MEENAKSHI COLLEGE OF ENGINEERING

NO-12, Vembuli Amman Kovil Street, West K.K.Nagar ,
Chennai – 600078.

ELECTRONICS AND INSTRUMENTATION ENGINEERING
REGULATION -2021

COURSE OUTCOMES

SEMESTER I

PROFESSIONAL ENGLISH – I (HS3151)

CO1	Utilize suitable language in professional settings.
CO2	Develop a strong understanding of essential grammatical structures and effectively utilize them in diverse contexts.
CO3	Interact with technical texts to uncover both their apparent and hidden significances, comprehensively exploring not just their technical complexities but also their nuanced interpretations.
CO4	Examine and interpret data presented in tables, charts, and other visual formats.
CO5	Compose definitions, descriptions, narratives, and essays covering a wide range of topics

MATRICES AND CALCULUS (MA3151)

CO1	Use the matrix algebra methods for solving practical problems
CO2	Apply differential calculus tools in solving various application problems
CO3	Able to use differential calculus ideas on several variable functions
CO4	Apply different methods of integration in solving practical problems
CO5	Apply multiple integral ideas in solving areas, volumes and other practical problems

ENGINEERING PHYSICS (PH3151)

CO1	Understand the importance of mechanics
CO2	Express their knowledge in electromagnetic waves

CO3	Demonstrate a strong foundational knowledge in oscillations, optics and lasers
CO4	Understand the importance of quantum physics
CO5	Comprehend and apply quantum mechanical principles towards the formation of energy bands

ENGINEERING CHEMISTRY (CY3151)

CO1	To infer the quality of water from quality parameter data and propose suitable treatment methodologies to treat water.
CO2	To identify and apply basic concepts of nanoscience and nanotechnology in designing the synthesis of nanomaterials for engineering and technology applications.
CO3	To apply the knowledge of phase rule and composites for material selection requirements.
CO4	To recommend suitable fuels for engineering processes and applications.
CO5	To recognize different forms of energy resources and apply them for suitable applications in energy sectors.

PROBLEM SOLVING AND PYTHON PROGRAMMING (GE3151)

CO1	Develop algorithmic solutions to simple computational problems
CO2	Develop and execute simple Python programs
CO3	Write simple Python programs using conditionals and loops for solving problems
CO4	Decompose a Python program into functions
CO5	Represent compound data using Python lists, tuples, dictionaries etc

PROBLEM SOLVING AND PYTHON PROGRAMMING LABORATORY (GE3171)

CO1	Develop algorithmic solutions to simple computational problems
CO2	Develop and execute simple Python programs
CO3	Implement programs in Python using conditionals and loops for solving problems
CO4	Deploy functions to decompose a Python program.
CO5	Process compound data using Python data structures
CO6	Utilize Python packages in developing software applications

HERITAGE TAMILS (GE3152)

CO1	Discuss the Tamil Language and Literature
CO2	Discuss about the paintings modern Art Sculpture
CO3	Illustrate the folk martial arts
CO4	Understand the Sangam age through Tamil Literature
CO5	Discuss the contribution of Tamil Literature in Indian Civilization

PHYSICS AND CHEMISTRY LABORATORY (BS3171)

PHYSICS LABORATORY	
CO1	Understand the functioning of various physics laboratory equipment.
CO2	Use graphical models to analyze laboratory data.
CO3	Use mathematical models as a medium for quantitative reasoning and describing physical reality.
CO4	Access, process and analyze scientific information.
CO5	Solve problems individually and collaboratively
CHEMISTRY LABORATORY	
CO1	To analyse the quality of water samples with respect to their acidity, alkalinity, hardness and DO.
CO2	To determine the amount of metal ions through volumetric and spectroscopic techniques
CO3	To analyse and determine the composition of alloys.
CO4	To learn simple method of synthesis of nanoparticles
CO5	To quantitatively analyse the impurities in solution by electroanalytical techniques

ENGLISH LABORATORY (GE3172)

CO1	Engage in active listening to effectively absorb and comprehend a broad spectrum of academic
CO2	Listen attentively and understand various perspectives presented in a discussion.
CO3	Communicate fluently and accurately in both formal and informal contexts.

CO4	Describe products and processes clearly and accurately, elucidating their uses and purposes
CO5	Express opinions adeptly in both formal and informal discussions.

SEMESTER II

PROFESSIONAL ENGLISH – II (HS3251)

CO1	Compare and contrast products and ideas in technical texts
CO2	Identify and report cause and effects in events, industrial processes through technical texts
CO3	Analyse problems in order to arrive at feasible solutions and communicate them in the written
CO4	Present their ideas and opinions in a planned and logical manner
CO5	Draft effective resumes in the context of job search

STATISTICS AND NUMERICAL METHODS (MA3251)

CO1	Apply the concept of testing of hypothesis for small and large samples in real life problems
CO2	Apply the basic concepts of classifications of design of experiments in the field of agriculture
CO3	Appreciate the numerical techniques of interpolation in various intervals and apply the numerical
CO4	Understand the knowledge of various techniques and methods for solving first and second order
CO5	Solve the partial and ordinary differential equations with initial and boundary conditions by using

PHYSICS FOR INSTRUMENTATION ENGINEERING (PH3255)

CO1	know basics of electricity and magnetism and the influence of vectors in EMT.
CO2	gain knowledge on the electrical and magnetic properties of materials and their applications
CO3	understand clearly of semiconductor physics and functioning of semiconductor devices
CO4	understand the optical properties of materials and working principles of various optical devices
CO5	appreciate the importance of nanotechnology and nanodevices.

BASIC CIVIL AND MECHANICAL ENGINEERING (BE3255)

CO1	Understanding profession of Civil and Mechanical engineering.
CO2	Summarize the planning of building, infrastructure and working of Machineries.
CO3	Apply the knowledge gained in respective discipline
CO4	Illustrate the ideas of Civil and Mechanical Engineering applications.
CO5	Appraise the material, Structures, machines and energy.

ENGINEERING GRAPHICS (GE3251)

CO1	Use BIS conventions and specifications for engineering drawing.
CO2	Construct the conic curves, involutes and cycloid
CO3	Solve practical problems involving projection of lines.
CO4	Draw the orthographic, isometric and perspective projections of simple solids.
CO5	Draw the development of simple solids.

ELECTRIC CIRCUIT ANALYSIS (EE3251)

CO1	Explain circuit's behavior using circuit laws
CO2	Apply mesh analysis/ nodal analysis / network theorems to determine behavior of the given DC and AC circuit
CO3	Compute the transient response of first order and second order systems to step and sinusoidal input
CO4	Compute power, line/ phase voltage and currents of the given three phase circuit
CO5	Explain the frequency response of series and parallel RLC circuits
	Explain the behavior of magnetically coupled circuits.

TAMILS AND TECHNOLOGY (GE3252)

CO1	Learn about weaving and ceramic methods in Sangam period
CO2	Experience about art and sculpture in Sangam period
CO3	Make and use of metals in Sangam period
CO4	Apply the knowledge on water management in Sangam Period
CO5	Implementing the digitization in Tamil

C117 – ENGINEERING PRACTICES LABORATORY (GE3271)

CO1	Draw pipe line plan; lay and connect various pipe fittings used in common household. plumbing work; Saw; plan; make joints in wood materials used in common household wood work.
CO2	Wire various electrical joints in common household electrical wire work.
CO3	Weld various joints in steel plates using arc welding work; Machine various simple processes like turning, drilling, tapping in parts; Assemble simple mechanical assembly of common household equipments; Make a tray out of metal sheet using sheet metal work
CO4	Solder and test simple electronic circuits; Assemble and test simple electronic components on PCB.

ELECTRIC CIRCUITS LABORATORY (EE3271)

CO1	Use simulation and experimental methods to verify the fundamental electrical laws for the given DC/AC circuit
CO2	Use simulation and experimental methods to verify the various electrical theorems (Superposition, Thevenin , Norton and maximum power transfer) for the given DC/AC circuit
CO3	Analyze transient behavior of the given RL/RC/RLC circuit using simulation and experimental methods
CO4	Analyze frequency response of the given series and parallel RLC circuit using simulation and experimentation methods
CO5	Analyze the performance of the given three-phase circuit using simulation and experimental methods

COMMUNICATION LABORATORY (GE3272)

CO1	Speak effectively in group discussions held in a formal/semi formal contexts.
CO2	Discuss, analyse and present concepts and problems from various perspectives to arrive at suitable
CO3	Write emails, letters and effective job applications.
CO4	Write critical reports to convey data and information with clarity and precision
CO5	Give appropriate instructions and recommendations for safe execution of tasks

SEMESTER III

TRANSFORMS AND PARTIAL DIFFERENTIAL EQUATIONS (MA3351)

CO1	Understand how to solve the given standard partial differential equations
CO2	Solve differential equations using Fourier series analysis which plays a vital role in engineering applications.
CO3	Appreciate the physical significance of Fourier series techniques in solving one and two dimensional heat flow problems and one dimensional wave equations.
CO4	Understand the mathematical principles on transforms and partial differential equations would provide them the ability to formulate and solve some of the physical problems of engineering.
CO5	Use the effective mathematical tools for the solutions of partial differential equations by using Z transform techniques for discrete time systems.

ANALOG ELECTRONICS (EI3351)

CO1	Explain the operation and characteristics of PN junction diode, Zener diode, LED and Laser diode.
CO2	Formulate the expression for voltage gain, current gain, input resistance and output resistance of a BJT CE and CC amplifier using h-parameter model.
CO3	Formulate the expression for voltage gain, input resistance and output resistance of FET amplifier under CS, CG and Source follower
CO4	Explain the operation of cascade amplifier, differential amplifier, single tuned amplifier and power amplifiers.
CO5	Analyze the operation of negative feedback amplifiers and to design RC and LC tuned Oscillators for a given frequency range.

DIGITAL SYSTEM DESIGN AND APPLICATIONS (EI3352)

CO1	Convert various types of codes and number system & gate level implementation of Boolean functions.
CO2	Apply K –Map for simplification and implementation of combinational logic circuit
CO3	Design the synchronous Sequential logic circuits namely counters, registers etc,
CO4	Analyze the asynchronous sequential circuits and explain the operation of memories and digital logic families
CO5	Design the VHDL coding for combinational logic and Sequential circuits.

TRANDUCERS ENGINEERING (EI3353)

CO1	Understand the working principles of various types of transducers
CO2	Gain knowledge on the application areas of different sensors
CO3	Select the right sensor/transducer for a given application
CO4	Determine the static and dynamic characteristics of transducers using software packages
CO5	Design simple signal conditioning circuits for the R, L and C type of sensors
CO6	Summarize the advanced sensor technologies and sensors for specific applications

LINEAR INTEGRATED CIRCUITS AND APPLICATIONS (EI3354)

CO1	Explain the IC fabrication process and discuss the fabrication of active and passive components.
CO2	Compute the gain and output voltage of the given Op-Amp circuits.
CO3	Explain the internal functional blocks and applications of ICs 555, 566, 565, and AD633 .
CO4	Explain the operation of voltage regulator ICs namely LM78XX, LM79XX, LM317 and LM723.
CO5	Explain the operation and design of various signal conditioning circuits.

C PROGRAMMING STRUCTURES (CS3353)

CO1	Develop C programs for any real world/technical application.
CO2	Apply advanced features of C in solving problems.
CO3	Write functions to implement linear and non–linear data structure operations.
CO4	Suggest and use appropriate linear/non–linear data structure operations for solving a given problem
CO5	Appropriately use sort and search algorithms for a given application.
CO6	Apply appropriate hash functions that result in a collision free scenario for data storage and retrieval

SEMICONDCUTOR DEVICES CIRCUITS LABORTAORY (EI3361)

CO1	Determine the Breakdown voltage, forward and reverse resistance of PN junction iode and Zener diode and calculate the ripple factor of rectifier circuits with filter.
CO2	Calculate the hybrid parameters of BJT under CE and CB configuration
CO3	Obtain the frequency response of CE amplifier and CS amplifier
CO4	Obtain the UJT and JFET parameters from the characteristics and also to calculate the gain of differential amplifier using JFET.
CO5	Design the RC and LC tuned oscillators for a given oscillating frequency.
CO6	Analyze the input and output performance of the given diode based circuit using simulation tools.

C PROGRAMMING & DATA SRTRCURES LABORTAORY (CS3362)

CO1	Use different constructs of C and develop applications
CO2	Write functions to implement linear and non-linear data structure operations

CO3	Suggest and use the appropriate linear / non-linear data structure operations for a given problem
CO4	Apply appropriate hash functions that result in a collision free scenario for data storage and Retrieval
CO5	Implement Sorting and searching algorithms for a given application

PROFESSIONAL DEVELOPMENT (GE3361)

CO1	Use MS Word to create quality documents, by structuring and organizing content for their day to day technical and academic requirements
CO2	Use MS EXCEL to perform data operations and analytics, record, retrieve data as per requirements and visualize data for ease of understanding
CO3	Use MS PowerPoint to create high quality academic presentations by including common tables, charts, graphs, interlinking other elements, and using media objects.

SEMESTER IV

INDUSTRIAL INSTRUMENTATION (EI3451)

CO1	Understand Principles and working of Viscosity, Humidity, Moisture, temperature ,
CO2	Calibrate temperature, flow , level and Pressure measuring devices
CO3	Apply measurement of Viscosity, Humidity, Moisture, temperature , pressure, flow and level in Industrial Applications.
CO4	Select and install Industrial instruments for various applications
CO5	Understand various Electrical type Industrial Instruments

AUTOMATIC CONTROL SYSTEMS (IC3451)

CO1	Represent and develop systems in different forms using the knowledge gained
CO2	Analyses the system in time and frequency domain
CO3	Discuss the effect of PID controller in closed loop systems

CO4	Construct compensator for the linear systems in frequency domain.
CO5	Analyses the stability of physical systems
CO6	Acquire and analyses knowledge in State variable model for MIMO systems

ENVIRONMENTAL SCIENCES AND SUSTAINABILITY (GE3451)

CO1	To recognize and understand the functions of environment, ecosystems and biodiversity and
CO2	To identify the causes, effects of environmental pollution and natural disasters and contribute to the preventive measures in the society.
CO3	To identify and apply the understanding of renewable and non-renewable resources and contribute to the sustainable measures to preserve them for future generations.
CO4	To recognize the different goals of sustainable development and apply them for suitable
CO5	To demonstrate the knowledge of sustainability practices and identify green materials, energy cycles and the role of sustainable urbanization.
CO6	To recognize and understand the functions of environment, ecosystems and biodiversity and their conservation.

EMBEDDED SYSTEMS (EI3401)

CO1	Understand the concept of embedded system and its architectural features
CO2	Experiment real world field devices with microcontrollers
CO3	Develop embedded software using Embedded C and Python
CO4	Construct real world signals using suitable data converters for control Applications.
CO5	Use the power of RTOS for embedded applications.
CO6	Design embedded systems with the right choice of microcontroller and the associated

IOT CONCEPTS AND APPLICATIONS (OCS352)

CO1	Explain the concept of IoT.
CO2	Understand the communication models and various protocols for IoT.
CO3	Design portable IoT using Arduino/Raspberry Pi /open platform
CO4	Apply data analytics and use cloud offerings related to IoT.
CO5	Analyze applications of IoT in real time scenario.

ELECTRICAL MACHINES & DRIVES (IC3452)

CO1	Ability to understand the terms associated with electrical machines
CO2	Ability to understand basic concepts and working principle of electrical machines
CO3	Ability to understand the performance characteristics of machines
CO4	Ability to identify suitable machines for carrying out interdisciplinary projects
CO5	Ability to understand the motor operating principle and characteristics of motor
CO6	Ability to understand the motor operating principle and characteristics of transformer

DIGITAL AND LINEAR INTEGRATED CIRCUITS LABORATORY (EI3461)

CO1	Design and implement the given Boolean function using logic gates.
CO2	Design and verify the truth table of combinational logic circuits (code converters, encoders, decoders, multiplexer and demultiplexer).
CO3	Design and implement the Counters and Shift registers.
CO4	Design and testing of Op-Amp circuits and to simulate the op-amp application circuit using simulation tools.
CO5	Design and testing of astable and monostable circuits using Timer IC NE/SE 555.

SENSORS AND SIGNAL CONDITIONING CIRCUITS LABORATORY (EI3462)

CO1	Ability to perform error analysis and uncertainty analysis
CO2	Ability to evaluate the static and dynamic characteristics of measuring instruments.
CO3	Ability to design and construct measurement systems using different types of resistance, capacitance and inductance transducers.
CO4	Ability to apply special transducers for measurement applications.
CO5	Ability to interface and analyze different signal conditioning units.
CO6	Ability to present the results in oral form as well as in written form as a report and graph.

SEMESTER V

PROCESS CONTROL (EI3551)

CO1	Develop models using first principles approach for processes such as level, flow, temperature and pressure as well as analyze models
CO2	Recommend the right type of control valve along with its characteristics for a given application
CO3	Design Size a control valve following the procedure outlined in the ISA S 75.01 standard.
CO4	Design & implement a suitable control scheme for a given process and validate through simulations.
CO5	Analyze various control schemes and recommend the right control strategy for a given application.
CO6	Use appropriate software tools (Example: MATLAB/SCILAB) for analysis, design and implementation of Process Control System

SIGNAL AND IMAGE PROCESSING (EI3501)

CO1	Ability to understand the technical terms associated with image and video processing
CO2	Ability to select the appropriate preprocessing techniques for manipulation of images

CO3	Ability to utilize the different approaches of image enhancement, segmentation and analysis techniques
CO4	Ability to use appropriate software tools (Example: MATLAB, Open CV and P ython) for image and video processing
CO5	Ability to apply different digital video processing methods
CO6	Ability to design automated techniques for image-based applications

ELECTRICAL VECHICLE TECHNOLOGY (CIC341)

CO1	Outline of electric and hybrid vehicle operation and architectures.
CO2	Design of hybrid and electric vehicles
CO3	Summarize the energy requirement for vehicles.
CO4	Illustrate the vehicle characteristics, operating modes, and performance parameters of the vehicle
CO5	Analyze the different subsystems of hybrid and electric vehicles

THERMAL POWER PLANT INSTRUMENTATION (CIC342)

CO1	Understand and analyze the process diagram of hydel, thermal, nuclear, wind and solar power plants.
CO2	Identify the instruments for monitoring various parameters related to thermal power plant.
CO3	Analyze and select appropriate control strategy for various systems involved in thermal power plant.
CO4	Recognize the important terms related to turbine monitoring system and able to analyze the problems related to turbine governing
CO5	Ability to understand the concepts of safety interlocks applied for combustion process.

ANALYTICAL INSTRUMENTATION (CIC344)

CO1	Understand the basic concept of qualitative and quantitative analysis of a given sample.
CO2	Explain the working knowledge of analytical instrumentation typically employed in chemical/biochemical research and industry laboratories.
CO3	Apply the fundamental principles of selective analytical instruments for separation, identification and quantitative analysis of chemical substances.
CO4	Differentiate between online and offline process and identify suitable instruments for analysis.
CO5	Describe the relative strengths and limitations of different instrumental based analysis methods.
CO6	Identify and suggest a suitable analytical method for a specific application.

FIBER OPTICS INSTRUMENTATION (CIC3394)

CO1	Utilize the principles of light transmission, characteristics and losses in optical fibers for measurement applications.
CO2	Apply the concepts of optical fibers for its use in sensor development as well as important applications in production, manufacturing and industrial applications.
CO3	Compare the lasing theory of various laser generation systems.
CO4	Design laser systems for measurement of physical quantities and for industrial applications.
CO5	Select lasers for a specific Industrial and medical application
CO6	Apply the principles of lasers for creating new sensors and measurement systems

INTRODUCTION TO WOMEN AND GENDER STUDIES (MX3081)

CO1	Describe the Feminist Theory
CO2	Describe the Women's Movements: Global, National and Local
CO3	Describe the Gender and Language
CO4	Describe the Gender and Representation

PROCESS CONTROL AND INSTRUMENTATION LABORATORY (EI3561)

CO1	Estimate work and measure parameter of flow/ level / temperature / pressure from pilot plant
CO2	Analyze, design suitable control schemes for industrial type process.
CO3	Design ON-OFF, feed forward, cascade and Multiloop PID controllers for the typical industrial process.
CO4	Use appropriate software tools for design, analysis and implementation of control scheme.
CO5	Experimentally measure industrial process parameters (such as flow, viscosity and humidity) and physiological parameters of the human body.
CO6	Validate electrical safety of an instrument.

SEMESTER VI

INDUSTRIAL AUTOMATION SYSTEMS (EI3651)

CO1	Explain the working of communication buses used in automation industries
CO2	Explain the working of sensors and drives used in automation applications
CO3	Describe about computer aided measurements and various signal transmission techniques
CO4	Acquire detailed knowledge on data acquisition system interface
CO5	Explain architecture of PLC and develop ladder program for a given sequence of operation
CO6	Explain the basics of importance of communication buses applied industrial automation engineering

INTRODUCTION TO INDUSTRIAL PROCESSES, MEASUREMENT AND CONTROL (EI3652)

CO1	Understand common unit operations in process industries
CO2	Identify the dynamics of important unit operations in petro chemical industry
CO3	Develop understanding of important processes taking place selected case studies namely petrochemical industry, power plant industry and paper & pulp industry
CO4	Select appropriate measurement techniques for selective processes

CO5	Develop controller structure based on the process knowledge
CO6	Analyze the operation and challenges in integrated industrial processes

IOT FOR AGRICULTURE (CIC343)

CO1	Express nature of soil science and the various sensors used.
CO2	Explain Sensors and actuators used for farming tools.
CO3	Analyse sensor data acquisition and telemetry system.
CO4	Understand plant anatomy and health monitoring system.
CO5	Design Advanced technologies for smart farming. L5

SAFETY INSTRUMENTED SYSTEMS (CIC344)

CO1	Analyse the role of safety instrumented system in the industry.
CO2	Define various hazards in industry environment.
CO3	Summarize the safety integrity level for an application.
CO4	Distinguish the safety environment in industry.
CO5	Analyse the failure modes, failure rates and MTBF using various reliability engineering tools.
CO6	Apply the design, installation and maintenance procedures for SIS applied to industrial processes.

RENEWABLE SYSTEMS (CIC345)

CO1	Recognize the Indian and global energy scenario.
CO2	Classify the various solar energy technologies and its applications.
CO3	Analyze the various wind energy technologies.
CO4	Outline the various bio-energy technologies.
CO5	Describe the ocean and geothermal technologies.

IOT FOR EDGE COMPUTING (CIC346)

CO1	Identify the evolving IoT Standards.
CO2	Explain the functions of communication and information theory in IoT.
CO3	Practice the concept of edge computing protocols.
CO4	Analyze the purpose of machine learning in IoT.
CO5	Construct hardware security for IoT applications.

WELL-BEING WITH TRADITIONAL PRACTICES-YOGA, AYURVEDA AND SIDDHA (MX 3085)

CO1	Learn the importance of different components of health
CO2	Gain confidence to lead a healthy life
CO3	Learn new techniques to prevent lifestyle health disorders
CO4	Understand the importance of diet and workouts in maintaining health

INDUSTRIAL AUTOMATION SYSTEMS LABORATORY (EI3661)

CO1	Understand and Programming of PLC, SCADA and DCS
CO2	Work with industrial automation system
CO3	Design and implement control schemes in PLC & DCS
CO4	Interface field devices with PLC & DCS

SEMESTER VII

INDUSTRIAL DATA COMMUNICATION (EI3751)

CO1	Acquire adequate knowledge over computer networking and communication protocols
CO2	Choose suitable networking architecture and the associated protocols for industrial data
CO3	Analyze the requirements of a given application and use appropriate communication protocols.

CO4	Adopt best practices in installation and commissioning of industrial data communication links
CO5	Realize the nature of the industrial application in hand and employ suitable wired solution
CO6	Ability to infer the requirements of an industry and select a wireless solution for installing Industrial data network

C402- APPLIED MACHINE LEARNING (EI3752)

CO1	Ability to understand the basic theory underlying machine learning.
CO2	Ability to understand a range of machine learning algorithms along with their strengths and
CO3	Ability to formulate machine learning problems corresponding to different applications.
CO4	Ability to apply machine learning algorithms to solve problems of moderate complexity.
CO5	Ability to read current research papers and understand the issues raised by current research

HUMAN VALUES AND ETHICS (GE3791)

CO1	Ability to understand the basic theory underlying machine learning.
CO2	Ability to understand a range of machine learning algorithms along with their strengths and
CO3	Ability to formulate machine learning problems corresponding to different applications.
CO4	Ability to apply machine learning algorithms to solve problems of moderate complexity.
CO5	Ability to read current research papers and understand the issues raised by current research

PRINCIPLES OF MANAGEMENT (GE3751)

CO1	Upon completion of the course, students will be able to have clear understanding of managerial
CO2	Have same basic knowledge on international aspect of management.
CO3	Understand management concept of organizing.
CO4	Understand management concept of directing.
CO5	Understand management concept of controlling.

4G/5G COMMUICATION NETWORKS (CEC 331)

CO1	understand the evolution of wireless networks.
CO2	learn the concepts of 5G networks.
CO3	comprehend the 5G architecture and protocols.
CO4	understand the dynamic spectrum management.
CO5	learn the security aspects in 5G networks.

SENSORS (OMR 353)

CO1	Understand various sensor effects, sensor characteristics, signal types, calibration methods and obtain transfer function and empirical relation of sensors. They can also analyze the Sensor response.
CO2	Analyze and select suitable sensor for displacement, proximity and range measurement.
CO3	Analyze and select suitable sensor for force, magnetic field, speed, position and direction
CO4	Analyze and Select suitable sensor for light detection, pressure and temperature measurement and also familiar with other miniaturized smart sensors.
CO5	Select and design suitable signal conditioning circuit with proper compensation and linearizing element based on sensor output signal.

SEMESTER VIII

PROJECT WORK/INTERNSHIP (EI3811)

CO1	Ability to identify, formulate, design, interprete,analyze and provide solutions to complex engineering and societal issues by applying knowledge gained on basics of science and Engineering
CO2	Ability to choose, conduct and demonstrate a sound technical knowledge of their selected project topics in the field of electronics, process automation, instrumentation and control by exploring suitable engineering and IT tools.

CO3	Ability to understand, formulate and propose new learning algorithms to solve engineering and societal problems of moderate complexity through multidisciplinary projects understanding commitment towards sustainable development.
CO4	Ability to demonstrate, prepare reports, communicate and work in a team as a member/leader by adhering to ethical responsibilities
CO5	Ability to acknowledge the value of continuing education for oneself and to stay up with technology advancements.