics include fault analysis, protective relays, and coordination schemes, ensuring safe and reliable system operation.
PE	Smart Grids	Covers advanced concepts in modern power systems with integration of communication and control. Topics include smart metering, grid automation, demand response, and integration of distributed energy resources.
PE	Renewable Energy Systems	Covers principles and integration of renewable energy sources such as solar and wind. Topics include resource assessment, system modeling, power conversion, and grid integration challenges.
PE	Cyber Security in Smart Grid	Covers security challenges in modern power systems. Topics include cyber threats, secure communication,

		intrusion detection, and protection of critical grid infrastructure.
<b>PE</b>	Electric Drive Systems	Covers operation and control of electric drive systems. Topics include motor characteristics, converter-fed drives, and control strategies for industrial and automotive applications.
<b>PE</b>	Power Electronic Converters	Covers analysis and design of power electronic converters. Topics include rectifiers, inverters, DC-DC converters, switching techniques, and control methods.
<b>PE</b>	Industrial Drives	Covers applications of electric drives in industrial systems. Topics include drive selection, control strategies, automation integration, and energy-efficient operation in industrial environments.
<b>PE</b>	Introduction to High Voltage Engineering	Covers principles of high voltage generation, measurement, and insulation systems. Topics include breakdown mechanisms in gases, liquids, and solids, overvoltage phenomena, insulation coordination, and testing of high voltage equipment.
<b>PE</b>	AI Applications for Electrical Systems	Introduces the application of artificial intelligence techniques in electrical engineering systems. Topics include machine learning, data-driven modeling, predictive analysis, intelligent monitoring, fault diagnosis, optimization, and AI-enabled control strategies for modern electrical and energy systems.

**Cyber Physical Systems**

<b>PE</b>	Introduction to Cyber-Physical Systems	Covers integration of computation, communication, and control in physical systems. Topics include system modeling, real-time control, networked systems, and applications in smart infrastructure.
<b>PE</b>	Advanced Control Systems	Covers advanced analysis and design of control systems. Topics include state-space methods, controllability, observability, and advanced controller design techniques.
<b>PE</b>	Modern Control	Introduces state-space modeling and modern control techniques. Topics include system representation, stability analysis, state feedback, and observer design.
<b>PE</b>	Network Dynamical Systems and control	Introduces the fundamentals of networked dynamical systems using concepts from graph theory, control theory, and dynamical systems. Covers modeling techniques for interconnected systems, distributed control strategies for cooperative behavior and stability, and applications in modern engineering systems and networked infrastructures.
<b>PE</b>	Robust and Optimal Control	Covers control design under uncertainties and optimal performance criteria. Topics include robustness analysis, H-infinity methods, and optimal control formulations.
<b>Signal Processing and Augmented-Virtual Reality</b>		
<b>PE</b>	Computer Vision	Covers techniques for acquiring, processing, and interpreting visual information from images and videos. Topics include image representation, feature

		extraction, object detection, and machine learning methods for vision-based applications.
<b>PE</b>	Introduction to Augmented and Virtual Reality	Covers principles of AR and VR systems. Topics include rendering, tracking, interaction, and system integration for immersive applications.
<b>PE</b>	Multimedia Techniques and Systems	Covers processing and integration of multi-sensory media, including audio, visual, and haptic modalities. Topics include multimodal signal representation, synchronization, compression, and system design for immersive applications.
<b>PE</b>	Signal Processing on Graphs	Covers signal processing techniques for data defined on graphs. Topics include graph Fourier transform, filtering, and applications in networked systems.
<b>PE</b>	Introduction to Haptics	Covers principles of tactile sensing and force feedback systems. Topics include haptic devices, signal processing, and human-machine interaction.
<b>PE</b>	Spatial Audio	Covers techniques for 3D audio perception and reproduction. Topics include sound localization, binaural processing, and immersive audio systems.
<b>PE</b>	System Identification	Covers the modelling of dynamic systems from measured data. Topics include parameter estimation, model structures, and validation techniques.

### Guidelines for Curriculum Implementation:

1. B.Tech projects 1 and 2 will be done under the same supervisor. Each component will be evaluated in the respective semesters. Since BTPs are part of the PC, the supervisor should be from the department.
2. Compulsory Industry-Academia Internship: The internship will be after the 4th and 6th semesters during the summer semester break. It is the students' responsibility to seek an internship. The internship should be for a minimum of 45 days. The students are expected to submit an internship completion certificate along with the report to the departments. The internship must be outside IIT Jodhpur.
3. Courses with theory and lab components should be separated as independent courses, but taught in the same semester.
4. Humanities and Social Science (HSS) courses will be offered through the School of Liberal Arts and the Department of Economics.
5. Design credit will be done during the semesters.

**Table 10.** Curriculum Progression Matrix

Curriculum Layer	Focus Area	Representative Courses	Key Competencies Developed
<b>Foundational Layer</b>	Basic electrical engineering and computational foundations	Introduction to Electrical Engineering, Circuit Theory, Data Structures and Algorithms (DSA)	Engineering fundamentals, computational thinking, circuit analysis, programming skills
<b>Analytical and Mathematical Modelling Layer</b>	Signal analysis, probabilistic modelling, and system representation	Signals and Systems, Statistical Inference and Modeling, System Identification, Engineering Optimization	Mathematical modelling, signal analysis, estimation, optimization, analytical reasoning
<b>Physical Systems and Electronics Layer</b>	Electronic circuits, electromagnetic systems, and measurements	Analog Circuits, Digital Design, Engineering Electromagnetics, Measurements and Instrumentation	Physical system understanding, circuit implementation, instrumentation, electronic system analysis
<b>Energy Systems Layer</b>	Power and energy conversion systems	Electrical Machines, Power Generation, Transmission and Distribution, Power	Energy conversion, power system analysis, electrical

		System Analysis, Power Electronics	infrastructure understanding
<b>Dynamic Systems and Control Layer</b>	System dynamics and control engineering	Control Systems, Advanced Control Systems, Modern Control, Robust and Optimal Control, Network Dynamical Systems and Control	Dynamic system modelling, feedback control, stability analysis, distributed and optimal control
<b>Cyber-Physical and Intelligent Systems Layer</b>	Embedded intelligence and interconnected systems	Embedded Systems, Introduction to Cyber-Physical Systems, Sensor and IoT, Robotics and Automation	Hardware-software integration, automation, sensing, intelligent system design
<b>Signal Processing and Intelligent Media Layer</b>	Signal, vision, audio, and immersive systems	Digital Signal Processing, Computer Vision, Signal Processing on Graphs, Multimedia Techniques and Systems, Spatial Audio	Signal analysis, multimedia processing, computer vision, graph-based learning, audio processing
<b>Immersive and Interactive Systems Layer</b>	Human-machine interaction and immersive technologies	Introduction to Augmented and Virtual Reality, Introduction to Haptics	Immersive system design, human-computer interaction, virtual

			environments, tactile interfaces
<b>Experimental and Application Layer</b>	Practical implementation and system validation	EE Lab 1,2, 3	Experimental learning, prototyping, system implementation, validation and testing