



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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Admin Off: 29-36-38, Museum Road, Governorpet, Vijayawada - 520 002. Ph: +91 - 866 - 3500122, 2576129

Department of Electronics & Computer Engineering

Program: B.Tech - Electronics & Computer Science

Academic Year :2021-2022

COURSE CODE	COURSE NAME	CO NO	Description of the Course Outcome
20UC1101	Integrated Professional English	CO1	Understand the concepts of grammar and to improve communication skills in reading and writing.
		CO2	Demonstrate the ability in interactive skills of speaking and writing that are better suited for corporate environment.
		CO3	Understand various strategies of reading and use them in interpreting the text.
		CO4	Apply the concepts of writing to draft corporate letters, emails and memos, reports, etc.
20UC1202	English Proficiency	CO1	Demonstrating different inter personal skills for employability
		CO2	Distinguishing business essential skills
		CO3	Classifying social media and corporate communication skills
		CO4	Applying analytical thinking skills
21UC2103	Essential Skills for Employability	CO1	Identify and organize sentence structures based on grammar
		CO2	Illustrate specific writing styles
		CO3	Relate intra personal skills
		CO4	Interpret inter personal Skills for developing oral communication
21UC2204	Corporate Readiness Skills	CO1	Extend word power for developing effective speaking and writing skills
		CO2	Differentiate critical and general reading skills
		CO3	Interpret inter personal skills
		CO4	Demonstrate necessary skills to be employable
21UC0010	Universal Human Values & Professional Ethics	CO1	Realize and Understand the basic aspiration, harmony in the human being.
		CO2	Envisage the roadmap to fulfill the basic aspiration of human beings.
		CO3	Analyze the profession and his role in this existence
		CO4	Understand the profession and his role in this existence


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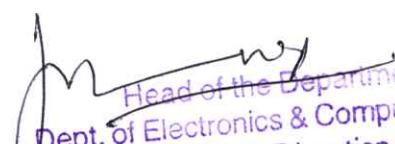
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20UC0007	Indian Heritage and Culture	CO1	Familiarizing students with various aspects of Indian culture and how they contribute to the concept of Unity in Diversity
		CO2	Understand the beginnings of Indian History and the developments during the Ancient period
		CO3	Understand the developments in India during the Medieval Age along with how they contributed to Indian civilization
		CO4	Understand the reasons for colonial rule over India and how independence was achieved from British rule
20UC0008	Indian Constitution	CO1	To acquire knowledge of the historical developments that culminated in the drafting of the Indian Constitution.
		CO2	To understand the basic features of the Indian Constitution.
		CO3	To understand the structure of the Federal government as defined by the Indian Constitution.
		CO4	To understand the Indian Judicial system and election commission of india
20UC0009	Ecology & Environment	CO1	Understanding the importance of Environmental education and conservation of natural resources
		CO2	Understanding the Ecosystems, biodiversity
		CO3	Understand global Environmental issues, pollution
		CO4	Understand the knowledge on solid waste management, disaster management and EIA process
21UC0011	Gender Sensitization	CO1	Develop a better understanding of important issues related to gender in contemporary India
		CO2	Sensitize to basic dimensions of the biological, sociological, psychological and legal aspects of gender.
		CO3	Attain a finer grasp of how gender discrimination works in our society and how to counter it.
		CO4	Acquire insight into the gendered division of labor and its relation to politics and economics.
20MT1101	Mathematics for Computing	CO1	Model a system of equations for real world applications in engineering, physical and biological sciences, computer science, finance, economics and solve them through matrix algebra
		CO2	Model basic and computational techniques on discrete structures like relations, orders, functions & FSM, Lattices, and propositional & predicate logic
		CO3	Model real world structures and their related applications using advanced discrete structures like graphs and trees.
		CO4	Model the given Statistical data for real world applications in Engineering science, Economics and Management.
		CO5	Demonstrate the Aptitude and Reasoning skills (Tests in skilling hours)


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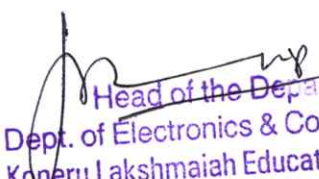
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21MT2102	Mathematics for Engineers	CO1	Apply differential and integral calculus to find maxima & minima of functions, evaluate the integrals and solve the differential equations.
		CO2	Demonstrate the Fourier series and Laplace transforms.
		CO3	Describe probability, Random Variables
		CO4	Explain complex variables, analytic functions and introduction to stochastic process and Algebraic structures.
21MT3101	Probability and Statistics	CO1	understand the terminologies of basic probability, two types of random variables and their probability functions
		CO2	observe and analyze the behavior of various discrete and continuous probability distributions
		CO3	understand the central tendency, correlation and correlation coefficient and also regression
		CO4	apply the statistics for testing the significance of the given large and small sample data by using t- test, F- test and Chi-square test
		CO5	Implement probability and statistics using R language
21UC1203	Design Thinking and Innovation	CO1	Understand the importance of Design thinking process for contextualized problems
		CO2	Analyze, define, and ideate for solutions
		CO3	Develop and test the prototype made
		CO4	Explore the fundamentals of entrepreneurship skills for transforming the challenge into an opportunity
21PH1101	Science Elective - 1 (SemiConductor Physics)	CO1	Understand semiconductor in terms of its electrical and optical properties
		CO2	Understand junction properties of semiconductor device.
		CO3	Understand the characteristics of devices like BJT, FET
		CO4	Understand the applications of photonic devices.
21CY1001	Science Elective - 2 (Engineering Chemistry)	CO1	Predict potential complications from combining various chemicals or metals in an engineering setting
		CO2	Discuss fundamental aspects of electrochemistry and materials science relevant to corrosion phenomena
		CO3	Examine water quality and select appropriate purification technique for intended problem
		CO4	Explain the role of chemical kinetics in the formation and destruction of ozone in the atmosphere and predict the connection between molecular behavior and observable physical properties.
		CO5	An ability to analyze and generate experimental skills
21UC3105	Problem Solving Skills-I	CO1	Apply the concepts of mathematical principles besides logic and identifying certain basic mathematical formulae to solve these kinds of problems


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		CO2	Formulate the concepts of mathematical principles of equations that contain the data related to real life situations which requires basic logic to analyze
		CO3	Solve concepts of Venn diagrams and number patterns and illustrate logic behind connectives, series, and analogies respectively
		CO4	Differentiate assumptions and arguments in critical reasoning
21UC3206	Problem Solving Skills-II	CO1	Implement problem solving ability through analyzing the given data and formulate solutions for real world problems based on time, travel and wages
		CO2	Determine the fundamental concepts of areas, volumes and derive solutions using simple mathematical principles besides interpreting the data through smart tricks to check the number analytics
		CO3	Estimate inductive reasoning, to categorize the rules-set from a given list of observations and relate them to predict the conclusions according to the given conditions
		CO4	Integrate verbal and non-verbal reasoning and to identify the logic behind the given arrangement based on the given conditions to bring out the possible outcome
21SC1101	Computational Thinking for Structured Design	CO1	Design Basic and Complex Building Blocks for real world problems using structured programming paradigm
		CO2	Translate computational thinking into Logic Design for Solving real world
		CO3	Apply and Analyse CRUD operations on Basic Data Structures using Asymptotic Notations
		CO4	Apply and Analyse CRUD operations on Linear Data Structures using Asymptotic Notations.
		CO5	Apply the structured programming paradigm with logic building skills on Basic and Linear Data Structures for solving real world problems
		CO6	Skill the students in such a way that students will be able to develop logic that help them to create programs as well as applications in C
20EC1101	Digital Logic & Processors	CO 1	Understand numerical and character representations in digital logic, number system, data codes and the corresponding design of arithmetic circuitry. Understanding Logic gates, Logic theorems, Boolean algebra and SOP/POS'S expressions.
		CO 2	Combinational systems design using standard gates and minimization methods
		CO 3	Sequential systems: Design of counters using flip flops.
		CO 4	Understanding PLA's, PAL's, FPGA's, and processors
		CO5	Analysing and realization of Boolean functions, half adder, encoders, decoders, flip flops, and counters.

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20ME1103	Design Tools Workshop	CO 1	Practice design thinking by developing artistic skills, Visualize and complete his/her innovative design by final drafting using 3D modeling
		CO 2	Understand the concept of web page, web browser, web server, and able to create Static webpages
		CO 3	Understand the concept of report writing using a markup language Latex
		CO 4	Understand the concept of data visualization and creating data visualization dashboards, Understand the basic concept of VR/AR
21SC1209	Design Tools Workshop – II	CO1	Practice the design ideology by 3D printing, 3D scanning techniques
		CO2	Visualize the design ideology by incorporating VR technique and VR technology, Visualize and present his design idea by applying AR technique and Hologram
		CO3	Practice of PCB technology
		CO4	Practice of Arduino based skill with different interfaces
21SC1202	Data Structures	CO1	Understand various sorting algorithms and analyze the efficiency of the algorithms
		CO2	Implement Linear Data Structures and Demonstrate their applications.
		CO3	Understand hashing techniques and Implement tree data structures.
		CO4	Understand graph data structures and apply graphs to solve problems
		COS	Develop and evaluate common practical applications for linear and nonlinear data structures.
21EC1202	Computer Organization & Architecture	CO1	Understand the functionality of CPU functional units - control unit, registers, the arithmetic and logic unit, instruction execution unit
		CO2	Understand the concepts of CPU and the operation of main, cache and virtual memory organizations
		CO3	Understand the concepts of the different types of I/O modules and I/O transfer techniques in computer modules
		CO4	Apply the concept of pipelining in instruction execution and design issues of RISC, CISC and parallel computing architectures
21EL2102	Object Oriented Programming	CO1	Understand basic Concepts of OOP, and apply the concepts of classes and objects through Java
		CO2	Apply access control, Inheritance, Packages.
		CO3	Apply Interfaces, Exception Handling, multi- threading, I/o.
		CO4	Apply collection framework and event driven programming.
		CO5	Apply object-oriented programming concepts to write programs and Analyses requirements and design to implement lab-based project with SDLC in a group of students.
21EC1203	Design of Basic Electronic Circuits	CO1	Understand the basic electronic components.
		CO2	Understand the basic circuit analysis techniques
		CO3	Understand the active circuit elements and working.

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21EC2104	Electronic Devices & Circuit Design	CO4	Analyse the applications of semiconductor devices
		CO1	Understand the BJT operations and a circuit function.
		CO2	Understand the FET operations and circuit functions
		CO3	Understand the Op.-Amp operations and circuit functions
		CO4	Understand the Op-Amp filters and Oscillator circuit functions
21EL3201	Signal Analysis and Communication Systems	CO1	Understand basic concepts related to Signal Processing System
		CO2	Ability to Analyze the Signal Processing Algorithms
		CO3	Ability to Analyze the Filter design Methodologies
		CO4	Ability to Analyze Signal Processing algorithms in different case studies
21EL22101	Operating Systems	CO1	Understand the OS structure and its functions. Articulate design trade-offs inherent in OS design.
		CO2	understanding of the role of process concepts on scheduling, scheduling algorithms, inter-process communication and system calls.
		CO3	Understand the concept of memory virtualization, page replacement algorithms, and deadlock
		CO4	Understand file system Implementation
		CO5	Develop application programs using different platforms and languages.
21EL2202	Embedded Systems Design	CO1	Understand the architecture and programming concepts of 8086 Microprocessor
		CO2	Apply the Programming concepts of 8051 Microcontroller
		CO3	Analyse the Interfacing of Peripherals to the 8051 microcontrollers through programming. Understand the basic architectures of PIC and ARM 7 microcontrollers
		CO4	Understand the basic concepts of CORTEX STM-32 microcontroller and RTOS
		CO5	Analyze the applications of programming with 8051 and 8086 on hardware / software. Analyze the applications of programming with Arduino
21EL2203	Database Management Systems	CO1	Illustrate the functional components of DBMS and Design an ER Model for a database.
		CO2	Design a relational model for a database & Implement SQL concepts and relational algebra.
		CO3	Implement PL/SQL programs, normalization techniques, indexing to construct and access database
		CO4	Analyze the importance of transaction Processing, concurrency control and recovery techniques.
		CO5	Design a database and implement SQL queries and PL/SQL programs to do various operations on data.
		CO6	Design and query database using database programming skills
21EL3101	VLSI Design	CO1	Understand the MOS theory and processing technology

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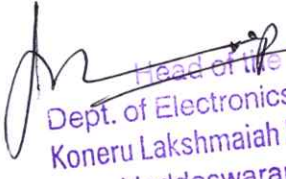
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		CO2	Understand the MOS circuit characterization and performance estimation
		CO3	Understand the combinational circuit design
		CO4	Understand the sequential circuit design
21EL2204	Web application Development	CO1	Create Static Web pages using basic HTML & apply CSS
		CO2	Apply JavaScript features for form validations and event handling
		CO3	Create databases using MYSQL and apply JDBC concepts to connect to a database
		CO4	Create dynamic web pages using servlets & JSP
		CO5	Design WEB pages considering the user interface, navigation, and interaction with the database
		CO6	Create Web Applications for real-time problems by providing UI and database accessibility.
21EL3102	Data Science	CO1	Understand Data Science, Exploratory Data Analysis, Data Extraction, Wrangling, Examine the inference from Exploratory data analysis (EDA)
		CO2	Demonstrate by organizing, comparing visualization and simple metrics
		CO3	Demonstrate by organizing comparing visualization and simple metrics
		CO4	Applying Variance, covariance, and correlation on Data Science
		CO5	Implementing Inferential Statistical Analysis
		CO6	Design & Development of various AI & ML Algorithms on Real-Time Applications
21EL3103	Software Engineering	CO1	Develop application programs using different platforms and languages.
		CO2	Apply Requirement modelling and design issues that are used in software development
		CO3	Analyze dynamic modelling issues which are used in software development
		CO4	Analyze various testing and CMMI techniques
21EL3104	Artificial Intelligence	CO1	Understand the problem, well defined problems and their solutions, Uninformed and Informed search.
		CO2	Game playing with adversarial search. Constraint satisfaction problems
		CO3	Building Knowledge and reasoning: - propositional logics, first order logic, forward and backward reasoning, resolution.
		CO4	Analyzing uncertainty using Bayes theorem, Hidden Markov model and Kalman filters.
		CO5	Solving AI problems.
21EL3202	Machine Learning	CO1	Understand Machine learning and apply decision tree model for a real-world problem
		CO2	Distinguish linear regression and logistic regression and identify best regression coefficients
		CO3	Analyze Bayesian model sand genetic programming model
		CO4	Interpret the neural network learning and evaluate the


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			model
		CO5	Implement Machine Learning models , evaluate and interpret the result
21EC2210	Data Networks & Protocols	CO1	Introduction to Computer networks and Data Link Layer
		CO2	Network layer and Internetworking
		CO3	Transport layer, Session Layer, Presentation Layer and Application Layer
		CO4	Advanced Topics: Cryptography, Advancements in Application layer, Wireless LANs, Network Security
21EL3203	Automata & Compiler Design	CO1	Understand Formal Language and Regular Expressions
		CO2	Apply Context Free grammars and parsing
		CO3	Understand Semantics
		CO4	Understand symbol table
		CO5	Implement Code generation
21EL3204	Deep Learning	CO1	Able to understand and remember the concepts of Perception, Back Propagation, PCA, Singular Value Decomposition
		CO2	Able to understand auto encoders- and apply Regularization, Denoising, Sparse, Contractive, Vectoral Representations of words Convolutional Neural Networks, LeNet, VGGNet, GoogleNet, ResNet, Fast RCNN, Faster RCNN, YOLO
		CO3	Apply Long Short-Term Memory (LSTM) Restricted Boltzmann Machines, Deep Dream, GRU, Neural style transfer, Deep learning for computer vision, text and sequences.
		CO4	Build Markov models, Markov networks, Markov chains, Variational autoencoders, Autoregressive Models: NADE, MADE, PixelRNN, Generative Adversarial Networks (GANs), how to train DCGAN, limitations of deep learning
		CO5	Implement basic Neural Networks, optimization algorithms, engine vector decomposition, various types of auto encoders, batch normalization, convolutional neural networks
21EL3104	Web Programming using Python and Django	CO1	Understanding the fundamental concepts like Flow control and conditions, File handling, OOPs and Python modules. Understand Django Template System
		CO2	Understand how to use models to store the data with admin.
		CO3	Analyze Django Forms, creating view CBV in various applications
		CO4	Analyze Django serialization to handle session with middleware.
		CO5	Evaluate various applications and deployment of application with Django
21EL3205	Cloud Computing for web Engineer	CO 1	understand cloud computing services and models
		CO 2	understand cloud computing virtualization concepts


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		CO 3	Apply cloud services using amazon web services (AWS) Cloud to utilize cloud resources.
		CO 4	Apply the techniques how to create and deploy web applications using amazon web services (AWS) Cloud
		CO 5	Analyze various cloud services in amazon web services (AWS) and create each service.
21EL3206	Big data Analytics for Web Engineer	CO 1	Ability to find and transmit data emanated from different embedded and IoT devices
		CO 2	Ability to use HADOOP and MAP reduce tools in the process of undertaking Analytics
		CO 3	Ability to develop data Modelling, Structuring, and Analytics using "R" Language
		CO 4	Ability to conduct various kinds of analytics on big data especially using text
21EL3207	Essentials of Block Chain Technology	CO 1	Understand the types, benefits, and limitations of blockchain.
		CO 2	Explore the blockchain decentralization and cryptography concepts
		CO 3	Enumerate the Bitcoin features and their alternative options
		CO 4	Apply the smart contracts on the Ethereum Platform
		CO 5	Analyse DApps on different frame works
21EL3208	Robotic Process Automation	CO 1	Understand the RPA Foundations and RPA Skills.
		CO 2	Understand the Process Methodologies and Requirements for RPA Environment Planning.
		CO 3	Understand the Process and Methodology of BOT Development.
		CO 4	Understand the Deployment, Monitoring and Data Preparation Methodologies
		CO 5	Implementation of BOT Development Process and Verification using the RPA Tools [UI Path].
21EL3211	Hardware software co design	CO1	Understand various Hardware/Software Co-Design, models
		CO2	Understand different methodologies involved in Hardware/Software Co-Design
		CO3	Understand various interfacing techniques involved in Hardware/Software Co-Design.
		CO4	Understand various target architectures involved in Hardware/Software Co-Design.
		CO5	Analyze the High-Level synthesis model and RTL optimization
21EL3203	Embedded Real Time Operating System	CO1	Current Trends for Embedded Systems
		CO2	Challenges in validating timing constraints in priority –driven systems Off-line versus On-line Scheduling
		CO3	Pros and Cons of Clock Driven Scheduling.
		CO4	Deferrable Servers



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		CO5	Real-Time Operating Systems Other Basic Operating System Functions
21EL3204	Networking of Embedded Systems	CO1	Understand concepts of serial communication protocols RS232, RS485, SPI
		CO2	Apply concepts of I2C and USB communication to develop the application
		CO3	Apply concepts of CAN bus and develop an application
		CO4	Apply concepts of Ethernet and Wireless network and develop an application
		CO5	Analyze embedded system protocols and develop applications
21EL4103	System on Chip	CO1	Able to understand the system architecture concepts
		CO2	Able to understand the requirements for processor selection strategies.
		CO3	Able to understand the requirements for memory selection strategies for SoC development.
		CO4	Able to understand the bus architectures and interconnect architectures and analyze the different case studies
		CO5	Able to understand the System Architecture Implementation & Verification
21EL4104	Embedded Security	CO1	understand security trends and policies
		CO2	understand embedded operating system security techniques
		CO3	understand and describe software security developments and upgrades.
		CO4	understand cryptography techniques
		CO5	Demonstration of experiments on crypto algorithms and cryptanalysis in Embedded Systems.
21EL3106	Fundamentals of IoT	CO1	Understand functional blocks and functioning of IoT devices
		CO2	Understand Communication models that are used for the development of the IoT based Systems
		CO3	Understand different networking topologies and protocols used for the development of IoT based Networks
		CO4	IoT Application Case studies
21EL3107	Internet of Things : Architectures and Prorocols	CO1	To Understand the Architectural Overview of IoT
		CO2	To Understand the IoT Reference Architecture and Real World Design Constraints
		CO3	To Apply the various IoT Protocols in Datalink and Network layers
		CO4	To Apply the various IoT Protocols in Transport and Session Layers
21EL3108	IoT Sensing and Actuating Devices	CO1	Understand the role of sensors and actuators in real-time aspects and Electrostatic transducers.
		CO2	Understand the role of Magnetic, Piezoelectric, Resistive and Optical Transducers.
		CO3	Apply the role of biosensors and Data Acquisition Systems.

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		CO4	Analyze the role of different Energy sources and power management in IoT
		CO5	Implement and Evaluate the Practical -IoT
21EL3209	wireless sensor networks	CO1	Understand the concepts of Wireless sensor networks, challenges, and limitations of wireless sensor networks
		CO2	Understand the MAC layer protocol for energy-efficient design of WSN
		CO3	Analyze the data dissemination and gateway concepts in WSN
		CO4	Understanding the concept of time synchronization, Localization, and positioning in WSN
		CO5	Development of different applications using WSN concepts
21EL3210	Cloud computing for IoT	CO1	To understand the differences between traditional deployment and cloud computing
		CO2	Understand different cloud infrastructures and service models and virtualization
		CO3	Apply the concept of Data Analytics by using AWS cloud
		CO4	Analyze the statistical data analysis and methods for evaluation

Academic Professor I/C

HOD-ECM

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