



# Koneru Lakshmaiah Education Foundation

(Category -1, Deemed to be University estd. u/s. 3 of the UGC Act, 1956)

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Campus: Green Fields, Vaddeswaram - 522 302, Guntur District, Andhra Pradesh, INDIA.

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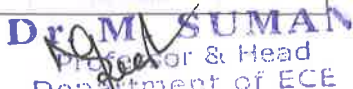
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Department of Electronics and Communication Engineering

Program: B.Tech -ECE

Academic Year : 2017-18

COURSE CODE	COURSE NAME	Co. No	CO DESCRIPTION
<b>HUMANITIES &amp; SOCIAL SCIENCES</b>			
17EN1201	Building Blocks for Communication Skills	CO1	Improve active participation on group discussion and understand the method of team playing skills
		CO2	Know writing strategies for office/ formal communication
		CO3	Improve the public speaking skills.
		CO4	Emphasize on different cultures and the importance of cross-cultural communication.
17EN3102	Instant Communication Skills	CO1	Improve pronunciation skills and understand the method of identifying antonyms.
		CO2	Apply writing strategies for office/ formal communication
		CO3	Analyze types of reading techniques and improve reading speed.
		CO4	Analyze different cultures and the importance of empathy in cross- cultural communication.
17UC2204	Aptitude Builder - 1	CO1	Apply the concept of Critical Reading and Analytical Reading with virtualX and Edbase tools to get familiar with the current societal issues
		CO2	Communicate effectively with the knowledge of concepts of grammar, various professional strategies with the usage of formal language.
		CO3	Apply the concepts of Numbers to solve the various analytical problems using FlexiQuiz tool.
		CO4	Apply the various concepts of mensuration to solve the analytical problems with Moodle tool.
17UC3105	Aptitude Builder - 2	CO1	Apply creative and interactive methodologies for solving questions related to variable aptitude, logical reasoning, quantitative aptitude etc.
		CO2	Realize the logical concepts of critical reading skills and Apply the strategies to communicate effectively in interviews.
		CO3	Apply the concepts of fundamental mathematics to solve the advanced levels of aptitude using LMS tools.
		CO4	Apply the concepts of number sequence to solve the permutation and combination problems
17UC0007	Indian Heritage and Culture	CO1	Familiarizing students with various aspects of Indian culture and how they contribute to the concept of Unity in Diversity
		CO2	Realize the beginnings of Indian History and the developments during the Ancient period
		CO3	Realize the developments in India during the Medieval Age along with how they contributed to Indian civilization
		CO4	Visualize the reasons for colonial rule over India and how independence was achieved from British rule
17UC0008	Indian Constitution	CO1	To understand Constitutional development after Independence
		CO2	To learn the fundamental features of the Indian Constitution
		CO3	To get a brief idea of the powers and functions of Union and State Governments
		CO4	To understand the basics of working of Indian Judiciary and the Election Commission

  
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17UC0009	Ecology and Environment	CO1	Apply the importance of environmental education and Design a hierarchy to achieve conservation of natural resources.
		CO2	Apply the importance of ecosystems to Construct a strategy to achieve biodiversity.
		CO3	Apply the concepts of environmental pollution and diverse the solution
		CO4	Apply the concepts of solid waste management to handle disaster management and EIA process.
17AC1008	Universal Human Values & Professional Ethics	CO1	Realize the Universal Human Values & Professional Ethics
17BT1001	Biology for Engineers	CO1	Understand the basis of Life, Living organisms and human body systems
		CO2	Understand the importance of Diet and Nutrition
		CO3	Acquire the knowledge of beneficial and harmful Microorganisms and Biosensors
		CO4	Understand the importance of Biosensors
17CY1001	Engineering chemistry	CO1	Analyze and Predict potential complications from combining various chemicals or metals in an engineering setting
		CO2	Analyze and Discuss fundamental aspects of electrochemistry and materials science relevant to corrosion phenomena
		CO3	Analyze and Examine water quality and select appropriate purification technique for intended problem
		CO4	Design engineering processes using polymers, conducting polymers ,green chemistry and nano chemistry.
		CO5	analyze & generate experimental skills
17MT1101	Single variable calculus and matrix algebra	CO1	Apply the physical laws and relations mathematically as a first order differential equations, solve by analytical and numerical methods also interpret the solution.
		CO2	Analyse physical laws and relations mathematically as a second/higher order differential equations, solve by analytical method and interpret the solution.
		CO3	Apply the Fourier series expansions of periodic functions and use the series to solve ordinary differential equations.
		CO4	Apply and analyse physical problems mathematically as a system of linear equations and solve them by analytical and numerical methods. Also, determine the nature of Quadratic form using Eigen values.
17MT1102	Foundations of computational mathematics	CO1	Apply the quantities of Real world problems by using the concepts of arithmetic.
		CO2	Apply the areas of regular and irregular solids of real world problems.
		CO3	Apply the numbers by successive division also finding the solution of equations.
		CO4	Estimating the roots of an equations and find the unknown values from the data by numerical methods
17MT1203	Multivariate calculus	CO1	Apply extreme values for functions of several variables
		CO2	Apply area, volume moment of inertia through multiple integrals in Cartesian or polar co-ordinates.
		CO3	Apply the concepts of vector calculus to calculate the gradient, directional derivative, arc length, areas of surfaces and volume of solids in practical problems
		CO4	Apply analytical and numerical solutions of Heat and wave equations
		CO5	Identify the solution of problems through MATLAB
17MT1204	Logic and reasoning	CO1	Apply Venn diagrams to find the conclusion of statements, solve puzzles using binary logic.
		CO2	Apply Non-verbal reasoning, to solve problems on clocks, calendars and problems.
		CO3	Evaluate the available models for Venn diagrams with given data, solve problems relating to cubes and number and letter series.
		CO4	Apply analytical reasoning to solve problems on coding, decoding and blood relations
17PH1001	Engineering materials	CO1	Apply structure of crystalline solids, kinds of crystal imperfections and appreciates structure-property relationship in crystal

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		CO2	Apply magnetic properties of materials and identifies their role in classification soft & hard magnetic materials having specific engineering applications.
		CO3	Apply thermal and mechanical properties of materials, heat treatment methods for changing the microstructure of materials and responses of materials subjected to load.
		CO4	Apply the role of electronic energy band structures of solids in governing various electrical and optical properties of materials.
		CO5	Apply the knowledge on structure and properties of materials while executing experiments and develop inter disciplinary projects.
17MT2009	Probability and Stochastic Processes	CO1	Apply the probability and joint and marginal probabilities to suitable real-world situations.
		CO2	Apply probability distributions to suitable real- world situations and also analyse bivariate data using correlation and regression analysis.
		CO3	Apply Markov chains and simulation techniques for suitable real world problems.
		CO4	Apply queuing models for single server with finite and infinite capacity and multi-server with infinite capacity to suitable real world problems.
<b>ENGINEERING SCIENCES</b>			
17ME1001	Engineering Mechanics	CO1	Analyse the concept of forces to solve the static equilibrium mechanics problems.
		CO2	Analyse principles of co-planar and non co-planar system of forces to solve Newtonian kinematics problems
		CO3	Apply the concept of centroid & centre of gravity to analyse moment of inertia of rigid bodies
		CO4	Apply the kinetics and kinematics principles to analyse rigid bodies
		CO5	Analyse the engineering systems with the help of mechanics concept to solve the engineering problems.
17CS2004	Object Oriented Programming	CO1	Apply basic Concepts of OOP, fundamentals of java to analyse the concepts of classes and objects through Java Language.
		CO2	Apply the concepts of constructors, Overloading, parameter passing to analyse Java programming real time problems
		CO3	Apply the process of access control and Inheritance to analyse optimization of Packages.
		CO4	Apply problems of Interfaces for analysing impact of exception handling on real time systems
		CO5	Apply object oriented programming concepts to analyse algorithms.
17CS1102	Data Structures	CO1	Apply measures of efficiency on algorithms to Analyse different Sorting Algorithms.
		CO2	Analyse and compare stack ADT and queue ADT implementations using linked list and applications.
		CO3	Analyse the linked implementation of Binary, Balanced Trees and different Hashing techniques.
		CO4	Analyse different representations, traversals, applications of Graphs and Heap organization.
17ME1003	Workshop Practice		Workshop Practice
17CS1101	Problem Solving and Computer Programming	CO1	Apply computer programming skills to analyse real time problems
		CO2	Apply Control Flow Statements to analyse C programs
		CO3	Interpret & Illustrate user defined C functions and different operations on list of data.
		CO4	Implement Linear Data Structures and compare them.
		CO5	Apply the knowledge obtained from the course to analyse real world problems.
17ME1002	Engineering Graphics	CO1	To inculcate the imagination and mental visualization capabilities for interpreting the geometrical details of common engineering objects, Orthographic projections of points, lines and planes
		CO2	Analyse projection of solids like cylinders, cones, prisms and pyramids to develop Layout of solids for practical situations.

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		CO3	Analyse orthographic projections to create isometric sketches and identify standard features such as hole, slots, etc.
		CO4	Analyse, create, annotate, edit and plot drawings using basic AutoCAD commands and features.
		CO5	Demonstrate competency with multiple drawing and modification commands in Solid Works.
17GN1003	Basic engineering measurements	CO1	Understand and apply the Basic fundamentals of physics to realize a measurement system.
		CO2	Apply mechanical measuring parameters and measuring techniques on simulation and experimentation.
		CO3	Understand various Electrical measuring parameters, and apply different measuring techniques on various Electrical parameters using simulation and experimentation.
		CO4	Apply electronic measuring parameters and different measuring techniques on simulation and experimentation tools.
		CO5	Apply the theoretical concepts to develop simulation tools for analytical experiments.
17GN1204	Coding Skills for Engineers	CO1	Apply measures of efficiency on algorithms to solve different Sorting Algorithms
		CO2	Analyze and compare stack ADT and queue ADT implementations using linked list and applications.
		CO3	Apply the linked implementation of Binary, Balanced Trees and different Hashing techniques.
		CO4	Analyze different representations, traversals, applications of Graphs and Heap organization.
		CO5	Apply linear and non-linear data structures to evaluate common practical applications
17CS2103	Discrete Mathematics	CO1	Understand the notion of mathematical thinking, mathematical proofs, and algorithmic thinking, to apply them in problem solving
		CO2	Understand the basics of discrete probability and number theory to apply the methods in problem solving.
		CO3	Apply algebraic techniques effectively to analyse basic discrete structures and algorithms.
		CO4	Analyse graphs and related discrete structures to create practical societal projects
17EE2105	Electrical Circuit Theory	CO1	Apply the Kirchhoff's laws and analyse electrical circuits
		CO2	Interpret the steady state and transient behaviour of electric circuits by the application of PDEs
		CO3	Analyse electrical circuits using network theorems and estimate various parameters using two port analysis
		CO4	Apply induction principles to magnetic circuits
17EC1101	Introduction to Electronics Engineering	CO1	Apply basic electronic components in various applications of everyday life.
		CO2	Apply various types of Displays and Sensors in usage of everyday life.
		CO3	Illustrate the usage of diodes, motors and Regulators in design of electronic applications.
		CO4	Analyse the Process, Interfacing and Parameters to be considered in design of Electronic Applications
		CO5	design the simpler circuits using Basic Components, Sensors and Communication Modules using Arduino
<b>PROFESSIONAL CORE COURSES</b>			
17EC2101	Analog Electronic Circuit Design	CO1	Analyze the operation of electronic devices like transistors and illustrate their electronic behaviour using Multisim.
		CO2	Distinguish linear and nonlinear circuits using lumped elements and analyze their response using Multisim
		CO3	Interpret feedback in amplifiers and realize them through lumped element circuits and linear ICs
		CO4	Design various electronic circuits using linear ICs and demonstrate their applications using Multisim
		CO5	Design Analog circuits for realistic applications and demonstrate it through a mini-project
17EC2102	Digital System	CO1	Apply Boolean logical concepts to analyse the digital circuits.

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	Design	CO2	Design and Combinational logic circuits and their verification through synthesis with hardware description language
		CO3	Design the Sequential logic circuits and their verification through synthesis with hardware description language
		CO4	Implement digital circuits using PAL, PLA, FPGA and CPLD for subsystem design using HDL with Xilinx
		CO5	Design and develop the application-oriented subsystems/systems with Xilinx
17EC2103	Signals and Systems	CO1	Describe the representations, manipulations and operations on Continuous-Time and Discrete Time signals and systems and apply them to model solutions to simple problems.
		CO2	Apply Fourier analysis to Continuous-Time signals and generate interpretations of signals in frequency domain.
		CO3	Apply Laplace Transforms and design LTI systems.
		CO4	Apply transform domain models to analyze CT and DT signals and systems.
		CO5	Design and Analyze signal processing concepts through simulation software and evaluate their performance in finding solutions to problems.
17EC2204	Computer Organization and Architecture	CO1	Apply the concepts of machine level, assembly level and high-level programming to understand the working of ALUs
		CO2	Analyse the different operations of CPU
		CO3	Infer I/O operation and different memory devices
		CO4	Analyse the design issues of RISC and SISC processors
17EC2205	Digital Signal Processing	CO1	Illustrate the LTI system functionalities and apply them to system design principles.
		CO2	Develop DFT and apply that to analyse signals in the frequency domain.
		CO3	Construct FIR and IIR filters for filtering operations and find solutions for filtering problems
		CO4	Establish relationships between mathematical and block representations for filter design.
		CO5	Develop signal processing algorithms in software and apply them to finding solutions for real-time problems.
17EC2206	Analog and Digital Communication	CO1	Apply time and frequency analysis techniques to analog modulation systems
		CO2	Apply Spectral analysis to angle modulation systems
		CO3	Analyse angle modulation systems
		CO4	Implement noise and Error analysis of an analogue system with multisim
		CO5	Design of communication circuits through project-based labs.
17EC3107	Computer Networks	CO1	Interpret the basic network structure, software and models, device and applications
		CO2	Analyse the error detection and correction techniques with link layer protocols with CISCO Packetrizer
		CO3	Design and Analyse different routing algorithms and network layer protocols
		CO4	Design and Analyse transport and application layer protocols
		CO5	Design of different networking protocols using simulation
17EC3108	Electronic System Design Workshop	CO1	Apply the active and passive components of Electronics for modern electronic system design
		CO2	Analyse the Analog and Digital electronic systems and their impacts on the performance.
		CO3	Design the Electronic Circuits and Demonstrate for social problems on mixed signal domains
		CO4	Design PCB art-work by following PCB design rules using the Software and learning about fabrications and packaging and EMI/EMC issues
		CO5	Develop different circuits with PCB FABRICATION techniques
17EC3109	Processors and Controllers	CO1	Understand the architectural features of Intel 8086 Microprocessor and able to apply the programming concepts of 8086 microprocessor.
		CO2	Understand the architectural features of Intel 8051 and PIC Microcontrollers.
		CO3	Apply the programming concepts of Intel 8051 Microcontroller.
		CO4	Apply the 8051 microcontroller interfacing concepts and to analyse the interfacing modalities of 8051 microcontroller with peripheral devices using

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			the TASM, KEIL, MCU IDE and Proteus tools.
		CO5	Develop various application programs with 8051 and 8086 hardware kits.
17EC2212	Electromagnetic Fields and Transmission Lines	CO1	Apply the principles of vector calculus and static fields to estimate the static Electric field and magnetic field due to different sources.
		CO2	Develop the boundary conditions on E, H fields and extend the concepts to obtain the governing laws of electromagnetic the field that helps to perceive the wave propagation
		CO3	Analyse the characteristics of the guided waves and the modes of propagation
		CO4	Formulate the energy propagation over transmission lines involving measurement of power and impedance with an insight into appropriate matching techniques.
<b>FLEXI CORE COURSES</b>			
17EC3301	VLSI Design	CO1	Apply basic principles of mathematics and sciences to conceptualize MOS device operation and fabrication process
		CO2	Analyse MOS device characteristics and device scaling process
		CO3	Design / construct stick diagrams and layouts for CMOS Digital systems
		CO4	Evaluate CMOS based systems' performance by applying integrated circuit testing fault models.
		CO5	Use modern EDA tools to synthesize CMOS based Digital Systems
17EC3302	RF System Design	CO1	Understand the Importance of RF Circuit Design, RF behaviour of passive components, Compare Types of Transmission Lines and represent Equivalent Circuits
		CO2	Understand and analyse the RF diode, BJT and FET characteristics, and modelling amplifier input and output impedance matching with Graphical AID/Tool for RF Design;
		CO3	Analyse Stability Considerations and stabilization methods to design RF Amplifiers Using Small Signal Analysis
		CO4	Analyze high frequency oscillator configuration and mixer designs.
		CO5	Analyse and design of RF electronic circuits
17EC3303	Wireless Communication	CO1	Apply the wireless communications concepts to interpret cellular Architecture.
		CO2	Interpret the basic concepts of GPRS Architecture & modulation coding schemes
		CO3	Interpret the basic concepts of UMTS
		CO4	Interpret the basic concepts of 4G LTE
		CO5	Analyse the various cellular communication architectures and its associate standard
17EC3304	AI, ANN & ML	CO1	Apply the concepts of AI and report their use in finding solutions to searching problems.
		CO2	Analyse the learning mechanisms used in AI and employ them in multiple neural network architectures.
		CO3	Differentiate supervised and unsupervised learning models by applying on contextual problems.
		CO4	Inspect and test the concepts of optimization in the fields of engineering.
		CO5	Apply and analyse the various AI,ANN,ML concepts to real world programme
17EC3305	Electronic Instruments, Automation & Biomedical Applications	CO1	Apply the basics of measurement concepts to calibrate the instrument
		CO2	Analyse the various electronic instruments
		CO3	Apply the basics of control systems and automation
		CO4	Study and analysis of industrial automation
		CO5	Design and development electronic measurement circuits suitable for automation
17EC3307	Embedded Controllers	CO1	Apply the Interfacing of Peripherals concepts of 8051 Microcontroller through programming.
		CO2	Understand the basic architectures of ARM 7 & AVR microcontrollers and apply the basic concepts to CORTEX STM-32 microcontroller.
		CO3	Apply the applications of programming with Arduino Uno
		CO4	Able to identify an architectural design of available technologies and solve the societal challenge using IoT.

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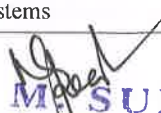
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		CO5	Apply the different Interfacing of Peripherals concepts of 8051 Microcontroller through programming.
<b>PROFESSIONAL ELECTIVES</b>			
<b>EMBEDDED CONTROLLERS, IOTS &amp; POWER ELECTRONICS</b>			
17EC3611	Wireless sensor Networks & IOT Applications	CO1	Understand the basics of WSN, challenges and applications
		CO2	Apply and demonstrate various WSN protocols using NS-2 simulator
		CO3	Understand IoT reference architecture and design issues of WSN
		CO4	Design and analyse IoT applications using simulation tool TinkerCad
17EC3612	Solar Photo-Voltaic cells & Solar Power Arrays	CO1	Apply the knowledge of the physical function of solar photovoltaic technologies by Measuring and evaluating solar cells performance.
		CO2	Analyze the critical comparisons of different solar photovoltaic cells with the knowledge of materials and production processes of various types of solar cells.
		CO3	Apply design concepts and develop reliable solar photovoltaic systems with testing and optimization techniques.
		CO4	Communicate technological, environmental, and socio-economic issues around solar energy to a target group with basic technical skills.
17EC3613	Electronic Systems for Renewable Energy & Smart Grid	CO1	Interpret the basics of renewable energy sources and apply to electronic power converters.
		CO2	Analyse the electronics systems for renewable energy sources
		CO3	Analyse the smart grid sub-systems and circuits
		CO4	Analyse and design of electrical smart grids for societal application.
17EC3614	IOT Applications for Smart Cities	CO1	Understand the basics of smart cities/villages/living
		CO2	Analyse the systems for smart cities with case studies.
		CO3	Analyse and design of smart grid sub-systems and circuits
		CO4	Understand the concept of advanced topics related to privacy, scaling, and design considerations.
<b>VLSI &amp; MICRO - ELECTRONICS</b>			
17EC3621	Low Power VLSI	CO1	Understand the different types of power dissipation in MOS structure
		CO2	Apply low power techniques at circuit level for CMOS circuits and analyse probabilistic power analysis
		CO3	Apply low power techniques and analyse different digital VLSI circuits using mentor graphics
		CO4	Design and analysis of low power techniques for memories.
17EC3623	IC Design & Applications	CO1	Apply the knowledge of Engineering Physics laws of power dissipation for low power circuits
		CO2	Apply low power techniques at circuit level for CMOS circuits and analyse probabilistic power analysis
		CO3	Apply low power techniques at gate level, architecture level and system levels
		CO4	Apply low power clock tree distribution techniques to create low power devices
17EC3624	VLSI Sub-system Design and Design for Testability	CO1	Understand the design flow and methodologies of VLSI sub-system
		CO2	Analyze the memory and array subsystems
		CO3	Analyze the fault-tolerant designs of digital VLSI circuits
		CO4	Design of testing of VLSI systems
<b>AUTOMATION &amp; ROBOTICS</b>			
17EC3631	Control Systems & Introduction to Robotics	CO1	Apply the concepts of control systems and analyse their static and dynamic conditions
		CO2	Apply the time frequency analysis and system design.
		CO3	Analyse the components of robotic systems and apply to construction of simple robots.
		CO4	Apply the fundamentals of kinetics to analyze the dynamic control in robotic design
17EC3632	Autonomous Vehicles & Automotive	CO1	Apply design procedure for autonomous vehicles
		CO2	Design and apply basic computation of sensors and actuators
		CO3	Analysis of automotive electronic systems

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		CO4	Design project of Automotive Electronics and autonomous Vehicles
17EC3633	Advanced Robotics	CO1	Understand the fundamentals of robotic sensors and motions in robotics
		CO2	Analyse the position and displacement of joints for different inputs conditions
		CO3	Analyse different robotic mechanisms
		CO4	Analyse of specific case studies with respect to robotic applications
17EC3634	Computer Vision & Applications	CO1	Interpret the fundamental concepts related to multi-dimensional signal processing and report their use in camera design.
		CO2	List the feature extraction techniques and summarize their importance in pattern recognition applications.
		CO3	Analyse image segmentation algorithms and formulate their requirements across applications.
		CO4	Develop Pattern recognition algorithms with basic pipelines and interpret their use across multiple applications.
17EC3635	Human Machine Interface & Brain Machine Interface	CO1	List concepts behind HCI and BMI and describe their role in the development of interaction mechanisms
		CO2	Design models in HCI and apply them to real world problems.
		CO3	Analyse the data analytic models and experiment them on real world data to estimate their performance.
		CO4	Design and Analyze HCI applications in the real world and review their performance.
<b>SIGNAL PROCESSING</b>			
17EC3641	Speech Signal Processing	CO1	Realize speech production and review different classification models.
		CO2	Apply transformation techniques on speech signals and analyse their need in speech recognition.
		CO3	Construct speech models and identify the highly applicable model for speech classification.
		CO4	Review AI speech recognition applications and assess their performance.
17EC3642	Digital Image Processing	CO1	Interpret the fundamental concepts of digital image processing and apply them to generate reviews on some key applications
		CO2	Develop 2D Transform models for analysing images in frequency domain and evaluate their capabilities.
		CO3	Develop restoration, segmentation and filtering algorithms on degraded images and list their efficiencies.
		CO4	Develop compression models and examine their performance for data transmission.
17EC3643	Biomedical Image Processing	CO1	Interpret the fundamental concepts of BioMedical image processing and apply them to generate reviews on some key applications.
		CO2	Analyse image acquisition models and categorize their capabilities in acquiring bio signals.
		CO3	Interpret image reconstruction models and list their efficiencies in bio images.
		CO4	Review various bio medical equipment used in real world and evaluate their usefulness in diagnostics.
17EC3644	Statistical Signal Processing	CO1	Apply Random variables & processes and solve problems in related to engineering
		CO2	Interpret estimation theory & methods to find solutions to predictive problems.
		CO3	Quantify noise filtering and spectral analysis by applying estimation models.
		CO4	Review Kalman filter and its capabilities in estimation problems.
<b>COMMUNICATION &amp; WIRELESS</b>			
17EC3651	Information Theory &	CO1	Apply the knowledge of mathematics to interpret the basic concepts of information theory
		CO2	Analyse noise consideration for information theory
		CO3	Analyse various coding techniques
		CO4	Analyse different error detection and correcting methods
17EC3652	4G Wireless Technologies & Cellular Communications	CO1	Analyse spread spectrum techniques
		CO2	Evaluate the performance of multicarrier systems
		CO3	Evaluate the performance of OFDM and MIMO systems
		CO4	Interpret the concepts of advanced cellular communication systems

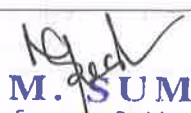
  
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17EC3654	Optical Communication Networks	CO1	Interpret the basic concepts of optical communication systems
		CO2	Analyse different optical sources, materials and structures
		CO3	Analyse different optical network protocols
		CO4	Analyse different optical networks
<b>DATA COMMUNICATION &amp; NETWORKS</b>			
17EC3661	TCP/IP Protocol Suite	CO1	Analyse addressing techniques and troubleshooting protocols
		CO2	Design DHCP for development of different networks
		CO3	Design DNS for development of different networks
		CO4	Analyse congestion control protocols with case studies
17EC3662	VoIP Systems & Broad Band Networks	CO1	Apply the networking knowledge to interpret the legacy technology of classical telephony
		CO2	Analyse different unicast routing protocols
		CO3	Analyse different VoIP protocols and codecs
		CO4	Analyse NAT techniques and Quality of service for networks with SIP protocol
17EC3663	5G Mobile, Wireless Technologies & IEEE 802	CO1	Interpret the basic concepts 4G & 5G Technologies
		CO2	Analyse different 5G Channels and Networking concepts
		CO3	Interpret the milli meter wave communications
		CO4	Analyse different IEEE standards (802.1)
<b>RF, MICROWAVE &amp; RADARS</b>			
17EC3671	Microwave Engineering	CO1	Apply the high frequency parameter analysis for Microwave Components
		CO2	Analyse Microwave Excitation and Propagation in waveguides and resonators
		CO3	Analyse the applications of linear and periodic structures of Microwave circuits
		CO4	Analyse and design the applications of microwave and millimetric wave circuits using HFSS
17EC3672	Antenna Design & Wave Propagation	CO1	Understand the radiation fields and antenna fundamentals
		CO2	Analyse different types of antennas and arrays
		CO3	Design and Analyse the different concept of antenna measurements
		CO4	Analyze the real-world applications of different antennas.
17EC3673	Radar Engineering & Navigational Aids	CO1	Apply the basic principles of communications to build a radar system
		CO2	Analyze the MTI radars
		CO3	Analyze different radar systems
		CO4	Understand the principles Navigation system.
<b>DATA-COMPUTING &amp; APPLICATION TOOLS</b>			
17EC3681	Machine Learning	CO1	Apply mathematical models to demonstrate the concepts of machine learning and list applications.
		CO2	Apply the knowledge of unsupervised learning models by evaluating their performance.
		CO3	Apply and analyze supervised learning models and report their functionality.
		CO4	Investigate and analyze deep learning applications and explain their capabilities in finding solutions for specific problems
17EC3682	Data Sciences	CO1	Analysis of statistical methods for Big data
		CO2	Understanding big data flat forms for large scale data storage
		CO3	Analyze big data streaming platforms for past data
		CO4	Applying big data for real world platforms
17EC3685	Video Surveillance	CO1	Apply the fundamental concepts related to Video Surveillance.
		CO2	Analyse different algorithms for feature extraction, pattern recognition
		CO3	Analyse Vehicle Tracking and Human activity Recognition
		CO4	Analyse the applications based on range, Attribute-based people search, Age estimation from face, Gender recognition from face and body
<b>INSTRUMENTATION &amp; BIO-MEDICAL ELECTRONICS</b>			
17EC3691	Autonomous Vehicle & Avionics	CO1	Apply basic comprehensive knowledge to bridge automotive electronics.
		CO2	Explore and conjugate the emerging technologies utilized to assist Autonomous Vehicles.

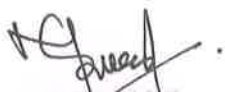
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		CO3	Apply artificial intelligence concepts for the Communication and Navigation of automated vehicles
		CO4	Understand the basic knowledge on aviation technology.
17EC3693	Biological & Cyber-Physical Systems	CO1	Apply design fundamentals of parameters of Cyber-Physical systems.
		CO2	Analyse various types of Cyber-Physical systems
		CO3	Interfacing of Biology with Silicon technology.
		CO4	Interprete Various Advanced technology with some case studies.
<b>SKILLING COURSES</b>			
17TS401	Technical Skilling-1 (Lab View and MultiSim)	CO1	Synthesize GSD and LabVIEW Environment such as Front Panel, Controls Palette, Controls and Indicators, Block Diagram Terminals, Functions Palette, Data Type, Boolean Operations, String Operations.
		CO2	Synthesize Loop Concept, Nested Loop, Feedback, Arrays, Cluster, Plotting Data using chart and Graph, Tunnel Concept, Introduction to parallelism, Local Variable, Global Variable, Property Nodes, Invoke Nodes using LabVIEW.
		CO3	Synthesize Case structures, Case Control using Enumerated data type, Introduction to Flat Sequence, Create New Sub VI, Input and Output Sub VI Connectors, Error handling and Debugging Techniques, Introduction to File I/O operations, Event Structure and operations, Design Technique, Introduction to Architecture, Synchronization and Communication using LabVIEW.
		CO4	Simulate Using MultiSim Instruments such as Multimeter, Function Generator, Wattmeter, Bode plotter, Introduction to Measurement Probe and Current Probe in MultiSim, Operations on Simulation Analysis such as AC analysis, DC operating Point, Fourier Analysis, Noise Analysis, Distortion Analysis, Parameter Sweep, Transfer Function, Worst case Execution using MultiSim
17TS402	Technical Skilling-2(Matlab) (Communications and DSP)	CO1	Analyse of LTI Systems and Filters using MATLAB
		CO2	Analyse and evaluate DFT and FFT in speech and bio-signal processing.
		CO3	Explore Multi-rate Signal Processing and Apply Wavelet transform for statistical feature extraction.
		CO4	Explore ANN classifier, Apply Wavelet transform, ANN for classification
17TS403	Technical Skilling-3 (VLSI-Xilinx-Vivado, ES-Keil&ARM, SP-Python, CS-Tems, IOT-Python, ML&AI-Keras)	CO1	Analyse VLSI Design Flow, Applications and Advantages of VLSI, Introduction to EDA Xilinx ISE, Introduction to Basic Electronics: Number Systems, Binary Arithmetic, Boolean Algebra, Introduction to Basic Logic Gates ,Code Conversions: Binary to Grey , Grey to Binary, Excess -3 Codes and combinational circuits
		CO2	Design, analyse and evaluate different VLSI circuits using HDL coding
		CO3	Design, analyse and evaluate different types of modelling with HDL programming
		CO4	Design, analyse and evaluate test benches, Delay statements , Test bench Structure with mentor graphics and FPGA boards
17TS404	Technical Skilling-4 (VLSI-Mentor Graphics, ES-Python& RasberrPie, SP-Python, CS-BTS simulators, IOT-Open CV, ML&AI-Tensor Flow)	CO1	Design of a basic CMOS inverter using pyxis schematic, pre-layout simulation with mentor graphics
		CO2	Analyse the Design rule check, Layout vs Schematic, Parasitic Extraction, Post layout simulation.
		CO3	Programming using raspberry and Arduino boards
		CO4	Introduction to Artificial Intelligence, Introduction to Machine Learning, Implementation of different Programs, Open CV, and different simulators.
17TS405	Technical Skilling-5 (VLSI-Pspice or Cadence, ES-CC Studio, SP-VC++, CS-HFSS-CST, ML&AI-Spider)	CO1	Describe the Numbers, Math functions, Strings, List, Tuples and Dictionaries in Python
		CO2	Express different Decision Making statements and Functions
		CO3	Interpret Object oriented programming in Python Understand and summarize different libraries and packages
		CO4	Explain how to use java effectively in all data types, array, functions, and search

  
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17TP3101	Technical Proficiency & Training -1	CO1	Recall the Basic Building Block concepts of C-Programming and apply this knowledge in writing basic programs
		CO2	Recall the Basic Building Block concepts of Object oriented programming through C++-Programming and apply to advanced problems in engineering.
		CO3	Analyse the problems in signal processing, image processing, machine learning and artificial intelligence etc and apply the programming knowledge to solve these problems
		CO4	Apply this programming knowledge to design software subsystems in the areas signal processing problems, image processing, machine learning and artificial intelligence
17TP3202	Technical Proficiency & Training -2	CO1	Introduction to Mentor Graphics tool, create a project, addition of libraries, identify path for genericI3 library file, create file for schematic, create pyxis schematic, Design of a basic CMOS inverter using pyxis schematic, pre layout simulation.
		CO2	Introduction to layout, Initialize the circuit for layout design, design of layout for basic CMOS inverter, Introduction to Calibre, Design rule check, Layout vs Schematic, Parasitic Extraction, Post layout simulation.
		CO3	Introduction to Python, Raspberry implementation using Python Python, Introduction to sp python, layering of Simulators for Python, Introduction to IoT. Programs using raspberry, Arduino
		CO4	Introduction to Artificial Intelligence, Introduction to Machine Learning, Implementation of different Programs, Open CV, and different simulators.
<b>TERM PAPER &amp; PROJECT</b>			
17IE2246	INDUSTRIAL TRAINING		INDUSTRIAL TRAINING
17IE3247	TERM PAPER	CO5	Students will jointly in team be able to identify the idea of the real world project and define the technical problems therein. Also, they will be able to decide on the methodology/tools (software/hardware) to be used for solving these problems in order to complete the part of the project (design, algorithm design etc.)this aspect by demanding day-to-day productivity and punctuality of the student.
17IE4048	PROJECT (PART I)	CO1	Exercise to acquire knowledge within the chosen area of technology for project development.
		CO2	identify, discuss and justify the technical aspects of the chosen area for problem analysis
		CO3	Reproduce, improve and refine technical aspects for chosen problem
		CO4	Communicate and report effectively project related activities and findings.
17IE4049	PROJECT (PART II)	CO1	Interpret characteristics and various stages of an identified problem for development
		CO2	Analyze the conceptual clarity about project management and feasibility analyses - Technical and Economic
		CO3	Analyze the learning and understand techniques for Project planning, scheduling execution control with systematic approach
		CO4	Work as an individual or as a team in development of technical projects, risk management plan and analyze the role of stakeholders
17IE4050	PRACTICE SCHOOL	CO5	Student team should be able to build the complete hardware/software solutions to the real-world problem by extending the work already done in Project-1. Also, students will be able to disseminate their solution in the form of project report and or an article.
17IE4051	INTERNSHIP	CO5	The course is specially designed to provide an opportunity to the students for development of their academic skills and logical thinking through open ended lab-oriented activities. As a part of education, this project course follows a method of learning and therefore, the student's actual day-to-day task involvement would constitute the central thread of the learning process. The evaluation will recognize this aspect by demanding day-to-day productivity and punctuality of the student.

  
Academic Professor I/C

  
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