Department of Electrical and ElectronicsEngineering
PROGRAM LEARNING OUTCOMES (PLOs)

PLO1. Engineering Knowledge and Skill: Apply the knowledge of mathematics, science, electrical engineering fundamentals, and an electrical engineering specialization to the solution of complex electrical engineering problems.

PLO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex electrical engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PLO3. Design and development of Solutions: Design solutions for complex electrical engineering problems and design system components or processesthat meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PLO4. Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysisand interpretation of data, and synthesis of the information to provide valid conclusions.

PLO5. Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex electrical engineering activities with an understanding of the limitations.

PLO6. The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PLO7. Effective Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PLO8. Individual and team work: Function effectively as an individual, andas a member or leader in diverse teams, and in multidisciplinary settings.

PLO9. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PLO10. Environment and sustainability: Understand the impact of the professional electrical engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PLO11. Professional Ethics: Apply ethical principles and commit toprofessional ethics and responsibilities and norms of the engineering practice.

PLO12. Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

Program Specific Outcomes (PSOs)

➢ To impart State-of-Art knowledge in the field of Electrical Engineering and hand on application based practical training with regular Academic and Industry interaction.

➢ To incorporate research environment and innovation projects towards assimilation of global technology in order to meet needs of automation and articulate a higher education system of ethics and mind set for a realistic education.

	ENGINEERING MATHEMATICS-I	L	T	P	C
Course Code:	**24AS101**	**3**	**1**	**0**	**4**
Course Type:	**BAS**				
Pre-Requisite	**None**				

COURSE LEARNING OUTCOMES (CLO)

The syllabus has been prepared in accordance with National Education Policy (NEP).
After completion of course, students would be able to:

1. Develop the essential tool of matrices to compute inverse, eigenvalues and eigenvectors required for matrix diagonalization process
2. Apply the knowledge of differentiation, partial differentiation, Maxima and minima of two variables for analyzing engineering problems.
3. Apply the multiple integrals in engineering applications.
4. Understand differentiation and integration of vectors with knowledge of Green's, Gauss divergence and Stroke's theorems.
5. Solve different problems with help of Fourier series.

	ENGINEERING MATHEMATICS-II	L	T	P	C
Course Code:	**24AS201**	**3**	**1**	**0**	**4**
Course Type:	**BAS**				
Pre-Requisite	**Engineering Mathematics-I**				

COURSE LEARNING OUTCOMES (CLO)

The syllabus has been prepared in accordance with National Education Policy (NEP).
After completion of course, students would be able to:

1. Demonstrate various physical models through higher order differential equation and solve such linear ordinary differential equation.
2. Obtain series solution of differential equation and explain application of Bessel's function
3. Apply Laplace transforms to find the solution of differential equations.
4. Know, analytic functions and conformal mapping of complex variables.
5. Evaluate complex integration and residues.

	ENGINEERING PHYSICS	L	T	P	C
Course Code:	**24AS102/202**	**3**	**1**	**0**	**4**
Course Type:	**BAS**				
Pre-Requisite	**None**				

COURSE LEARNING OUTCOMES (CLO)

The syllabus has been prepared in accordance with National Education Policy (NEP). After completion of course, students would be able to:

1. The student is expected to be familiar with broader areas of Physics such as mechanics of solids, optics, mechanical and electromagnetic waves oscillations and their relevance in Engineering.
2. An understanding of Physics also helps engineers understand the working and limitations of existing devices and techniques, which eventually leads to new innovations and improvements.
3. The student would be able to learn the fundamental concepts on Quantum behavior of matter in its micro state.
4. The course also helps the students to be exposed to the phenomena of electromagnetism and also to have exposure on semiconductor devices such as solar cell.

	ENGINEERING PHYSICS LAB	L	T	P	C
Course Code:	24AS152/252	0	0	2	1
Course Type:	BAS				
Pre-Requisite	None				

COURSE LEARNING OUTCOMES (CLO)

The syllabus has been prepared in accordance with National Education Policy (NEP).
After completionof course, students would be able to:

1. Use the different measuring devices and meters to record the data with precision
2. Develop basic communication skills through working in groups in performing the laboratoryexperiments and by interpreting the results
3. Apply the mathematical concepts/equations to obtain quantitative results

	ENGINEERING CHEMISTRY	L	T	P	C
Course Code:	24AS103/203	3	1	0	4
Course Type:	BAS				
Pre-Requisite	None				

COURSE LEARNING OUTCOMES (CLO)

The syllabus has been prepared in accordance with National Education Policy (NEP). After completion of course, students would be able to:

1. Understand to identify the quality of water and how to improve the quality of water.
2. Rationalize bulk properties and processes using thermodynamic considerations.
3. Get preliminary understanding on introductory idea about nano materials.
4. Analyze the quantitative aspects of fuel combustion, spectroscopy and the mechanism of corrosion.

	ENGINEERING Chemistry Lab	L	T	P	C
Course Code:	24AS153/253	0	0	2	1
Course Type:	BAS				
Pre-Requisite	None				

COURSE LEARNING OUTCOMES (CLO)

The syllabus has been prepared in accordance with National Education Policy (NEP).
After completionof course, students would be able to:

1. Understand the basic concepts of measurement techniques.
2. The synthesis, dynamics, chemical transformation and their applications.

	BASIC ELECTRICAL ENGINEERING	L	T	P	C
Course Code:	24EE101/201	3	0	0	3
Course Type:	ES				
Pre-Requisite	None				

COURSE LEARNING OUTCOMES (CLO)

The syllabus has been prepared in accordance with National Education Policy (NEP). After completion of course, students would be able to:

1. Learn about transient analysis of RLC circuits with DC excitation.
2. Realize the requirement of transformers in transmission and distribution of electric power and other applications.
3. Develop an idea on Magnetic circuits, Electromagnetism
4. Learn about measuring instruments, single phase and polyphase AC circuits

	Basic Electrical Engineering Lab	L	T	P	C
Course Code:	**24EE151/251**	**0**	**0**	**2**	**1**
Course Type:	**ES**				
Pre-Requisite	**None**				

COURSE LEARNING OUTCOMES (CLO)

The syllabus has been prepared in accordance with National Education Policy (NEP).
After completionof course, students would be able to:

1. Verify fundamental laws like Ohm's Law, KCL, KVL, etc.
2. Understand the calibration of energy meter.
3. Understand open circuit and short circuit test of single-phase transformer.
4. Analyse RLC series and parallel circuits

	Basic Electronics Engineering	L	T	P	C
Course Code:	**24EC101/201**	**3**	**0**	**0**	**3**
Course Type:	**ES**				
Pre-Requisite	**None**				

COURSE LEARNING OUTCOMES (CLO)

The syllabus has been prepared in accordance with National Education Policy (NEP).
After completionof course, students would be able to:

1. To learn the fundamental concepts of semiconductor devices
2. An ability to apply the concept of diode in clipper and clamper circuits
3. Acquire the skills of constructing the different transistors configurations
4. To learn the basic concepts of integrated circuits
5. To Compile the different building blocks in digital electronics using logic gates and implement simple logic function using basic universal gates
6. To acquire the knowledge of microprocessors.

	Basic Electronics Engineering Lab	L	T	P	C
Course Code:	**24EC151/251**	**0**	**0**	**2**	**1**
Course Type:	**ES**				
Pre-Requisite	**None**				

COURSE LEARNING OUTCOMES (CLO)

The syllabus has been prepared in accordance with National Education Policy (NEP).
After completionof course, students would be able to:

1. Measure voltage, frequency and phase of any waveform using CRO.
2. Generate sine, square and triangular waveforms with required frequency and amplitude usingfunction generator.
3. Analyze the characteristics of different electronic devices such as diodes, transistors and operationalamplifiers
4. To develop skill to build and verify digital circuits.

	ENGINEERING MECHANICS	L	T	P	C
Course Code:	**23ME101/201**	**3**	**0**	**0**	**3**
Course Type:	**ES**				
Pre-Requisite	**None**				

COURSE LEARNING OUTCOMES (CLO)

The syllabus has been prepared in accordance with National Education Policy (NEP).
After completionof course, students would be able to:

1. Understand the concepts of thermodynamics.
2. Apply principles of thermodynamics to real engineering problems.
3. Understand the basics of powertrain applications.
4. Grasp the elements of robotics.
5. Understand the working principles of various measuring tools and devices.

	Basic Mechanical Engineering Lab	L	T	P	C
Course Code:	**23ME151/251**	**0**	**0**	**2**	**1**
Course Type:	**ES**				
Pre-Requisite	**21ME151/251**				

COURSE LEARNING OUTCOMES (CLO)

The syllabus has been prepared in accordance with National Education Policy (NEP).
After completionof course, students would be able to:

1. The working of thermal power plants.
2. The working of 2 and 4 stroke IC engines.
3. Different automobile parts, gears and gear trains.
4. The working of Refrigeration and Air Conditioning cycles.
5. The working principles of flow meters and U-tube manometers.

	Fundamentals of Computer & C Programming	L	T	P	C
Course Code:	**23CS101/202**	**3**	**1**	**0**	**4**
Course Type:	**ES**				
Pre-Requisite	**None**				

COURSE LEARNING OUTCOMES (CLO)

After completion of course, students would be able to:

1. Understand the fundamental concepts of computers, both hardware and software.
2. Learn and understand the major system software's that help in developing of an application.
3. Apply and analyse the basic programming constructs in context of C programming language.
4. Analyse and evaluate the derived datatypes (array) and the operations that can be performed onthem, along with the concept of modularity through functions
5. Create and manipulate a database or data storage through files.
6. Learn a programming approach to solve problems.

	C Programming Lab	L	T	P	C
Course Code:	**23CS151/251**	**0**	**0**	**2**	**1**
Course Type:	**ES**				
Pre-Requisite	**None**				

COURSE LEARNING OUTCOMES (CLO)

The syllabus has been prepared in accordance with National Education Policy (NEP). After completionof course, students would be able to:

1. Understand the Typical C Program Development Environment, compiling, debugging, Linking andexecuting.
2. Introduction to C Programming using Control Statements and Repetition Statement
3. Apply and practice logical formulations to solve some simple problems leading to specificapplications.
4. Design effectively the required programming components that efficiently solve computing problemsin real world.
5. Employ good programming practices such as incremental development, data integrity checking andadherence to style guidelines.

	Communicative English	L	T	P	C
Course Code:	**24HS101/201**	**2**	**0**	**0**	**2**
Course Type:	**HSS**				
Pre-Requisite	**None**				

COURSE LEARNING OUTCOMES (CLO)

The syllabus has been prepared in accordance with National Education Policy (NEP). After completion of course, students would be able to:

1. Learners will be able to write effectively using correct grammatical structures.
2. Learners will be able to read and speak fluently in English.
3. Learners will know the nuances of effective presentations.
4. Learners will be able to engage in group discussions, debate, deliver speeches and such others.
5. Learners will be able to write project reports, research papers, prepare MoM and agendas, andsuch other documents required to be created in any work place.

	COMMUNICATIVE ENGLISH LAB	L	T	P	C
Course Code:	**24HS151/251**	**0**	**0**	**2**	**1**
Course Type:	**HSS**				
Pre-Requisite	**None**				

COURSE LEARNING OUTCOMES (CLO)

The syllabus has been prepared in accordance with National Education Policy (NEP). After completionof course, students would be able to:

1. Learners will be able to write effectively using correct grammatical structures.
2. Learners will be able to read and speak fluently in English.
3. Learners will know the nuances of effective presentations.
4. Learners will be able to engage in group discussions, debate, deliver speeches and such others.
5. Learners will be able to write project reports, research papers, prepare MoM and agendas, and suchothr documents required to be created in any work place

	INDIAN CONSTITUTION & POLITY	L	T	P	C
Course Code:	**23VAC102/202**	**2**	**0**	**0**	**2**
Course Type:	**HSS**				
Pre-Requisite	**None**				

COURSE LEARNING OUTCOMES (CLO)

The syllabus has been prepared in accordance with National Education Policy (NEP).
After completionof course, students would be able to:

1. Identify and explore basic concepts in the Constitution and understand their applicability & scope and the importance of the role of judiciary in ensuring checks an balances.
2. Differentiate different aspects of Indian Legal System and its related bodies
3. To appreciate the critical Interface between fundamental Rights and directive principles of state policy and apply the rationale to emerging issues and challenges.
4. Know about the enforcement remedies available under the Constitution of India
5. To apply Intellectual Property Law principles to real problems and analyse the social impact of Intellectual Property Law and Policy
6. To apply the very dynamics of IP Law to the individuals, MNC's and other possible stakeholders.

	NATIONAL SERVICE SCHEME	L	T	P	C
Course Code:	**23SE151/251**	**0**	**0**	**2**	**1**
Course Type:	**HSS**				
Pre-Requisite	**None**				

COURSE LEARNING OUTCOMES (CLO)

Course aims at evoking social consciousness among students through various activities viz., working together, constructive and creative social work, to be skillful in executing democratic leadership, developing skill in program me development to be able for self-employment, reducing gap between educated and uneducated, increasing awareness and desire to help sections of society.

	YOGA & PHYSICAL EDUCATION	L	T	P	C
Course Code:	**23SE151/251**	**0**	**0**	**2**	**1**
Course Type:	**HSS**				
Pre-Requisite	**None**				

COURSE LEARNING OUTCOMES (CLO)

The syllabus has been prepared in accordance with National Education Policy (NEP).
After completionof course, students would be able to:
Increased balance, strength, and flexibility

1. Competence of all five breath techniques and variations
2. An internal sense of focus and clarity in the movement meditation
3. Understanding of the cultural and philosophical approaches to yoga
4. Desire to learn, excel and continue studies on the art of yoga
5. Basic knowledge of Basketball, Cricket, Football, Volleyball, Badminton & Table Tennis

	MECHANICAL WORKSHOP LAB	L	T	P	C
Course Code:	**23ME152/252**	**0**	**0**	**2**	**1**
Course Type:	**ES**				
Pre-Requisite	**None**				

COURSE LEARNING OUTCOMES (CLO)

The syllabus has been prepared in accordance with National Education Policy (NEP). After completion of course, students would be able to:

1. Use different manufacturing (Fitting, carpentry, sheet metal, welding, smithy working etc.)processes required to manufacture a product from the raw materials.
2. Use different measuring, marking, cutting tools used in the workshop.
3. Be aware of the safety precautions while working in the workshop.

	Engineering Graphics & Design Lab	L	T	P	C
Course Code:	**23ME153/253**	**3**	**1**	**0**	**4**
Course Type:	**ES**				
Pre-Requisite	**23ME153/253**				

COURSE LEARNING OUTCOMES (CLO)

Once the course is completed, the students will be able to

1. Understand orthographic projections of points and lines in any position through AutoCAD.
2. Imagine and convert isometric view into orthographic projections and vice versa.
3. Should be able to understand the simple machine components and draw its projections

	GERMAN LANGUAGE PHASE - I	L	T	P	C
Course Code:	**24FLGR-I**	**2**	**0**	**0**	**2**
Course Type:	**OE**				
Pre-Requisite	**NONE**				

COURSE LEARNING OUTCOMES (CLO)

At the end of the course, the student will be able to

1. Read and write short, simple texts.
2. Have Fluency in reading and writing.
3. Understand a dialogue between two native speakers and to take part in short, simple conversations usingthe skills acquired.
4. Know the culture of the countries where the German language is spoken.
5. Developing pronunciation so that they can read the text and e-mail during their employment, instructingthem to write their own CV and developing a fundamental conversation with any German national.

	FRENCH LANGUAGE PHASE – I	L	T	P	C
Course Code:	**21FLFR-I**	**2**	**0**	**0**	**2**
Course Type:	**OE**				
Pre-Requisite	**NONE**				

COURSE LEARNING OUTCOMES (CLO)

At the end of the course, the student will be able to

1. Read and write short, simple texts.
2. Have Fluency in reading and writing.
3. Understand a dialogue between two native speakers and to take part in short, simple conversations usingthe skills acquired.
4. Know the culture of the countries where the French language is spoken.

	ENGINEERING MATHEMATICS-III	L	T	P	C
Course Code:	**24AS301**	**3**	**1**	**0**	**4**
Course Type:	**ABS**				
Pre-Requisite	**21MA0101, 21MA0102**				

COURSE LEARNING OUTCOME

At the end of the course, the student will be able to

1. Solve different types of partial differential equations. Also, to find solutions of boundary value problems including heat and wave equations.
2. Apply and analyze Fourier transforms with different applications.
3. Evaluate the problems using z-transforms.
4. Understand linear algebra and its application to Engineering.

	Electrical Machines-I	L	T	P	C
Course Code:	**23EE0203**	**3**	**0**	**0**	**3**
Course Type:	**PC**				
Pre-Requisite	**NONE**				

COURSE LEARNING OUTCOMES (CLO)

At the end of the course, the student will be able to

1. Model and analyze the performance of different types of DC machines.
2. Learn the performance, operation, various characteristics, starting and control of DC machines
3. Analyze the performance of different types of Transformers
4. Familiarize with the applications of DC machines and transformer

	Electromagnetic Theory	L	T	P	C
Course Code:	**23EE0205**	**3**	**0**	**0**	**3**
Course Type:	**PC**				
Pre-Requisite	**NONE**				

COURSE LEARNING OUTCOMES (CLO)

At the end of the course, the student will be able to

1. Understand the concepts of Electrostatics and their applications
2. Familiarize with the concepts of Magnetostatics and their applications
3. Learn the concept of modelling Electromagnetic Field.
4. Identify, formulate, and solve engineering problems in the area of electric and magnetic fields waves.

	Digital System Design	L	T	P	C
Course Code:	**23EE0207**	**3**	**0**	**0**	**3**
Course Type:	**PC**				
Pre-Requisite	**NONE**				

COURSE LEARNING OUTCOMES (CLO)

At the end of the course, the student will be able to

1. Understand the concepts of digital logic circuits.
2. Design combinational and sequential logic circuits.
3. Learn the concepts of Memory devices.
4. Design combinational logic circuits using digital ICs.

	Electrical & Electronics, Measurements and Instrumentation	L	T	P	C
Course Code:	23EEPE65	3	0	0	3
Course Type:	PE				
Pre-Requisite	None				

COURSE LEARNING OUTCOMES (CLO)

At the end of the course, the student will be able to

1. Understand the working of analog meters for power and energy measurements.
2. Learn the operation of different measuring and display devices.
3. Comprehend the measurement of non- electrical quantities.
4. Understand the working of Instrument transformers and Recorders.

	Network Analysis and Synthesis	L	T	P	C
Course Code:	21EE0209	3	0	0	3
Course Type:	PC				
Pre-Requisite	None				

COURSE LEARNING OUTCOMES (CLO)

At the end of the course, the student will be able to

1. Analyse AC electrical circuits using basic laws and theorems of electrical circuits
2. Apply the Laplace, Transform analysis to electrical circuits
3. Solve two-port networks and Apply graph theory
4. Design analog filter and Synthesize networks

	Electrical Machines Laboratory – I	L	T	P	C
Course Code:	23EE0253	0	0	2	1
Course Type:	P				
Pre-Requisite	23EE0203				

COURSE LEARNING OUTCOMES (CLO)

At the end of the course, the student will be able to

1. Obtain the performance characteristics of Electrical machines.
2. Simulate the circuits of DC machines.
3. Discriminate the concept of efficiency and the short circuit impedance of a transformer from no-load test, winding resistance, short circuit test, and load test.
4. Infer the operation of DC Shunt Generator under different loading conditions.

	Digital Electronics Lab	L	T	P	C
Course Code:	23EE0257	0	0	2	1
Course Type:	P				
Pre-Requisite	23EE0207				

COURSE LEARNING OUTCOMES (CLO)

At the end of the course, the student will be able to

1. Distinguish between analog and digital systems.
2. Identify the various digital ICs and understand their operation.
3. Develop skills for designing combinational logic circuits and their practical implementation on breadboard
4. Understand the function of elementary digital circuits under real and simulated environment.

	Essentials of Block Chain & Internet of Things	L	T	P	C
Course Code:	23CS0201	0	0	2	1
Course Type:	SEC				
Pre-Requisite	None				

TRAINING LEARNING OUTCOMES (CLO)
At the end of the course, the student will be able to

1. Understand and learn how bitcoin and other coins work in real world.
2. Understand the vision of IoT and communication protocols from a global context.
3. Analyze various protocols of IoT.
4. Evaluate the applications of IoT in agriculture, healthcare, smart grid, factory.

	EFFECTIVE COMMUNICATION SKILLS	L	T	P	C
Course Code:	23SS251	0	0	2	1
Course Type:	SEC				
Pre-Requisite	None				

Training Learning Outcomes (TLO): -
After the completion of the training, the student will have ability:

1. To communicate effectively and interact with people with confidence.
2. To demonstrate and differentiate between various forms of communication.
3. To apply effective communication skills confidently which a student need to get ahead injob and life

	GERMAN LANGUAGE PHASE - II	L	T	P	C
Course Code:	24FLGR201-II	2	0	0	2
Course Type:	OE				
Pre-Requisite	24FLGR101-I				

COURSE LEARNING OUTCOMES (CLO)
At the end of the course, the student will be able to

1. After completion of this student will be able to read and write short, simple texts.
2. After completion of this student will have Fluency in reading and writing.
3. After completion of this student will able to use language creatively and spontaneously.
4. Students will get awareness of cross-cultural and intercultural difference.

	FRENCH LANGUAGE PHASE – II	L	T	P	C
Course Code:	24FLFR201-II	2	0	0	2
Course Type:	OE				
Pre-Requisite	23FLFR101-II				

COURSE LEARNING OUTCOMES (CLO)
At the end of the course, the student will be able to

1. After completion of this student will be able to read and write short, simple texts.
2. After completion of this student will have Fluency in reading and writing.
3. After completion of this student will able to use language creatively and spontaneously.
4. After completion of this student will able to know the culture of the countries where theFrench language is spoken.

	NUMERICAL METHODS	L	T	P	C
Course Code:	**24MDC101D**	**3**	**1**	**0**	**4**
Course Type:	**MDC**				
Pre-Requisite	**NONE**				

COURSE LEARNING OUTCOMES (CLO)

At the end of the course, the student will be able to

1. Find solutions by various numerical methods to get approximation solutions of algebraic atranscendental, simultaneous linear equations.
2. Do differentiation and integrations of tabular data.
3. Find numerical solutions of ordinary and partial differential equations.
4. Understand curve fitting and find largest and smallest eigen values according to use inapplications.

	Electrical Machines II	L	T	P	C
Course Code:	**23EE0201**	**3**	**0**	**0**	**3**
Course Type:	**PC**				
Pre-Requisite	**23EE0203**				

COURSE LEARNING OUTCOMES (CLO)

At the end of the course, the student will be able to

1. Describe the magnetic field pattern and compute the MMF of an AC machine whenexcited.
2. Analyze the effect of parameter variation on torque of Induction Motor and identifysuitable starting, speed control and braking methods for Induction Motor.
3. Discuss the operation of various types of Single-phase induction motor.
4. Determine the voltage regulation of an Alternator or predetermine the efficiency of an AC rotating machine and inspect the synchronized operation of an Alternator with an Infinite bus bar.

	Control Engineering	L	T	P	C
Course Code:	**23EE0206**	**3**	**0**	**0**	**3**
Course Type:	**PC**				
Pre-Requisite	**NONE**				

COURSE LEARNING OUTCOMES (CLO)

At the end of the course, the student will be able to

1. Identify different physical systems and classify them as open loop and close loop controlsystems.
2. Describe the mathematical relation between input and output for LTI systems.
3. Apply different time domain and frequency domain tools to analyze the absolute andrelative stability of LTI systems.
4. Assess the performance of LTI systems to different inputs and to design basic controllers to meet out desired performance.

	Linear Integrated Circuits	L	T	P	C
Course Code:	23EE0208	3	0	0	3
Course Type:	PC				
Pre-Requisite	None				

COURSE LEARNING OUTCOMES (CLO)

At the end of the course, the student will be able to

1. Understand the concept of multistage amplifiers, analysis of multistage amplifier and its frequency response, Darlington pair and bootstrap circuits.
2. Learn the basics of tuned amplifiers such as single tuned, double tuned, stagger tuned & power amplifiers.
3. Study and analyze the performance of negative as well as positive feedback circuits.
4. Study and analyze the wave shaping circuits and operational amplifies

	Programming using Python	L	T	P	C
Course Code:	23EEPE09	3	0	0	3
Course Type:	PC				
Pre-Requisite	None				

COURSE LEARNING OUTCOME

At the end of the course, the student will be able to

1. Understand the concept of multistage amplifiers, analysis of multistage amplifier and its frequency response, Darlington pair and bootstrap circuits.
2. Learn the basics of tuned amplifiers such as single tuned, double tuned, stagger tuned & power amplifiers.
3. Study and analyze the performance of negative as well as positive feedback circuits.
4. Study and analyze the wave shaping circuits and operational amplifies.

	Electrical Machines Laboratory- II	L	T	P	C
Course Code:	23EE0254	0	0	2	1
Course Type:	P				
Pre-Requisite	23EE0204				

COURSE LEARNING OUTCOMES (CLO)

At the end of the course, the student will be able to

1. Conduct a suitable test to determine the system parameters of Synchronous Machine.
2. Evaluate the performance factors of Induction and Synchronous Machines.
3. Understand operation, starting, characteristics and testing of synchronous machines
4. Perform synchronization of alternator with infinite bus-bar.

	Linear Integrated Circuits Laboratory	L	T	P	C
Course Code:	23EE0258	0	0	2	1
Course Type:	P				
Pre-Requisite	23EE0208				

COURSE LEARNING OUTCOMES (CLO)

At the end of the course, the student will be able to

1. Elucidate and design the linear and non-linear applications of an opamp and special application ICs.
2. Design and construct waveform generation circuits
3. Illustrate the function of application specific ICs such as Voltage regulators, PLL and its applications
4. Elucidate and design the active filters and oscillators.

	Electrical Measurement & Control Laboratory	L	T	P	C
Course Code:	23EE0256	0	0	2	1
Course Type:	PC				
Pre-Requisite	23EE0206,23EE0209				

COURSE LEARNING OUTCOMES (CLO)

At the end of the course, the student will be able to

1. Learn the measurement of non-electrical variables and electrical quantities
2. Apply the fundamentals of measuring methods in computing basic R,L and C parameters.
3. Understand the characteristic behaviour of transducers and Programmable LogicController in industrial applications.
4. Design and develop simple control mechanisms for given LTI systems.

	Live Project-I & Industrial Visits	L	T	P	C
Course Code:	23EE0260	0	0	1	1
Course Type:	LP				
Prerequisite	23CS0201,23EE0207,23EE0209,23EE0205,23 EE0257				

COURSE LEARNING OUTCOMES:

At the end of the course, the student will be able to

1. To conceptualize a novel idea / technique into a product
2. To think in terms of multi-disciplinary environment
3. To estimate the ability of the student in transforming the theoretical knowledge studied sofar into a working model of an electrical/electronic system.
4. To take on the challenges of teamwork, prepare a presentation in a professional manner,and document all aspects of design work.

	EFFECTIVE COMMUNICATION SKILLS	L	T	P	C
Course Code:	23SS351	0	0	2	1
Course Type:	SEC				
Pre-Requisite	None				

Course Learning Outcomes (CLO): -

After the completion of the training, the student will have ability:

1. To be confident working in a team and leading it as well.
2. To categorise the work and achieve expected performance within the time frame & willbe able to adapt himself to work under various kinds of stress and re-energise himself to bounce back from such situations.
3. To get benefitted from Emotional Quotient in building stronger professional relationshipsand achieving career and personal goals.
4. To face complex problems and effectively deal with it in the job due to Critical Thinking & Problem-Solving Skills.

	Artificial Intelligence and Machine Learning	L	T	P	C
Course Code:	**23CS0202**	**0**	**0**	**2**	**1**
Course Type:	**SEC**				
Pre-Requisite	**None**				

COURSE LEARNING OUTCOMES (CLO)

At the end of the course, the student will be able to

1. Identify problems that are amenable to solution by AI methods, and which AI methods may be suited to solving a given problem
2. Understands the basics and need of AI and Machine learning in global view.
3. Understands, apply and evaluate the supervised learning techniques.
4. Design and implement the different applications using the concepts of AI and ML

	Environmental Bioengineering	L	T	P	C
Course Code:	**23ESEB101/24ESEB201**	**3**	**0**	**0**	**3**
Course Type:	**VAC**				
Pre-Requisite	**None**				

COURSE LEARNING OUTCOMES (CLO)

At the end of the course, the student will be able to

1. To develop an awareness about our environment and elicit collective response for its protection.
2. Able to understand the different types of environmental pollution problems and their sustainable solutions.
3. Able to work in the area of sustainability for research and education.
4. Having a broader perspective in thinking for sustainable practices by utilizing the engineering knowledge and principles gained from this course

	DISCRETE MATHEMATICS	L	T	P	C
Course Code	**24MDC106B**	**3**	**1**	**0**	**4**
Course Type	**MDC II**				
Pre-Requisit	**NONE**				

COURSE LEARNING OUTCOMES (CLO)

At the end of the course, the student will be able to

1. Write an argument using logical notation and determine if the argument is or is not valid.
2. Understand the basic principles of sets and operations in sets and prove basic set equalities.
3. Understanding recurrence relation and properties of algebraic structures such as groups, rings and fields.
4. To apply graph theory to solve real-world problems like traveling salesman problem and networks and the maximum flow problem. Also, to get idea of Boolean algebra and its applications.

	Power Electronics	L	T	P	C
Course Code:	23EE0305	3	0	0	3
Course Type:	PC				
Pre-Requisite	NONE				

COURSE LEARNING OUTCOMES (CLO)

At the end of the course, the student will be able to

1. To learn the details of power semiconductor switches (Construction, Characteristics andoperation).
2. Understand and analyse the operation of controlled rectifiers, choppers and inverters.
3. Understand the operation of AC-to-AC converters and applications of power electroniccircuits.
4. To learn about the control of various power electronic converters.

	Generation, Transmission and Distribution	L	T	P	C
Course Code:	23EE0307	3	0	0	3
Course Type:	PC				
Pre-Requisite	NONE				

COURSE OUTCOME

At the end of the course, the student will be able to

1. Learn the economics connected with power generation
2. Analyze the performance of transmission lines.
3. Understand the types and constructional features of cables and insulation.
4. Know about the transmission and distribution Substation schemes

	Discrete Transforms and Signal Processing	L	T	P	C
Course Code:	23EEPE67	3	0	0	3
Course Type:	PE				
Pre-Requisite	NONE				

COURSE LEARNING OUTCOMES (CLO)

At the end of the course, the student will be able to

1. Classify signals and systems and their mathematical representation.
2. Learn discrete Fourier transform and its properties.
3. Design IIR filters using analog to digital transformation.
4. Design FIR filters using windows technique. Also, to understand digital signal processorsand their programming.

	Control Engineering	L	T	P	C
Course Code:	23EE0206	3	0	0	3
Course Type:	PC				
Pre-Requisite	NONE				

COURSE LEARNING OUTCOMES (CLO)

At the end of the course, the student will be able to

1. Identify different physical systems and classify them as open loop and close loop controlsystems.
2. Describe the mathematical relation between input and output for LTI systems.
3. Apply different time domain and frequency domain tools to analyze the absolute andrelative stability of LTI systems.
4. Assess the performance of LTI systems to different inputs and to design basic controllers to meet out desired performance

	POWER ELECTRONICS LAB	L	T	P	C
Course Code:	23EE0355	0	0	2	1
Course Type:	P				
Pre-Requisite	NONE				

COURSE LEARNING OUTCOMES (CLO)

At the end of the course, the student will be able to

1. Design and construct converter and inverter circuits using power electronic devices.
2. Design and construct commutation circuits.
3. Perform the speed control of machines using various power electronic circuits. 4.Enable student simulate various power electronic converts using MATLAB/LABVIEW

	Electrical Simulation and Programming Lab	L	T	P	C
Course Code:	23EE0357	0	0	2	1
Course Type:	P				
Pre-Requisite	NONE				

COURSE LEARNING OUTCOMES (CLO)

At the end of the course, the student will be able to

1. Understand the main features and importance of the MATLAB/ SCI LAB mathematicalprogramming environment.
2. Apply working knowledge of MATLAB/ SCI LAB package to simulate and solveElectrical, Electronics circuits and Applications.
3. Solve, Simulate and Analyse various AC and DC circuits.
4. Solve, Simulate and Analyse various Transformer, DC Generator circuits, Analog andDigital Electronics circuits.

	Live Project-II & Industrial Visits	L	T	P	C
Course Code:	23EE0359	0	0	1	1
Course Type:	LP				
Prerequisite	23CS0202,23EE0258,23EE0256,23EE0254				

INDUSTRIAL INTERNSHIP LEARNING OUTCOMES (IILOs):

At the end of the course, the student will be able to

1. To conceptualize a novel idea / technique into a product2.To think in terms of multi-disciplinary environment
3. To estimate the ability of the student in transforming the theoretical knowledge studied so far into a working model of an electrical/electronic system.
4. To take on the challenges of teamwork, prepare a presentation in a professional manner, and document all aspects of design work.

	PRESENTATION SKILLS	L	T	P	C
Course Code:	23SS553	0	0	2	1
Course Type:	SEC				
Pre-Requisite	None				

Course Learning Outcomes (CLO): -

After the completion of the training, the student will have ability:

1. To be confident in presenting himself in front of audience.
2. To become professional in his approach towards work culture.
3. To enhance the level of communication skills while interacting with others.

	Design Thinking and Augmented Virtual Reality	L	T	P	C
Course Code:	24CS0202B	0	0	2	1
Course Type:	SEC				
Pre-Requisite	None				

COURSE LEARNING OUTCOMES (CLO)

After the completion of TRAINING the students will be able to:

1. Understand and critically apply the concepts and methods of business processes.
2. Understand and analyzing design thinking history and its various concepts.
3. Understand, analyzing and create models with user's collaboration to apply design thinking concepts.
4. Understands the role and importance of graphics in VR, AR and MR.
5. Understand the technical and experiential design foundation required for the implementation of immersive environments in current and future virtual, augmented and mixed reality platforms.

	Creating an Entrepreneurial Mind	L	T	P	C
Course Code:	23MDC402	3	0	0	3
Course Type:	MDC				
Pre-Requisite	None				

COURSE LEARNING OUTCOMES (CLO)

At the end of the course, the student will be able to

1. Learn about and get an insight of Entrepreneurs and Entrepreneurship development.
2. Understand the basics of Business project report, Fund Raising and SWOT analysis.
3. Understand the different support system for business development.
4. Gain knowledge and acquire skills for setting up an enterprise and learn how the management works.

	Management Process and Organizational Behaviour	L	T	P	C
Course Code:	23MDC401	3	0	0	3
Course Type:	MDC I				
Pre-Requisite	None				

COURSE LEARNING OUTCOMES (CLO)

At the end of the course, the student will be able to

1. Understand the concept of management
2. Learn about different management skills requirements for the corporate world.
3. Demonstrate application of previous knowledge testing of Principles of Management in solving business problems.
4. Understand the human behaviour and its contribution at work place. Also, to understand the competitiveness in businesses.

	Power System Analysis	L	T	P	C
Course Code:	24EE0306	3	0	0	3
Course Type:	PC				
Pre-Requisite	NONE				

COURSE LEARNING OUTCOMES (CLO)

At the end of the course, the student will be able to

1. Realize the basic protective schemes applied in power system analysis.
2. To discuss types of electromagnetic and static distance relays, effect of arc resistance, powerswings, line length and source impedance on performance of distance relays.
3. To discuss construction, operating principles and performance of various differential relays for differential protection.
4. To describe the construction and operating principle of different types of fuses and to givethe definitions of different terminologies related to a fuse
5.

	Microprocessor & Microcontroller	L	T	P	C
Course Code:	23EE0308	3	0	0	3
Course Type:	PC				
Pre-Requisite	NONE				

COURSE LEARNING OUTCOMES (CLO)

At the end of the course, the student will be able to

1. Identify various hardware components of microcomputers and peripherals.
2. Understand the architecture and working of Intel 8086 microprocessor
3. Design and develop small practical systems using microcontrollers.
4. Comprehend the architecture Intel 8051 microcontroller, assembly language programmingusing 8051 instructions set.

	Power System Analysis Laboratory	L	T	P	C
Course Code:	23EE0356	0	0	2	1
Course Type:	Prerequisite				
Pre-Requisite	None				

COURSE LEARNING OUTCOMES (CLO)

At the end of the course, the student will be able to

1. Acquire skills of using computer packages for power system studies.
2. Acquire knowledge in conducting experiments related to power system studies.
3. To explain the use of MATLAB package to assess the performance of medium and longtransmission lines.
4. Simulate single-area and two-area frequency control

	Microprocessors and Microcontrollers Lab	L	T	P	C
Course Code:	23EE0358	0	0	2	1
Course Type:	PC				
Pre-Requisite	None				

COURSE LEARNING OUTCOMES (CLO)

At the end of the course, the student will be able to

1. Program 8085/8051 Microprocessor & microcontroller using assembly language
2. Perform various arithmetic operations using microprocessors.
3. Perform various code conversions.
4. Perform various types of interfacing.

	Live Project-III & Industrial Visit	L	T	P	C
Course Code:	23EE0360	0	0	1	1
Course Type:	LP				
Prerequisite	23CS0301,23EE0355,23EE0357,23EE0305				

COURSE LEARNING OUTCOMES (CLO):

At the end of the course, the student will be able to

1. To conceptualize a novel idea / technique into a product
2. To think in terms of multi-disciplinary environment
3. To estimate the ability of the student in transforming the theoretical knowledge studied so farin o a working model of an electrical/electronic system.
4. To take on the challenges of teamwork, prepare a presentation in a professional manner, and document all aspects of design work.

	PROFESSIONAL SKILLS	L	T	P	C
Course Code:	23SS654	0	0	2	1
Course Type:	SEC				
Pre-Requisite	None				

Training Learning Outcomes (TLO): -

After the completion of the training, the student will have ability:

1. To understand the importance of professional writing required in workplace.
2. To explore different formats in resume, cover letters & other business-related letters.
3. To develop knowledge, skills and understanding people in-group and individually.
4. To apply communication strategies either in-group or one on one basis and will be confidentto lead the discussion among them.

	BIG DATA ANALYTICS, TOOLS AND TECHNIQUES	L	T	P	C
Course Code:	23CS0302	0	0	2	1
Course Type:	SEC				
Pre-Requisite	None				

TRAINING LEARNING OUTCOMES (TLO)

After completion of TRAINING, students would be able to:

1. Understand the vision of Big Data from a global context.
2. To understand and apply Hadoop in Market perspective of Big Data.
3. To evaluate the application of Big Data in Industrial and Commercial Building Automation, evaluating Big Data performance using MapReduce and Real-World Design Constraints.
4. Applying and analyzing architecture and APIs with use of Devices, Gateways and Data Management in Big data.

	Waste Management	L	T	P	C
Course Code:	21ESUG203	3	0	0	3
Course Type:	PE				
Pre-Requisite	None				

COURSE LEARNING OUTCOMES (CLO)

At the end of the course, the student will be able to

1. To develop an awareness about solid waste and management practices
2. Able to design feasible solutions for waste management
3. Students will have understanding of waste management practices, law and regulation related o solid waste management.

	Solid State Electrical Drives and Control	L	T	P	C
Course Code:	**23EE0405**	**3**	**0**	**0**	**3**
Course Type:	**PC**				
Pre-Requisite	**23EE0203, 23EE0204, 23EE0305**				

COURSE LEARNING OUTCOMES (CLO)

At the end of the course, the student will be able to

1. Understand the steady state operation and transient dynamics of motor-load system
2. Learn the characteristics and control of solid-state DC and AC drives
3. Learn digital control and applications of electric drives
4. Select suitable converters and their controls for drive applications.

	Renewable Energy Sources	L	T	P	C
Course Code:	**24EE0407**	**3**	**0**	**0**	**3**
Course Type:	**PC**				
Pre-Requisite	**NONE**				

COURSE LEARNING OUTCOMES (CLO)

At the end of the course, the student will be able to

1. Analyze the energy scenario of the world and nation.
2. Carry out a comparative analysis of different types of coal, including their treatment, liquefaction and gasification.
3. Compare the liquid and gaseous fuels sourced from petroleum including their characterization
4. Analyze the potential of alternate energy sources and their scope and limitation.

	Power System Protection	L	T	P	C
Course Code:	**24EE0411**	**3**	**0**	**0**	**3**
Course Type:	**PC**				
Pre-Requisite	**NONE**				

COURSE LEARNING OUTCOMES (CLO)

At the end of the course, the student will be able to

1. Identify different power system analysis problems.
2. Describe problems related with power networks, bus impedance algorithms, short circuit, power flow and stability studies.
3. Apply principles to solve problems described in CLO2.
4. Assess the results obtain by solving above problems.

	Electric Drives and Renewable Energy Laboratory	L	T	P	C
Course Code:	**23EE0455**	**0**	**0**	**2**	**1**
Course Type:	**PC**				
Pre-Requisite	**NONE**				

COURSE LEARNING OUTCOMES (CLO)

At the end of the course, the student will be able to

1. Apply the usage of modern power converters for PV systems.
2. Understand the main features and importance of the Energy Plus, TRNSYS, HOMER mathematical programming environment.
3. To learn underlying concepts, modelling inputs and modelling methods of renewable energy systems.
4. To interpret and validate simulation results.

	Modern Control Systems	L	T	P	C
Course Code:	24EE0409	3	0	0	3
Course Type:	PC				
Pre-Requisite	NONE				

COURSE LEARNING OUTCOMES (CLO)

At the end of the course, the student will be able to

1. Develop different state space representations for linear time invariant systems.
2. Write descriptions for discrete time systems and analyse the stability of such systems.
3. Understand and justify the peculiar behaviours shown by nonlinear systems.
4. Analyse the stability of nonlinear systems using phase plane, describing function and Lyapunov method.

	Electric Drives and Renewable Energy Laboratory	L	T	P	C
Course Code:	23EE0455	0	0	2	1
Course Type:	PC				
Pre-Requisite	NONE				

COURSE LEARNING OUTCOMES (CLO)

At the end of the course, the student will be able to

1. Apply the usage of modern power converters for PV systems.
2. Understand the main features and importance of the Energy Plus, TRNSYS, HOMERmathematical programming environment.
3. To learn underlying concepts, modelling inputs and modelling methods of renewable energy systems.
4. To interpret and validate simulation results.

	MINOR PROJECT (INDUSTRIAL INTERNSHIP)	L	T	P	C
Course Code:	21EE0457	0	0	24 (6)	12
Course Type:	LP/SI				
Prerequisite	None				

COURSE LEARNING OUTCOMES (CLOs):

At the end of the course, the student will be able to

1. To conceptualize a novel idea / technique into a product
2. To think in terms of multi-disciplinary environment
3. To estimate the ability of the student in transforming the theoretical knowledge studied sofar into a working model of an electrical/electronic system.
4. To take on the challenges of teamwork, prepare a presentation in a professional manner, and document all aspects of design work.

	Live Project-IV & Industrial Visits	L	T	P	C
Course Code:	23EE0459	0	0	1	1
Course Type:	LP				
Prerequisite	23CS0201,23EE0207,23EE0209,23EE0205,23EE0257				

COURSE LEARNING OUTCOMES (CLO):

At the end of the course, the student will be able to

1. To conceptualize a novel idea / technique into a product
2. To think in terms of multi-disciplinary environment

3. To estimate the ability of the student in transforming the theoretical knowledge studied so far into a working model of an electrical/electronic system.
4. To take on the challenges of teamwork, prepare a presentation in a professional manner, and document all aspects of design work.

	TEAMWORK & INTERPERSONAL SKILLS	L	T	P	C
Course Code:	**23SS452**	**0**	**0**	**2**	**1**
Course Type:	**SEC**				
Pre-Requisite	**None**				

Course Learning Outcomes (CLO): -

After the completion of the training, the student will have ability:

1. To develop knowledge, skills and understanding people in-group and individually.
2. To learn to apply communication strategies either in-group or one on one basis and willbe confident to lead the discussion among them.
3. To work with people even with conflicts and reducing the differences among them byreaching to an equilibrium.

	Data Structures and Algorithm using C++	L	T	P	C
Course Code:	**23CS0401**	**0**	**0**	**2**	**1**
Course Type:	**SC**				
Pre-Requisite	**Basic Programming Knowledge**				

TRAINING LEARNING OUTCOMES (CLO)

At the end of the course, the student will be able to

1. Prepare object-oriented design for small/medium scale problems.
2. Demonstrate the differences between traditional imperative design and object-oriented design
3. To explain class structures as fundamental, modular building blocks, to understand therole of inheritance, polymorphism, dynamic binding and generic structures in building reusable code
4. For a given algorithm student will able to analyze the algorithms to determine the time and computation complexity and justify the correctness.
5. For a given problem of Stacks, Queues and linked list student will able to implement it andanalyze the same to determine the time and computation complexity.
6. For a given Search problem (Linear Search and Binary Search) student will able to implement it.
7. Design and identify how to select the appropriate data structure according to the problem.

	MAJOR PROJECT (INDUSTRIAL INTERNSHIP)	L	T	P	C
Course Code:	**23EE0430**	**0**	**0**	**24 (6)**	**12**
Course Type:	**LP/SI**				
Prerequisite	**None**				

COURSE LEARNING OUTCOMES (CLO):

At the end of the course, the student will be able to

1. Extend their academic experience into areas of personal interest, working with new ideas, issues, organizations, and individuals. Identification of relevant problems in the industry and innovative solutions.
2. Think critically and creatively about academic, professional, or social issues and to further develop their analytical and ethical leadership skills necessary to

3. address and help solve these issues.
4. Refine research skills and demonstrate their proficiency in written and/or oral communication skills.
5. Take on the challenges of teamwork, prepare a presentation in a professional manner, and document all aspects of design work.

	Data acquisition and Telemetry	L	T	P	C
Course Code:	**23EEPE01**	**3**	**0**	**0**	**3**
Course Type:	**PE**				
Pre-Requisite	**None**				

COURSE LEARNING OUTCOMES (CLO)
At the end of the course, the student will be able to
1. Understand the functionality of different components and configuration of data acquisition system
2. Understand the working and functionality of the Data Logger
3. Gain knowledge on different telemetry systems working principle, design techniques, signaltransmission method, media and salient features
4. Gain knowledge on digital communication techniques and applications of single and multiplechannel digital telemetry systems.

	Instrumentation System	L	T	P	C
Course Code:	**23EEPE02**	**3**	**0**	**0**	**3**
Course Type:	**PE**				
Pre-Requisite	**None**				

COURSE LEARNING OUTCOMES (CLO)
At the end of the course, the student will be able to
1. Learn about various transducers and their working principles.
2. Learn different Op-amp based filters used for signal conditioning before data acquisition.
3. Learn the working principle of telemetry system used for transmission of acquired data.
4. Learn about various display devices.

	Sensors and Transducers	L	T	P	C
Course Code:	**23EEPE03**	**3**	**0**	**0**	**3**
Course Type:	**PE**				
Pre-Requisite	**None**				

COURSE LEARNING OUTCOMES (CLO)
At the end of the course, the student will be able to
1. Obtain knowledge on the basic concepts of various sensors and transducers.
2. Acquire knowledge in mechanical and electromechanical sensors.
3. Understand the working principle of capacitive inductive sensor and transducers.
4. Know the principle and operation of piezoelectric and electro chemical sensors.

	Wind and Solar Energy Systems	L	T	P	C
Course Code:	**23EEPE04**	**3**	**0**	**0**	**3**
Course Type:	**PE**				
Pre-Requisite	**None**				

COURSE LEARNING OUTCOMES (CLO)
At the end of the course, the student will be able to
1. Identify the need for technologies pertaining to renewable energy sources in the currentenergy scenario
2. Describe the basic physics of wind and solar power generation.
3. Outline the power electronic interfaces for wind and solar generation.
4. Interpret the issues related to the grid-integration of solar and wind energy systems

	Python Programming	L	T	P	C
Course Code:	23EEPE05	3	0	0	3
Course Type:	PE				
Pre-Requisite	None				

COURSE LEARNING OUTCOMES (CLO)

At the end of the course, the student will be able to

1. Understand the principle of direct solar energy conversion to power using PVtechnology.
2. Comprehend the performance and operating characteristics of PV system and itsComponents.
3. Understanding the design of photovoltaic systems for variety of applications.
4. Explain basics of solar photovoltaic systems. Also, to identify the feasibility of PV systems as an alternative to the fossil fuels.

	Design of Hydro Power Station	L	T	P	C
Course Code:	23EEPE07	3	0	0	3
Course Type:	PE				
Pre-Requisite	None				

COURSE LEARNING OUTCOMES (CLO)

At the end of the course, the student will be able to

1. Apply the fundamentals of hydrology, to various hydraulic and civil structures as required forhydro-power projects.
2. Contribute as well as bring about innovations and developments in some areas like wave power and new technologies in hydraulic structures.
3. Realize the requirement of pre-requisite measures required to maintain the stability in a hydropower plant.
4. Design hydro power plant particularly, electrical design part.

	PLC, DCS and SCADA	L	T	P	C
Course Code:	23EEPE08	3	0	0	3
Course Type:	PE				
Pre-Requisite	None				

COURSE LEARNING OUTCOMES (CLO)

At the end of the course, the student will be able to

1. Learn hardware, architecture and software for PLC and SCADA
2. Learn PLC and SCADA programming for selected industrial processes
3. Study DCS architecture and industrial automation
4. Learn various industrial data communication protocols

	Programming with Java	L	T	P	C
Course Code:	23EEPE09	3	0	0	3
Course Type:	PE				
Pre-Requisite	None				

COURSE LEARNING OUTCOMES (CLO)

At the end of the course, the student will be able to

1. Understand the vision of Object Oriented Programming from industry context.
2. Understand and apply Object Oriented Programming using Java using java I.D.E.
3. Apply and analyze multithreading programming of Java Language to create more robust and fast applications.
4. Evaluate the application of Web Server and Application Server and how to deploy Web Applications.
5. Build and create Web Applications using front end as html, css and java script and backend using **J**ava Servlets and **J**.S.P(**J**ava Server Pages). Creating projects by establishing database connection with IBM DB2 or MySql.

	MECHATRONICS	L	T	P	C
Course Code:	23EEPE10	3	0	0	3
Course Type:	PE				
Pre-Requisite	None				

COURSE LEARNING OUTCOMES (CLO)

At the end of the course, the student will be able to

1. Understand the fundamentals of fluid power Principles, characteristics of the fluid powersystem components.
2. Analyze the fluid power system components for various application
3. Design and develop fluid power circuits to various mechatronic systems.
4. Understand fluid power in to various mechatronic applications.

	Advanced Topics in Electrical Insulation	L	T	P	C
Course Code:	23EEPE11	3	0	0	3
Course Type:	PE				
Pre-Requisite	None				

COURSE LEARNING OUTCOMES (CLO)

At the end of the course, the student will be able to

1. Select the appropriate insulation material and to understand about failures.
2. Familiarize about dielectrics and vacuum insulation.
3. Acquire knowledge on advanced measuring and testing techniques.

	Reactive Power Control and FACT Devices	L	T	P	C
Course Code:	23EEPE12	3	0	0	3
Course Type:	PE				
Pre-Requisite					

COURSE LEARNING OUTCOMES (CLO)

At the end of the course, the student will be able to

1. Describe the technical characteristics and performance of the electric power system with andwithout power electronics support.
2. Identify, formulate and analyse complex problems in electric power engineering.
3. Identify different power electronic based solutions for improving both the steady state and thetransient.
4. Communicate and work effectively on why and how power electronics can be used for power u utility applications.

	Micro Electro Mechanical Systems	L	T	P	C
Course Code:	23EEPE13	3	0	0	3
Course Type:	PE				
Pre-Requisite	None				

COURSE LEARNING OUTCOMES (CLO)

At the end of the course, the student will be able to

1. Understand the fundamentals of Micro Electro Mechanical Systems (MEMS).
2. Identify and understand standard micro fabrication techniques.
3. Conversant with mechanical and electrical behaviors of MEMS.
4. Demonstrate sensing and actuation techniques of MEMS system. Also, tounderstand the application of MEMS in real-world systems.

	Electrical Power Utilization and Illumination	L	T	P	C
Course Code:	**23EEPE14**	**3**	**0**	**0**	**3**
Course Type:	**PE**				
Pre-Requisite	**None**				

COURSE LEARNING OUTCOMES (CLO)

At the end of the course, the student will be able to

1. Select the heating and welding requirements and the lighting system
2. Familiarize the industrial drives and traction system
3. Bring solutions for the problems in refrigeration and air conditioning systems.
4. List the current guidelines in the design, construction, and management of safe and energy-efficient lighting schemes.

	Design of Electrical Machines	L	T	P	C
Course Code:	**23EEPE15**	**3**	**0**	**0**	**3**
Course Type:	**PE**				
Pre-Requisite	**None**				

COURSE LEARNING OUTCOMES (CLO)

At the end of the course, the student will be able to

1. Understand the basic design principles, design limitations and latest design trends of DC machines.
2. Apply design concepts to design the winding, core, frame and cooling circuit of single phase and three phase transformers.
3. Analyze the performance and accomplish complete design of single phase and three phase induction motors.
4. Design the main dimensions, selection of stator and rotor slots, insulation, type of windings of three phase alternators.

	Special Electrical Machines	L	T	P	C
Course Code:	**23EEPE16**	**3**	**0**	**0**	**3**
Course Type:	**PE**				
Pre-Requisite	**None**				

COURSE LEARNING OUTCOMES (CLO)

At the end of the course, the student will be able to

1. Understand the working principle, construction and applications of stepper motors and reluctance motors
2. Gain knowledge in principle of operation, characteristics and control of permanent magnet brushless dc motors and synchronous motors
3. Select an energy efficient linear or rotary motor based on the characteristics of the load & application.
4. Incorporate the correct control technique to the machine for efficient operation.

	Electrical Safety and Safety Management	L	T	P	C
Course Code	23EEPE17	3	0	0	3
Course Type	PE				
Pre-Requisit	None				

COURSE LEARNING OUTCOMES (CLO)
At the end of the course, the student will be able to
1. Understand the Indian electricity rules and their significance
2. Elucidate the safety standard in residential, commercial and agricultural
3. Learn about electrical safety installation, testing and commission
4. Understand about electrical safety in distribution system

	Electrical Systems Design for Building	L	T	P	C
Course Code:	23EEPE18	3	0	0	3
Course Type:	PE				
Pre-Requisite	None				

COURSE LEARNING OUTCOMES (CLO)
At the end of the course, the student will be able to
1.Understand design of electrical installations in high rise buildings2.Understand Illumination schemes in buildings
3.Understand Solar Electric System Design for Buildings
4.Learn regulation and safety installation practices of buildings against lightning, earthing,electric shock, electric fire.

	Communication Systems	L	T	P	C
Course Code:	23EEPE19	3	0	0	3
Course Type:	Prerequisite				
Pre-Requisite	None				

COURSE LEARNING OUTCOMES (CLO)
At the end of the course, the student will be able to
1. Design Amplitude Modulation communication systems.
2. Design Angle Modulation communication systems.
3. Analyse the Noise performance of Analog communication systems.
4. Analyse the Capacity of the Channel and limits of the Communicatin systems.

	Wireless Communication Systems	L	T	P	C
Course Code:	23EEPE20	3	0	0	3
Course Type:	Prerequisite				
Pre-Requisite	None				

COURSE LEARNING OUTCOMES (CLO)
At the end of the course, the student will be able to
1. Understand technologies used in wireless comm.
2. Understand Cellular concept.
3. Understand multiple access technologies.
4. Gain knowledge about the effect of Different fading models and diversity techniques

	Switched Mode Power Conversion	L	T	P	C
Course Code:	23EEPE21	3	0	0	3
Course Type:	PE				
Pre-Requisite	None				

COURSE LEARNING OUTCOMES (CLO)

At the end of the course, the student will be able to

1. Apply the concept of ideal and real characteristics of switching devices and design the reactivecircuit elements for switched mode converters
2. Learn various concepts on the operation and steady state analysis of Switching power converters
3. Learn various concepts on analysis, modelling and performance functions of switching power converters.
4. Learn various concepts on closed-loop control of switching power converters. Also, Familiarize with the applications of Switched mode power converters.

	Power Converter Analysis and Design	L	T	P	C
Course Code:	23EEPE22	3	0	0	3
Course Type:	PE				
Pre-Requisite	None				

COURSE LEARNING OUTCOMES (CLO)

At the end of the course, the student will be able to

1. Know the basics of snubber and drive circuits design
2. Develop the knowledge on analysis and design of power converters
3. Design various types of controllers
4. Understand the operation and design of resonant converter.

	Advanced Control Theory	L	T	P	C
Course Code:	23EEPE23	3	0	0	3
Course Type:	PE				
Pre-Requisite	None				

COURSE LEARNING OUTCOMES (CLO)

At the end of the course, the student will be able to

1. Apply various stability concepts to non-linear systems.
2. Gain knowledge on the basics of optimal and adaptive control.
3. Familiarize with the practical utility of controllability, observability and state observer
   a. Concepts.
4. To enable students to study and analyse various advanced control strategies with theapplications of mathematical problems.

	AIRCRAFT ELECTRONIC SYSTEMS	L	T	P	C
Course Code:	23EEPE24	3	0	0	3
Course Type:	PE				
Pre-Requisite	None				

COURSE LEARNING OUTCOMES (CLO)

At the end of the course, the student will be able to

1. Understand the insights of the flight instruments.
2. Appreciate and classify the monitoring and management systems.
3. Differentiate electrostatic and electromagnetic effects.
4. List the control and indicating systems in aircraft. Also, enrich about recording and reporting systems in aircraft.

	Power System Harmonics	L	T	P	C
Course Code:	23EEPE25	3	0	0	3
Course Type:	PE				
Pre-Requisite	None				

COURSE LEARNING OUTCOMES (CLO)

At the end of the course, the student will be able to

1. Familiarize with the terms and standards associated with harmonics
2. Understand the causes for harmonic producing loads in power electronics converter.
3. Apply principles of harmonic mitigation to bring down the level of harmonics within the standard limits
4. To design filters for harmonic elimination with computer simulation.

	Vehicular Power Systems	L	T	P	C
Course Code:	23EEPE26	3	0	0	3
Course Type:	PE				
Pre-Requisite	None				

COURSE LEARNING OUTCOMES (CLO)

At the end of the course, the student will be able to

1. Understand concept of power system for aircraft system
2. Learn the concept of power system and power electronics for space system.
3. Learn the concept of power system for sea and undersea vehicles.
4. Understand concept of power system for automotive and fuel cell-based vehicles.

	Industrial Power System	L	T	P	C
Course Code:	23EEPE27	3	0	0	3
Course Type:	PE				
Pre-Requisite	None				

COURSE LEARNING OUTCOMES (CLO)

At the end of the course, the student will be able to

1. Acquire knowledge on Induction Motor Starting Studies.
2. Understand about Power Factor Correction in Induction Motor.
3. Analyse Harmonic, Flicker, Ground Grid problem in power system.
4. To understand the terminologies used in the context of an electrical distributionsystem.

	Smart Grid	L	T	P	C
Course Code:	23EEPE28	3	0	0	3
Course Type:	PE				
Pre-Requisite	None				

COURSE LEARNING OUTCOMES (CLO)

At the end of the course, the student will be able to

1. Understand the challenging issues and architecture of smart grid
2. Understand the communication and wide area monitoring in smart grid
3. Rudimentary energy management issues in smart grid
4. Acquire the knowledge in computational intelligence and security issues in smart grid. Also,to know the role of Power electronics and energy storage in smart grid
5.

	Micro Grid	L	T	P	C
Course Code:	**23EEPE29**	**3**	**0**	**0**	**3**
Course Type:	**PE**				
Pre-Requisite	**None**				

COURSE LEARNING OUTCOMES (CLO)

At the end of the course, the student will be able to

1. Explain the operational methods of microgrids.
2. Design a prototype model of Micro Grid and implement its feature.
3. Summarize the various control techniques and communication protocols used in microgrids.
4. Perform assessment on the different benefits of microgrids. Also, to distinguish on thetechnical difference between smart grids and microgrids

	Power System Deregulation	L	T	P	C
Course Code:	**23EEPE30**	**3**	**0**	**0**	**3**
Course Type:	**PE**				
Pre-Requisite	**None**				

COURSE LEARNING OUTCOMES (CLO)

At the end of the course, the student will be able to

1. Understand the basics of deregulation, power system economic operation and its Benefits.
2. Learn the role of independent system operator
3. Understand the transmission services
4. Acquire knowledge on security and congestion management

	Modern Power System Analysis	L	T	P	C
Course Code:	**23EEPE31**	**3**	**0**	**0**	**3**
Course Type:	**PE**				
Pre-Requisite	**None**				

COURSE LEARNING OUTCOMES (CLO)

At the end of the course, the student will be able to

1. Learn the algorithms for computing network matrices.
2. Understand the use of numerical methods for power flow analysis and optimal power flowanalysis.
3. Analyse the contingency, Stability and transient state estimation problems in Power systems.
4. To apply various optimization methods related to power flow analysis, FACTS devices and Optimal power flow solution.

	High Voltage Engineering	L	T	P	C
Course Code:	**23EEPE32**	**3**	**0**	**0**	**3**
Course Type:	**PE**				
Pre-Requisite	**None**				

COURSE LEARNING OUTCOMES (CLO)

At the end of the course, the student will be able to

1. Understand the causes of over voltages and their effects on power system
2. Familiarize the concept of solid, liquid and gaseous dielectrics
3. Gain knowledge on the generation and measurement of high voltages and currentsas well as the testing of high voltage equipment.
4. Investigate the technique used for the generation and measurement of high voltagesand currents.

	Power Quality	L	T	P	C
Course Code:	23EEPE33	3	0	0	3
Course Type:	PE				
Pre-Requisite	None				

COURSE LEARNING OUTCOMES (CLO)

At the end of the course, the student will be able to

1. Perceive the power quality major events like voltage sag, interruptions and harmonics.
2. Study the various methods of power quality mitigation and monitoring.
3. Understand the power quality issues due to distributed generation.
4. To acquire knowledge regarding monitoring of power quality events and analyse the data.

	Power System Optimization	L	T	P	C
Course Code:	23EEPE34	3	0	0	3
Course Type:	PE				
Pre-Requisite	None				

COURSE LEARNING OUTCOMES (CLO)

At the end of the course, the student will be able to

1. Categorize various power system optimization problem.
2. Apply evolutionary optimization techniques in power system applications.
3. Compare the different optimization techniques.
4. Analyze the optimal operation of the power system network using advance optimization methods and multi objective optimization methods.

	Energy Storage Technology	L	T	P	C
Course Code:	23EEPE35	3	0	0	3
Course Type:	PE				
Pre-Requisite	None				

COURSE LEARNING OUTCOMES (CLO)

At the end of the course, the student will be able to

1. Apply the suitable energy storage technique for different energy sources.
2. Differentiate the energy storage options based on operating conditions
3. Understand need and types of energy storage system.
4. Economically analyze the storage options

	POWER ELECTRONICS FOR RENEWABLE ENERGY SYSTEMS	L	T	P	C
Course Code:	23EEPE36	3	0	0	3
Course Type:	PE				
Pre-Requisite	None				

COURSE LEARNING OUTCOMES (CLO)

At the end of the course, the student will be able to

1. Identify the impact of power electronics in renewable energy systems
2. Demonstrate the application of power electronics in solar PV
3. Analyze the performance of power converters in wind technology
4. Devise the complete operation of small/medium sized renewable energy system. Also, toestimate the parameters of power converters for renewable energy systems.

	Substation Design	L	T	P	C
Course Code:	23EEPE37	3	0	0	3
Course Type:	PE				
Pre-Requisite	None				

COURSE LEARNING OUTCOMES (CLO)

At the end of the course, the student will be able to

1. Develop Substation Layouts.
2. Design Air Insulated and Gas Insulated Substation and Interface Communication Techniques.
3. Monitor and Control the Substation Operation.
4. Adopt Substation Technology Advances in future along with GIS.

	Hybrid Electric Vehicles	L	T	P	C
Course Code:	23EEPE38	3	0	0	3
Course Type:	PE				
Pre-Requisite	None				

COURSE LEARNING OUTCOMES (CLO)

At the end of the course, the student will be able to

1. Realize the importance of electric transportation systems.
2. Understand the basics of electric vehicle components and configuration.
3. Understand the various charging types, comfort and safety methods.
4. Understand the application of electric vehicle in Smart grid.

	ENERGY MANAGEMENT AND AUDIT	L	T	P	C
Course Code:	23EEPE39	3	0	0	3
Course Type:	PE				
Pre-Requisite	None				

COURSE LEARNING OUTCOMES (CLO)

At the end of the course, the student will be able to

1. Students can evaluate the techno economic feasibility of the energy conservation technique adopted through audit.
2. Students will gain the ability to identify the efficiency improvement process in any industry.
3. Students will gain the ability to identify the demand supply gap of energy in Indian scenario.
4. To gain the ability to carry out energy audit of an industry/organization and prepare an audit report.

	Power System Operation and Control	L	T	P	C
Course Code:	23EEPE40	3	0	0	3
Course Type:	PC				
Pre-Requisite	NONE				

COURSE LEARNING OUTCOMES (CLO)

At the end of the course, the student will be able to

1. Learn the basics of power system control
2. Control the frequency and voltage of power system
3. Understand the economic operation of power system
4. Realize the modern computer control in power system

	OPERATION RESEARCH	L	T	P	C
Course Code:	**23AS701**	**3**	**0**	**0**	**3**
Course Type:	**Prerequisite**				
Pre-Requisite	**None**				

COURSE LEARNING OUTCOMES (CLO)

At the end of the course, the student will be able to

1. Develops the managerial skill for budding engineers using network Analysis
2. Identify and develop operational research models from the verbal description of the real system.
3. Using mathematical software to solve the linear Programming.
4. Knowing solving technique, analyze the result for decision making processes in Management Engineering

	Modern Optimization Techniques	L	T	P	C
Course Code:	**23EEPE42**	**3**	**0**	**0**	**3**
Course Type:	**OE**				
Pre-Requisite	**NONE**				

COURSE LEARNING OUTCOMES (CLO)

At the end of the course, the student will be able to

1. Obtain knowledge on optimization techniques applied to power system problems.
2. Understand the different evolutionary computation techniques and multi objectiveoptimization and their applications in power system problems.
3. Understand the principles and fundamentals of GA, PSO and nature inspiredalgorithm.
4. Learn various topologies and learning algorithms of GA, PSO and nature inspiredalgorithm.

	Soft Computing	L	T	P	C
Course Code:	**23EEPE43**	**3**	**0**	**0**	**3**
Course Type:	**OE**				
Pre-Requisite	**None**				

COURSE LEARNING OUTCOMES (CLO)

At the end of the course, the student will be able to

1. Understand different topologies of Neural Networks.
2. Learn about fuzzy logic and support vector technique.
3. Learn the basics of genetic algorithm.
4. Develop application on different soft computing techniques like Fuzzy, GA and Neural network

	Introduction to Robotics and Industrial Automation	L	T	P	C
Course Code:	**23EEPE44**	**3**	**0**	**0**	**3**
Course Type:	**PE**				
Pre-Requisite	**None**				

COURSE LEARNING OUTCOMES (CLO)

At the end of the course, the student will be able to

1. Explain basic concepts of Programmable Logic Controller (PLC) and Industrial automation.
2. Determine basic programming languages and instructions of a PLC and Use a particular Programmable Logic Controller (PLC) for various applications.
3. Design an automated system for industrial derive to meet defined operationalspecifications.
4. Explain basic concept, type and components of Robotic system and Define the principlesand benefits of the various actuators, drives and sensors. Solve forward

5. kinematics of any serial robot, compute position and orientation of end effectors as a function to joint variables.

	CYBER SECURITY	L	T	P	C
Course Code:	**23EEPE45**	**3**	**0**	**0**	**3**
Course Type:	**PE**				
Pre-Requisite	**None**				

COURSE LEARNING OUTCOMES (CLO)

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

1. Define the concept of ethical hacking and its associated applications in Information Communication Technology (ICT) world.
2. Underline the need of digital forensic and role of digital evidences.
3. Explain the methodology of incident response and various security issues in ICT world, and identify digital forensic tools for data collection.
4. Recognize the importance of digital forensic duplication and various tools for analysis to achieve adequate perspectives of digital forensic investigation in various applications /devices like Windows/Unix system. Also, to apply the knowledge of IDS to secure network and performing router and network analysis.

	SMART GRID TECHNOLOGIES & IOT	L	T	P	C
Course Code:	**23EEPE46**	**3**	**0**	**0**	**3**
Course Type:	**PE**				
Pre-Requisite	**Fundamentals of Power Distribution System, Transmission and Distribution, Power system Operation and Control, Communication Networks**				

COURSE LEARNING OUTCOMES (CLO)

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

1. Understand the significance of smart grid concept
2. Get acquainted with different smart devices and smart meters
3. Describe how modern power distribution system functions
4. Identify suitable communication networks for Smart Grid applications

	DISTRIBUTED GENERATION AND MICROGRIDS	L	T	P	C
Course Code:	**23EEPE47**	**3**	**0**	**0**	**3**
Course Type:	**PE**				
Pre-Requisite	**The students are preferred to have a basic knowledge in Power System Analysis and Distribution Systems**				

COURSE LEARNING OUTCOMES (CLO)

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

1. Understand the current scenario of Distributed Generation and the need to implement DG sources.
2. Investigate the different types of RES as DGs.
3. Appraise the grid integration, interfaces and technical impacts of DGs upon transmission and distribution systems.
4. Analyze the aspects of Power Quality and Reliability. Also, to understand comprehensively about different types of Storage systems.

	Infrastructure for Smart Cities	L	T	P	C
Course Code:	**23EEPE48**	**3**	**0**	**0**	**3**
Course Type:	**PE**				
Pre-Requisite	**None**				

COURSE LEARNING OUTCOMES (CLO)

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

1. Understand the necessity of infrastructural development for smart cities.
2. Identify components of infrastructure and Prepare infrastructure plan for smart city.
3. Understand smart transport system for smart cities and its application
4. Study of water resources systems for smart city and its application. Also, to understandNational and Global policies to implement for smart city development.

	Electric Vehicle Machines and Drives	L	T	P	C
Course Code:	**23EEPE49**	**3**	**0**	**0**	**3**
Course Type:	**PE**				
Pre-Requisite	**None**				

COURSE LEARNING OUTCOMES (CLO)

After completion of the course, students would be able to:

1. Motor Drive Technology, Energy Source Technology
2. Design Criteria of DC Motor Drives for EVs
3. Design Criteria of PM Brushless Motor Drives for EVs,
4. Design Criteria of SR Motor Drives for EVs

	Real-Time Control of Power Systems and EnergyManagement	L	T	P	C
Course Code:	**23EEPE50**	**3**	**0**	**0**	**3**
Course Type:	**PE**				
Pre-Requisite	**None**				

COURSE LEARNING OUTCOMES (CLO)

After completion of the course, students would be able to:

1.Develop mathematical models for analysis of linear and non–linear State Estimation, Observability and Contingency analysis of any practical Power System

2.Prepare the practical input data required for linear and non–linear State Estimationmethods and Contingency studies.

3.Identify the strategic locations for measurements to analyses the state of the art

4.To have complete overview of Real Time operation of Power system (RTPS) and communication & protocols employed in RTPS. Also, to understand the need and
importance of energy audit, management and evaluate the benefits of different energy management techniques.

	Distribution System Planning and Automation	L	T	P	C
Course Code:	**23EEPE51**	**3**	**0**	**0**	**3**
Course Type:	**PE**				
Pre-Requisite	**Power Systems Analysis**				

COURSE LEARNING OUTCOMES (CLO)

After completion of the course, students would be able to:

Understand and distinguish characteristics of distribution system from transmission

systems. Design, analyze and evaluate distribution system design based on forecasted data.
Identify and select appropriate sub-station location.
Design and evaluate a distribution system for a given geographical service area from alternate design alternatives.

	DIGITAL COMMUNICATION	L	T	P	C
Course Code:	**23EEPE52**	**3**	**0**	**0**	**3**
Course Type:	**PE**				
Pre-Requisite	**None**				

COURSE LEARNING OUTCOMES

At the end of the course, the student will be able to

1. Design Digital communication system.
2. Design and implement Base Band transmission schemes.
3. Design and implement Base pass signaling schemes.
4. Design and implement Spread Spectrum Techniques. Also, design & physical implementation of Digital Radio Transmitter & Receiver.

	OPTICAL FIBER COMMUNICATION	L	T	P	C
Course Code:	**23EEPE53**	**3**	**0**	**0**	**3**
Course Type:	**PE**				
Pre-Requisite	**None**				

COURSE LEARNING OUTCOMES (CLO)

At the end of the course, the student will be able to

1. Fundamentals, advantages and advances in optical communication system.
2. Types, basic properties and transmission characteristic of optical fibers.
3. Knowledge of working and analysis of optical amplifiers and important parts at the transmitter (Semiconductor lasers/LEDs, modulators etc) as well as at the receiver sides (optical detector etc.) of the optical communications system.
4. To understand the fiber optical network components, variety of networking aspects, FDDI, SONET/SDH and operational principles WDM.

	MOBILE COMMMUNICATION	L	T	P	C
Course Code:	**23EEPE54**	**3**	**0**	**0**	**3**
Course Type:	**PE**				
Pre-Requisite	**None**				

COURSE LEARNING OUTCOMES

At the end of the course, the student will be able to

To study the specifications and functionalities of various protocols/standards of mobile networks.

	DATA COMMUNICATION NETWORK	L	T	P	C
Course Code:	**23EEPE55**	**3**	**0**	**0**	**3**
Course Type:	**PE**				
Pre-Requisite	**None**				

COURSE LEARNING OUTCOMES

At the end of the course, the student will be able to

1. To introduce basic concepts of Data communication with different models.
2. Enumerate the physical layer, DLL, NL, TL and AL, its explanation of the function(s) of each layer.
3. To introduce about the switching concept and its different types.

	WIRELESS COMMUNICATION	L	T	P	C
Course Code:	23EEPE56	3	0	0	3
Course Type:	PE				
Pre-Requisite	None				

COURSE LEARNING OUTCOMES

At the end of the course, the student will be able to

1. Capable of characterizing a wireless channel and evolve the system design specifications.
2. Capable of designing a cellular system based on resource availability and traffic demands.
3. Able to identify suitable signaling and multipath mitigation techniques for the wireless channel and system under consideration.
4. Capable of exploiting multiple antenna techniques for capacity/ performance gains.

	SATELLITE COMMUNICATION	L	T	P	C
Course Code:	23EEPE57	3	0	0	3
Course Type:	PE				
Pre-Requisite	None				

COURSE LEARNING OUTCOME

At the end of the course, the student will be able to

1. Design and implementation of various the satellite orbits
2. Analyse the Satellite link design.
3. Design and analyze the earth segment and space segment
4. Analyse the different multiple access methods along with various applications

	EMBEDDED SYSTEMS DESIGN	L	T	P	C
Course Code:	23EEPE58	3	0	0	3
Course Type:	PE				
Pre-Requisite	None				

COURSE LEARNING OUTCOMES

At the end of the course, the student will be able to

The purpose of this course is to expose the concepts of embedded system principles – Microcontrollers and its interfacing with peripherals.

	RADAR & IMAGING	L	T	P	C
Course Code:	23EEPE59	3	0	0	3
Course Type:	PE				
Pre-Requisite	None				

COURSE LEARNING OUTCOMES (CLO)

After completion of course, students would be able to:

1. Understand basic of radar system.
2. To understand the fundamental concepts of radar detection.
3. To understand FM-CW radars and Fundamentals of Doppler measurements.
4. To understand images from range.

	VIRTUAL INSTRUMENTATION	L	T	P	C
Course Code:	23EEPE60	3	0	0	3
Course Type:	PE				
Pre-Requisite	None				

COURSE LEARNING OUTCOMES (CLO)

At the end of the course, student will be able to:

1. Develop virtual instruments for specific application using LabVIEW software.

2. Ease the programming required to make computer interact with real world.
3. To acquire, analyze and display the throughput of any compactible system.
4. Knowledge to connect with third party software and hardware.

	MICROELECTRONICS	L	T	P	C
Course Code:	**23EEPE61**	**3**	**0**	**0**	**3**
Course Type:	**PE**				
Pre-Requisite	**None**				

COURSE LEARNING OUTCOMES (CLO)

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

1. Understand IC technology and MOS transistor theory.
2. Describe the techniques used the design of CMOS logic circuits.
3. Explain VLSI fabrication techniques.

	Computer Architecture and very large-scale Integration	L	T	P	C
Course Code:	**23EEPE62**	**3**	**0**	**0**	**3**
Course Type:	**PE**				
Pre-Requisite	**None**				

COURSE LEARNING OUTCOMES (CLO)

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

1. Apply the basic knowledge of digital concept to the functional components of a Computer System and analyze the addressing mode concepts and design the instruction set Architecture. 2. Identify the functions of various processing units within the CPU of a Computer System and analyze the function of the memory management unit and create suitable memory interface to the CPU.
3. Describe the techniques used for VLSI fabrication, design of CMOS logic circuits, switches and memory.
4. Describe the techniques used the design of CMOS logic circuits, switches and memory in VLSI And generalize the design techniques and analyze the characteristics of VLSI circuits such as area,speed and power dissipation.

	Biomedical Engineering	L	T	P	C
Course Code:	**23EEPE63**	**3**	**0**	**0**	**3**
Course Type:	**PE**				
Pre-Requisite	**None**				

COURSE LEARNING OUTCOMES (CLO)

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

1. Learn the basic human physiology.
2. Understand the applications of measuring, recording and monitoring instruments.
3. Understand the concepts of various medical instruments and supporting systems.

	Computer Aided Design and Manufacturing	L	T	P	C
Course Code:	**23EEPE64**	**2**	**0**	**0**	**2**
Course Type:	**PE**				
Pre-Requisite	**None**				

COURSE LEARNING OUTCOMES (CLO)

After completion of the course, students would be able to:

1. Explain lifecycle of a product and the role of computer-aided design (CAD) in product development.
2. Create the different wireframe primitives, surface primitives and solid primitives usingparametric representations.
3. Apply geometric transformations on the created wireframe, surface and solid models.
4. Understand concepts of modeling in 2D and 3D.
5. Understand different CAD Packages and its features. Also, to apply the CNC

6. machine toolsand programming manufacturing processes

	Modern Control Systems	L	T	P	C
Course Code:	**23EEPE65**	**3**	**0**	**0**	**3**
Course Type:	**PC**				
Pre-Requisite	**NONE**				

COURSE LEARNING OUTCOMES (CLO)

At the end of the course, the student will be able to

1. Develop different state space representations for linear time invariant systems
2. Write descriptions for discrete time systems and analyse the stability of such systems
3. Understand and justify the peculiar behaviours shown by nonlinear systems.
4. Analyse the stability of nonlinear systems using phase plane, describing function and Lyapunov method.