MAR ATHANASIUS COLLEGE OF ENGINEERING

KOTHAMANGALAM

ELECTRICAL & ELECTRONICS ENGINEERING DEPARTMENT

LIST OF COURSE OUTCOME

SEMESTER	SUBJECT CODE	SUBJECT NAME	CO NO:	CO DESCRIPTION
S1	MAT 101	LINEAR ALGEBRA AND CALCULUS	1	Solve systems of linear equations, diagonalize matrices and characterise quadratic forms
			2	Compute the partial and total derivatives and maxima and minima of multivariable functions
			3	Compute multiple integrals and apply them to find areas and volumes of geometrical shapes, mass and centre of gravity of plane laminas
			4	Perform various tests to determine whether a given series is convergent, absolutely convergent or conditionally convergent
			5	Determine the Taylor and Fourier series expansion of functions and learn their applications.
S1	CYT 100	ENGINEERING CHEMISTRY	1	Apply the basic concepts of electrochemistry and corrosion to explore its possible applications in various engineering fields.
			2	Understand various spectroscopic techniques like UV-Visible, IR, NMR and its applications.
			3	Apply the knowledge of analytical method for characterizing a chemical mixture or a compound. Understand the basic concept of SEM for surface characterisation of nanomaterials.

			4	Learn about the basics of stereochemistry and its application. Apply the knowledge of conducting polymers and advanced polymers in engineering.
			5	Study various types of water treatment methods to develop skills for treating wastewater.
S1	EST100	ENGINEERING MECHANICS	1	Recall principles and theorems related to rigid body mechanics
			2	Identify and describe the components of system of forces acting on the rigid body
			3	Apply the conditions of equilibrium to various practical problems involving different force system.
			4	Choose appropriate theorems, principles or formulae to solve problems of mechanics.
			5	Solve problems involving rigid bodies, applying the properties of distributed areas and masses
S1	EST120	BASICS OF CIVIL AND MECHANICAL ENGINEERING	1	Recall the role of civil engineer in society and to relate the various disciplines of Civil Engineering.
			2	Explain different types of buildings, building components, building materials and building construction
			3	Describe the importance, objectives and principles of surveying.
			4	Summarise the basic infrastructure services MEP, HVAC, elevators, escalators and ramps
			5	Discuss the Materials, energy systems, water management and environment for green buildings.
			6	Analyse thermodynamic cycles and calculate its efficiency
			7	Illustrate the working and features of IC Engines

			8	Explain the basic principles of Refrigeration and Air Conditioning
			9	Describe the working of hydraulic machines
			10	Explain the working of power transmission elements
			11	Describe the basic manufacturing, metal joining and machining processes
S1	HUN101	LIFE SKILLS	1	Define and Identify different life skills required in personal and professional life
			2	Develop an awareness of the self and apply well-defined techniques to cope with emotions and stress.
			3	Explain the basic mechanics of effective communication and demonstrate these through presentations.
			4	Take part in group discussions
			5	Use appropriate thinking and problem solving techniques to solve new problems
			6	Understand the basics of teamwork and leadership
S1	CYL120	ENGINEERING CHEMISTRY LAB	1	Understand and practice different techniques of quantitative chemical analysis to generate experimental skills and apply these skills to various analyses
			2	Develop skills relevant to synthesize organic polymers and acquire the practical skill to use TLC for the identification of drugs
			3	Develop the ability to understand and explain the use of modern spectroscopic techniques for analysing and interpreting the IR spectra and NMR spectra of some organic compounds
			4	Acquire the ability to understand, explain and use instrumental techniques for chemical analysis

			5	Learn to design and carry out scientific experiments as well as accurately record and analyze the results of such experiments
			6	Function as a member of a team, communicate effectively and engage in further learning. Also understand how chemistry addresses social, economical and environmental problems and why it is an integral part of curriculum
S1	ESL120	CIVIL AND MECHANICALWORKSHOP	1	Name different devices and tools used for civil engineering measurements
			2	Explain the use of various tools and devices for various field measurements
			3	Demonstrate the steps involved in basic civil engineering activities like plot measurement, setting out operation, evaluating the natural profile of land, plumbing and undertaking simple construction work.
			4	Choose materials and methods required for basic civil engineering activities like field measurements, masonry work and plumbing.
			5	Compare different techniques and devices used in civil engineering measurements
			6	Identify Basic Mechanical workshop operations in accordance with the material and objects
			7	Apply appropriate Tools and Instruments with respect to the mechanical workshop trades
			8	Apply appropriate safety measures with respect to the mechanical workshop trades
S2	MAT 102	VECTOR CALCULUS, DIFFERENTIAL	1	Apply the concept of vector functions and learn to work with conservative vector field

		EQUATIONS AND CALCULUS	2	Apply computing integrals of scalar and vector field over surfaces in three-dimensional space.
			3	Solve homogeneous and non-homogeneous linear differential equation with constant coefficients
			4	Apply Laplace transforms to solve physical problems arising in engineering
			5	Apply Fourier transforms to solve physical problems arising in engineering
S2	PHT 100	ENGINEERING PHYSICS A	1	Compute the quantitative aspects of waves and oscillations in engineering systems.
			2	Apply the interaction of light with matter through interference, diffraction and identify these phenomena in different natural optical processes and optical instruments.
			3	Analyze the behaviour of matter in the atomic and subatomic level through the principles of quantum mechanics to perceive the microscopic processes in electronic devices.
			4	Classify the properties of magnetic materials and apply vector calculus to static magnetic fields and use Maxwell's equations to diverse engineering problems
			5	Analyze the principles behind various superconducting applications, explain the working of solid state lighting devices and fibre optic communication system
S2	EST110	ENGINEERING GRAPHICS	1	Draw the projection of points and lines located in different quadrants
			2	Prepare multiview orthographic projections of objects by

				visualizing them in different positions
			3	Draw sectional views and develop surfaces of a given object
			4	Prepare pictorial drawings using the principles of isometric and perspective projections to visualize objects in three dimensions.
			5	Convert 3D views to orthographic views and vice versa
			6	Obtain multiview projections and solid models of objects using CAD tools
S2	EST 130	BASICS OF ELECTRICAL AND ELECTRONICS ENGINEERING	1	Apply fundamental concepts and circuit laws to solve simple DC electric circuits
			2	Develop and solve models of magnetic circuits
			3	Apply the fundamental laws of electrical engineering to solve simple ac circuits in steady state.
			4	Describe the working of various electronic components and their characteristics
			5	The working principle of various electronic circuits and outline the principle of an electronic instrumentation system
			6	Explain the principle of radio and cellular communication
S2	HUN102	PROFESSIONAL COMMUNICATION	1	Develop vocabulary and language skills relevant to engineering as a profession
			2	Analyse, interpret and effectively summarize a variety of textual content
			3	Create effective technical presentations
			4	Discuss a given technical/non-technical topic in a group setting and arrive at generalizations/consensus

			5	Identify drawbacks in listening patterns and apply listening techniques for specific needs
			6	Create professional and technical documents that are clear and adhering to all the necessary conventions
S2	EST102	PROGRAMMING IN C	1	Analyze a computational problem and develop an algorithm/flowchart to find its solution
			2	Develop readable* C programs with branching and looping statements, which uses Arithmetic, Logical, Relational or Bitwise operators.
			3	Write readable C programs with arrays, structure or union for storing the the data to be processed
			4	Divide a given computational problem into a number of modules and develop a readable multi-function C program by using recursion if required, to find the solution to the computational problem
			5	Write readable C programs which use pointers for array processing and parameter passing
			6	Develop readable C programs with files for reading input and storing output
S2	PHL 120	ENGINEERING PHYSICS LAB	1	Apply modern instruments like CRO, strain gauge to measure the basic physical quantities viz. frequency and amplitude of a wave pattern,strain etc. Carryout measurement of wave pattern in a stretched string and the corresponding frequency values using a Melde's string apparatus.
			2	Determine the wavelength of monochromatic beam of light and thickness of micro-thin object etc. by forming Newton's rings pattern and an air wedge fringe pattern.

			3	Carryout the measurement of wavelength by diffraction of plane transmission grating and the spectra formed by a monochromatic beam of light and a laser.
			4	Determine the wavelength of a laser beam using the plane transmission grating. Measurement of numerical aperture of an optic fibre and evaluate the properties of a solar cell and LED through itsI-Vcharacteristics.
			5	Determine the velocity of ultrasonic waves in liquid using ultrasonic diffractometer.Compare the magnetic moment of various magnets and determine the magnetic flux density using deflection/vibration Magnetometer.
S2	ESL130	ELECTRICAL & ELECTRONICS WORKSHOP	1	Demonstrate safety measures against electric shocks.
			2	Identify the tools used for electrical wiring, electrical accessories, wires, cables, batteries and standard symbols.
			3	Develop the connection diagram, identify the suitable accessories and materials necessary for wiring simple lighting circuits for domestic buildings.
			4	Identify and test various electronic components
			5	Draw circuit schematics with EDA tools
			6	Assemble and test electronic circuits on boards
			7	Work in a team with good interpersonal skills
S3	C 201	LINEAR ALGEBRA AND COMPLEX ANALYSIS	1	Identify analytic functions and harmonic functions
			2	Identify conformal mappings and some important transformations

			3	Evaluation of integrals using Cauchy integral formula
			4	Evaluate real definite integrals as application of residue theorem
			5	Solve any given system of linear equations
			6	Find the eigenvalues of the matrix and how to diagonalize a matrix
S3	EE 201	CIRCUITS AND NETWORKS	1	Ability to analyse electrical networks by applying basic solving theorems and techniques.
			2	Expertise in developing network topologies for various types of circuits.
			3	Ability to Solve R,L,C circuits under steady state and transient conditions
			4	Application of basic circuit solving techniques and Laplace tools to evaluate complex networks involving transformers and couplings.
			5	Ability to solve two port networks.
			6	Obtain Better understanding about network synthesis
S3	EE 205	DC MACHINES AND TRANSFORMERS	1	Ability to analyze the circuit and electro dynamical model of electric machines
			2	Ability to understand the operation of different types of D.C. Generators
			3	Ability to understand the working principle, starting and speed control of D.C. Motors. Also able to test the performance of D.C. machines
			4	Capable of analyzing the equivalent circuit model of transformers
			5	Ability to analyze the performance of single phase transformers
			6	Capable of identifying the winding configurations of three phase transformers

S3	EE 207	COMPUTER PROGRAMMING	1	Understand the fundamentals of C language and be able to analyze and illustrate problems with flow chart and algorithm.
			2	To develop programs using iterative statements for analytical problems
			3	Acquire knowledge regarding arrays and strings
			4	Ability to use function for the abstraction of real time problems.
			5	Ability to develop structured programming to solve mathematical and analytical problems.
			6	Gain knowledge for efficient file management in real time problems and design programs using python
S3	EE 203	ANALOG ELECTRONIC CIRCUITS	1	An understanding of the basic concepts of analog electronic circuits which are the building blocks of various electronic systems and also the biasing of transistors and their design
			2	Ability to understand methods of FET biasing and hence to design amplifier circuits.
			3	Ability to analyze various amplifier circuits and their design
			4	Capability to design and analyse oscillator circuits for implementation and testing in forthcoming Electronic Circuits Lab.
			5	Ability to analyze and design various circuits using OPAMPS.
			6	Capability to design and analyze multivibrator circuits, oscillators and waveform generation circuits using Op-amps so as to aid their implementation and testing in Electronic Circuits Lab.
S3	HS 210	LIFE SKILLS	1	The course enable the students to communicate effectively and

				to face interview and group discussion.
			2	The student will be able to make effective presentations and report.
			3	The student will be able to think critically on a particular problem and solving them.
			4	Ability to work in group and teams.
			5	Capability of handling engineering ethics and human value
			6	Become an effective leader.
S3	EE 231	ELECTRONIC CIRCUITS LAB	1	An understanding of the basic concepts of analog electronic circuits and hence to design rectifier circuits, clipping and clamping circuits
			2	Ability to understand and design amplifier and oscillator circuits.
			3	Ability to design and analyze various voltage regulators and to simulate electronic circuits using PSPICE
			4	Gain the ability to design and implement various wave shaping linear integrated circuits such as inverting amplifier, integrator and differentiator circuits.
			5	Ability to analyze and design various circuits using Op-amps.
			6	Gain the ability to design and implement electronic circuits such as multivibrators using IC 555 and Schmitt trigger using IC 741
S3	EE233	PROGRAMMING LAB	1	Understand the fundamentals of C language and be able to analyse and debug the common errors associated while reading and writing data.
			2	Developed programs using iterative statements for analytical problems
			3	Acquire knowledge regarding arrays and strings and capability

				to write programs to solve complex mathematical and user friendly programs.
			4	Ability to create function based for the abstraction of real time problems.
			5	Ability to develop structured programs using arrays, structures and pointers to solve problems.
			6	Gain knowledge for efficient file management in real time problems and designed programs using python
S4	MA 202	PROBABILITY DISTRIBUTIONS, TRANSFORMS AND NUMERICAL METHODS	1	To have a concept of discrete probability density functions and probability distributions like binomial distribution and Poisson distribution
			2	To have a concept of continuous probability density functions and probability distributions like Normal, Gamma and Exponential distribution
			3	To use Fourier integrals and Fourier transforms in solving various engineering problems
			4	To understand the concept of Laplace and inverse Laplace transforms and apply them to solve ordinary differential equations
			5	To use the iteration and interpolation methods to solve engineering problems
			6	To use the concept of numerical methods and their applications to solve linear systems and first order ODE's
S4	EE 202	SYNCHRONOUS AND INDUCTION MACHINES	1	Ability to identify alternator types, and appreciate their performance.
			2	Ability to determine the voltage regulation and analyze the performance of alternators.
			3	Ability to describe the principle of operation of synchronous

				motor and different applications.
			4	Capable of describing the principle of operation of 3-phase induction motors and select appropriate motor types for different applications.
			5	Ability to analyze the performance of 3-phase induction motors.
			6	Capable of describing the operation and application of induction generator and 1 - phase induction motors.
S4	EE 204	DIGITAL ELECTRONICS AND LOGIC DESIGN	1	Ability to perform arithmetic operation with binary numbers and to understand the relevance of various codes such as ASCII, Excess-3, gray code etc. in digital system.
			2	Ability to simplify and design logic circuits using Boolean algebra and Karnaugh map.
			3	Ability to apply combinational logic to practical applications.
			4	Ability to design and realize various types of registers and counters.
			5	Ability to apply the counter design procedure and hence develop systems in various logical applications.
			6	Ability to design and implement hardware logic of analog to digital and digital to analog converters. Also gained the capability to design the logics using hardware description language.
S4	EE 206	MATERIAL SCIENCE	1	Able to understand the different types of conductors, semiconductors and dielectrics, their properties and their application in electrical engineering.
			2	Able to identify and select a proper insulating material for various applications in electrical appliances.

			3	Able to describe the basic mechanism of dielectric breakdown in solids ,liquids and gases.
			4	Able to classify magnetic materials and describe different laws related to them
			5	Able to understand concept and applications of superconducting materials and solar energy materials
			6	Able to describe various modern techniques for material studies
S4	EE 208	MEASURMENTS AND INSTRUMENTATION	1	Obtain sound knowledge in measurement and measuring instruments
			2	Gain knowledge in measurement of resistances, power and energy
			3	Ability to understand the working principle of instrument transformers and measurement of HV and HC
			4	Obtain sound knowledge in magnetic measurements and rotational speed measurement
			5	Ability to understand the working of potentiometers and AC bridges
			6	Obtain knowledge in transducers and data acquisition system
S4	HS 200	BUSINESS ECONOMICS	1	Make investment decisions based on capital budgeting methods in alignment microeconomic and macroeconomic theories.
			2	Able to analyse the profitability of the firm, economy of operation, determination of price under various market situations with good grasp on the effect of trade cycles in business
			3	Gain knowledge on monetary theory, measures by RBI in controlling interest rate and emerging concepts like bitcoin.

			4	Gain knowledge of elementary accounting concepts used for preparing balance sheet and its interpretation.
			5	Identify the need for various credit control methods and the significance of national income concepts.
			6	Understand the functioning of the Indian capital and money markets and the tax system.
S4	EE 232	ELECTRICAL MACHINES LAB 1	1	Ability to determine the various characteristics of DC shunt and compound motor like OCC, efficiency, armature reaction and load test and interpret the results.
			2	Capable of Conducting brake and field test on series motor and determine its efficiency.
			3	Conduct OCC and load test on DC shunt Generators and comment on its performance parameters.
			4	Predetermination of efficiency, regulation and losses in single and three phase transformers and determination of polarity.
			5	Capability to successfully operate transformers in parallel and evaluate their load sharing.
			6	Ability to determine efficiency of three phase to two phase conversion by Scott connection
S4	EE 234	CIRCUITS AND MEASUREMENTS LAB	1	Ability to analyze and verify the electrical network theorems.
			2	An understanding of basic concept of power measurement and magnetic measurement
			3	Ability to calibrate electrical and electronic measuring instruments.
			4	Graduates will be capable for the selection of appropriate measuring instruments and measuring techniques of electric and electronic parameters.
			5	Understand the measuring methods for different circuit

				elements according to their ranges
			6	Ability to use different transducers for measurement of physical variables

S5	EE 301	POWER GENERATION TRANSMISSION AND PROTECTION	1	Graduates will acquire knowledge about the various energy resources and economics of generation.
			2	Graduates will come to know about the various transmission line parameters and how the transmission lines are modelled.
			3	Concepts of overhead and underground transmission systems are imparted to students
			4	Ability to understand HVDC and AC transmission systems.
			5	Various power system protection devices like circuit breakers and relays are made aware of to the graduates.
			6	Protection of machines and transmission lines are made clear to graduates.
S5	EE 303	LINEAR CONTROL SYSTEM	1	Capable to demonstrate an understanding of the fundamentals of feedback control systems.
			2	Able to determine the time responses of first and second-order systems to various step inputs
			3	Able to determine the absolute stability of a closed-loop control system
			4	Able to apply root-locus technique to analyze and design control systems.
			5	Capability in analyzing the system in frequency domain
			6	Capability in analyzing the system in frequency domain
S5	EE 305	POWER ELECTRONICS	1	Able to describe the characteristics of power semiconductor devices and identify suitable switch choices for a given application.
			2	Able to design and analyze single phase controlled rectifiers and its control circuit according to the specifications.
			3	Able to design and analyze three phase controlled rectifiers and dual converters.
			4	Able to design and analyze single phase and three phase inverters with reduced harmonics for practical applications

			5	Acquire knowledge in voltage control in inveters especially about AC voltage controllers.
			6	Able to analyze basic chopper circuits
S5	EE 307	SIGNALS AND SYSTEMS	1	Ability to represent various signals and systems
			2	Ability analyse the continuous time system with Laplace transform
			3	Ability to represent and analyse signals using Fourier representation
			4	Ability to acquire knowledge in sampling and sample reconstruction of signals
			5	Ability to analyse the discrete time systems using Z transform analyse DT systems with DFS
			6	Acquire basic knowledge in non-linear systems
S5	EE 309	MICROPROCESSOR AND EMBEDDED SYSTEM	1	The course enables the students to develop strong basics in 8085 microprocessor and enable them to write assembly language programs in 8085.
			2	The student will be able to apply concept of stack, subroutines in 8085 programming, and will learn the timing and control signals, the various machine and instruction cycles so that they will be able to draw the timing diagram for any instruction of 8085
			3	The student will understand the concept of memory interfacing, the address decoding and interrupt structure of 8085 and will be familiarised with the PPI 8255 and interfacing of I/O devices with 8085.
			4	The student will be introduced with the concept of Embedded Systems, embedded product development and the tools used.
			5	The student will gain basic knowledge in 8051 architecture, addressing modes and instruction set.
			6	Students will be introduced with 8051 C programming so that they can write simple programs for 8051 and they can design real time systems by interfacing IO devices to 8051.
S5	EE 369	HIGH VOLTAGE ENGINEERING EL-1	1	Ability to analyse various types of High Voltage DC generators

			2	Capacity to analyse various types of High Voltage AC generators
			3	Ability to analyse various types of High Voltage Impulse generators
			4	Expertise in various measurement systems for High Voltage Signals
			5	Capability of understanding the various techniques in High Voltage Testing
			6	Expertise in setting up High Voltage Laboratories
S5	EE 367	NEW AND RENEWABLE SOURCES OF ENERGY EL-1	1	Have a basic knowledge about non-conventional energy resources
			2	Understand various types of solar thermal systems and its applications
			3	Ability to understand about the theory and applications of solar photovoltaic systems
			4	Awareness about the basic theory and applications of tidal energy and ocean thermal energy
			5	Have a basic knowledge about Wind Energy Conversion Systems
			6	Insight about the basic theory and applications of biomass power plants and fuel cells
S5	EE 331	DIGITAL CIRCUITS AND EMBEDDED SYSTEMS LAB	1	Gain the ability to design, set-up and analyze combinational digital circuits
			2	Students will be expose to the various digital ICs.
			3	Ability to design and set-up sequential digital circuits
			4	Students will be introduced to the fundamentals of microprocessor 8085 programming
			5	Gain the knowledge to use simulation software such as Keil, Proteus to gain experience in coding ,assembling and interfacing peripherals with microcontroller.
			6	Students will be able to use software FlashMagic and learn to download hexcodes to microcontroller kit for interfacing motors, LEDs etc.
S5	EE 333	ELECTRICAL MACHINES LAB II	1	Capability to use starters and improving the starting torque of induction motor using external rotor resistance.
			2	Capability to predetermine the performance parameters of induction motors

			3	Ability to analyze the performance of induction generator and single phase induction motor.
			4	Graduates will acquire the ability to find out the regulation of alternators by direct loading, emf/mmf method, potier method.
			5	Ability to synchronize and analyze the performance characteristics of alternator
			6	Ability to determine the voltage regulation of the given salient pole alternator
S5	EE 341	DESIGN PROJECT	1	Able to contribute as an individual or in a team in the development of technical projects.
			2	Able to prepare a project plan and to improve their communication skills by the presentation of projects
			3	Capable of think innovatively on the development of products, processes or technologies in the engineering fields within realistic constraints
			4	Able to analyse the problem requirements and formulate workable design solutions
			5	Able to develop practical knowledge within a chosen area of technology for project development, prototyping and product validation.
			6	Able to report their technical ideas and possess a sense of responsibility to their profession.
S6	EE 302	ELECTROMAGNETICS	1	Ability to Analyze fields and potentials due to static charges
			2	Capable of Explaining the physical meaning of the differential equations for electrostatic and magnetic fields
			3	Understand how materials are affected by electric and magnetic fields
			4	. Understand the relation between the fields under time varying situations
			5	Understand the principles of propagation of uniform plane waves
			6	Be aware of electromagnetic interference and compatibility
S6	EE 304	ADVANCED CONTROL THEORY	1	Ability to design a complex system as a logical step in frequency domain
			2	Knowledge in classical techniques for the design of compensator in time domain

			3	Knowledge in classical techniques for modelling of compensators in canonical forms
			4	Ability to design state variable feedback controller and observer using pole placement technique, and to conduct stability analysis in continuous and sampled data system
			5	Obtain sound knowledge about characteristics of nonlinearities and ability to analyse non-linear systems by describing function method.
			6	Obtain sound knowledge about characteristics of nonlinearities and ability to analyse non-linear systems by describing function method.
S6	EE 306	POWER SYSTEM ANALYSIS	1	Ability to represent the power system components using per unit quantity and have sound knowledge in symmetrical component representation.
			2	Ability to carry out symmetrical and unsymmetrical fault analysis
			3	Students will be able to carry out load flow studies under normal and abnormal conditions
			4	Sound knowledge on load frequency control and voltage control
			5	Ability to handle economic dispatch & unit commitment problems.
			6	Ability to use equal area criteria technique for stability studies and to analyse transient stability problems using standard algorithms.
S6	EE 308	ELECTRIC DRIVES	1	Acquire fundamental knowledge in dynamics and speed control techniques in electrical machines
			2	Ability to understand speed control methods in DC Motors using solid state devices
			3	Ability to understand chopper controlled DC drives and basics of cycloconverters used in electric drives
			4	Ability to understand speed control techniques in Induction motors
			5	Understand the use of inverters in induction motors and acquire knowledge on space vectors

			6	Ability to understand speed control techniques used in synchronous motors
S6	HS 300	PRINCIPLES OF MANAGEMENT	1	A student who has undergone this course would be able to manage people and organisations
			2	A student who has undergone this course would be able to critically analyse and evaluate management theories and practices
			3	A student who has undergone this course would be able to plan and make decisions for organisations
			4	A student who has undergone this course would be able to do staffing and related HRD functions
S6	EE 368	SOFT COMPUTING EL-II	1	Familiarize with Artificial intelligence and evolution of soft computing
			2	Get knowledge about neural networks,architecture and fuzzy logics
			3	Familiarize the concept of neuro fuzzy modeling and fuzzy inference systems
			4	Understand the phenomena of data clustering algorithms and rule base structure identification
			5	Get knowledge about machine learning using neural nets.
			6	Understand the concept of support vector machine for learning and application of machine learning approach to knowledge acquisition
S6	EE 372	BIOMEDICAL INSTRUEMNTATION E-II	1	Get the knowledge about human physiology and understand different sources of bio-electric potentials.
			2	Familarize different types of biopotential electrodes and working of ECG machine.
			3	Undrestand different methods of measurement of blood pressure and heart sounds
			4	Familarize with different pacemakers, EMG, EEG and respiratory parameter measurements
			5	Ability to understand working of different types of ventilators, X-ray machine and ultrasonic imaging system.
			6	Understand different instruments for clinical laboratory, electrical safety, method of accident prevention and get the knowledge about tele-medicine.

S6	EE 332	SYSTEMS AND CONTROL LAB	1	Ability to design and determine the time and frequency domain parameters by combining theoretical and applied analysis.
			2	Ability to mathematically model real-time systems and implement it in MATLAB and SIMULINK.
			3	Capability to develop model of servo motors and characterize synchros.
			4	Familiarization of PLC controllers for implementing real time processes.
			5	Capability in designing and testing of various types of controllers.
			6	Capability in designing and testing of various types of compensators.
S6	EE 334	POWER ELECTRONICS AND DRIVES LAB	1	Have an ability to select and design suitable firing circuits
			2	Students must be able to correlate theoretical and practical analysis of AC-DC, DC-AC and DC-DC converters
			3	Have a better understanding on the design and analysis of AC Voltage controllers
			4	Have an ability to select a suitable power electronics component for a particular application
			5	Have an ability to correlate theoretical and practical analysis of converter fed to AC&DC drives
			6	Become proficient with computer skills (e.g., MATLAB) for the analysis and design of power electronic circuits
S6	EE 352	COMPREHENSIVE EXAM	1	Students will gain comprehensive knowledge in core subjects of Electrical and Electronics Engineering.
			2	Students will be able to integrate knowledge and to analyse, evaluate and manage technical problems.
			3	The students will be confident in discussing the fundamental aspects of any engineering problem/situation and give answers in dealing with them.
			4	Students will develop self-confidence and communication skills.
			5	Students will develop competency to perform well in job interviews and tests.

			6	Students will develop professional competency and the ability for time and stress management.
S7	EE 401	ELECTRONIC COMMUNICATION	1	An understanding of basic concepts of amplitude modulation and frequency modulation, need for modulation in transferring signal through either wireless or wired communication system.
			2	Be able to apply analog modulation techniques and receiver fundamentals in analog communication.
			3	Ability to understand principles of TV and RADAR system.
			4	Capability to understand the concepts of digital communication, different sampling process and applications of data communication.
			5	Ability to understand principles of satellite communication and concepts of different multiple access techniques.
			6	Ability to understand basic concepts of cellular telephone.
S7	EE 403	DISTRIBUTED GENERATION AND SMART GRIDS	1	Ability to integrate distributed energy resources to grid
			2	Ability to explain the protection coordination schemes and control of microgrid
			3	Ability to describe the coordinated operation of smart grid and the use of smart meters
			4	Capable of describing demand side management in smart grid
			5	Ability to analyze the performance of smart grid and smart substation
			6	Capable of describing power quality aspects with smart grid
S7	EE 405	ELECTRICAL SYSTEM DESIGN	1	Understand about the acts and rules regulating the design of electricalsystem in India
			2	Developed knowledge in design of low and medium voltage electrical installation
			3	Gain knowledge in the designing of distribution transfomer substations
			4	Acquire knowledge in earthing design for substation
			5	Understand about the lighting calculations and external lighting

			6	Developed knowledge in energy conservation technique in lighting and solar PV systems
S7	EE 407	DIGITAL SIGNAL PROCESSING	1	Students will be able to analyse DT systems with DFT.
			2	Students can understand the structure of FIR and IIR systems.
			3	Students can gain the ability to design IIR filters.
			4	Students can gain the ability to design FIR filters.
			5	Students can acquire knowledge of finite word length effects in signal processing.
			6	Students can gain knowledge of Digital Signal Processors and their applications
S7	EE 409	ELECTRICAL MACHINE DESIGN	1	Get knowledge about the general design considerations while designing Electrical machines
			2	Capable of designing the overall dimensions of transformers
			3	Graduates will be able to design DC Electrical machines for given specifications.
			4	Ability to design synchronous machines for given specifications.
			5	Capable of designing the main dimensions of Induction machines.
			6	Get knowledge about computer aided design and finite element method
S7	EE 465	POWER QUALITY-EL 3	1	Students will be able to identify the Power Quality Problems
			2	Students can understand the IEEE guide lines standards and practices.
			3	Students can gain knowledge of harmonic analysis.
			4	Students can gain awareness of Power Quality Monitoring devices.
			5	Students can acquire knowledge about Harmonic Elimination.
			6	Students can gain knowledge of Power Quality Management in Smart Grid.
S7	EE 469	ELECTRIC AND HYBRID VEHICLES-EL 3	1	Should have a basic nowledge on electric, hybrid electricvehicles, conventional vehicles, basics of vehicle performnace and characteristics
			2	Will be aware of the basic concepts of hybrid and electric traction, topologies, power flow control

			3	Should have a general awareness on the different components of electric propulsion unit along with different configuration
			4	Will have an awareness of the different types of energy storage for electric and hybrid electric vehicles including fuel cells and hybrid energy storage
			5	Should have an idea of proper sizing of drive train, propulsion motor, power electronics and energy storage technology
			6	Will be aware of the different energy management strategies, communication protocols like CAN, supporting subsystems etc.
S7	EE 451	SEMINAR AND PROJECT PRELIMINARY	1	The students will be able to identify and analyse a current topic of professional interest and present it before an audience.
			2	Students will be confident in answering to the questions on the topic of interest.
			3	Ability to prepare a technical report on the topic of interest.
			4	The students will be able to identify and analyse an engineering problem.
			5	The students will be able to propose a process and work plan to solve an engineering problem
			6	The students will be capable to conduct modeling/simulation of an erngineering problem before implementation.
S7	EE 431	POWER SYSTEM LAB	1	Ability to analyze different power system components using softwares like MATLAB, MiPower etc
			2	Ability to detremine the steady state operating characteristics of a power system using load flow anaysis based on different numerical techniques(N-R method, G-S method, FDLF)
			3	Ability to ensure that existing and new equipment ratings are adequate to withstand short circuit at different regions of the power system using short circuit analysis
			4	Analyse Power System Stability by Equal Area Criterion for any power system network
			5	Capable o analyzing the characteristics of various types of relays

			6	Ability to validate the performance of Power System devices by appropriate tests
S7	EE 463	COMPUTER AIDED POWER SYSTEM ANALYSIS-EL 3	1	Students will be able to model any power system for analysis.
			2	Ability to develop bus impedance matrix and bus admittance matrix.
			3	Student will be able to carry out load flow analysis in any power system network.
			4	Student will be able to understand the concepts of power flow.
			5	Student will learn to perform fault studies for a power system network.
			6	Able to carry out contingency analysis and to perform state estimation on any power system.
S8	EE 402	SPECIAL ELECTRICAL MACHINES	1	An ability to understand various types of Servomotors and its operating characteristics
			2	Capable of understanding the concept of switched stepper motor, its operating characteristics and excitation modes
			3	To obtain sound knowledge in the constructional features and characteristics of AC series motor, Hysteresis motor and Universal motor
			4	An ability to understand the concept of reluctance motors and its applications
			5	To understand the operating principle of permanent magnet brushless DC motors
			6	An ability to understand the operating principle of linear motors and its various types
S8	EE 404	INDUSTRIAL INSTRUMENTATION AND AUTOMATION	1	Get the knowledge about process control and selection of transducer for various physical quantities.
			2	Undestand different applications of transducers and an introduction to nano instrumentation.
			3	Familarize with design of various signal conditioning system for transducers.
			4	Get an idea about MEMS, its applications and virtual instrumentation.
			5	Familarize with automation system and different devices used in automation.

			6	Ability to understand the programming realization of PLC & basic concepts of SCADA, DCS & CNC.
S8	EE474	ENERGY MANAGEMENT AND AUDITING EL 4	1	Able to understand the concept of energy management and energy management opportunities
			2	Able to choose the apt method of electrical energy reduction
			3	Able to analyse a mechanical system and recommend a suitable method for energy reduction
			4	Able to describe various energy saving opportunities in various systems
			5	Able to describe energy auditing
			6	Able to analyse a new system financially by using different methods
S8	EE482	ENERGY MANAGEMENT AND AUDITING(GLOBAL)	1	Able to understand the concept of energy management and its oppurtunities
			2	Able to choose the apt method of electrical energy reduction
			3	Able to analyse a mechanical system and recomment a suitable method for energy reduction
			4	Able to describe various energy saving oppurtunities
			5	Able to describe energy auditing
			6	Able to analyse a new system financially
S8	EE 462	DESIGN OF DIGITAL CONTROL SYSTEMS EL-4	1	Get knowledge about the concept of digital control systems
			2	Capable of understanding different types of configurations used in design of digital control systems and steady state performances.
			3	Graduates will be able to design digital PID controller for given system based on frequency response method
			4	Ability to design different types of digital controllers using different methods like root locus,Ragazzini and dead beat response.
			5	Capable of analyzing discrete time system using state space methods.
			6	Ability to design Digital state feedback controller and also study the stability of digital control systems.
S8	EE 494	INSTRUMENTATION SYSTEM (GLOBAL)	1	Fundamental concepts of measuring systems are obtained

			2	Motion, Force and Torque measurementsare familiarized
			3	Shaft power, Pressure and Sound measurements are familiarized
			4	Apply fundamental concepts in testing pressure and sound system
			5	Familiarized with temperature measurement systems
			6	Apply fundamental concepts in working of various instruments
S8	EE 472	INTERNET OF THINGS EL-4	1	Vision and introduction to IoT
			2	Expertise in IoT data and communication protocols and management
			3	Knowledeg in data storage and knowledge management in IoT Technology
			4	Knowledge on sensor technologies
			5	Familiarization with prototyping and design softwares for IoT
			6	Obtain better understanding about Real World IoT Design Constraints, Industrial Automation and Commercial Building Automation in IoT.
S8	EE 492	PROJECT	1	Students will acquire a sound technical knowledge of their selected project topic.
			2	Students will be able to identify a technical problem and formulate it.
			3	Students will be able to think innovatively on the development of components, products, process or technologies in engineering field
			4	To make the students capable of applying the knowledge gained in solving real life engineering problems.
			5	Students will be able to prepare a project report.
			6	Students will be able to demonstrate the knowledge, skills and attitudes of a professional engineer.