Koneru Lakshmaiah Education Foundation
(Category -1, Deemed to be University estd. u/s. 3 of the UGC Act, 1956)
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Department of Electronics & Computer Engineering

Program: B.Tech - Electronics & Computer Engineering

Academic Year :2018-2019

COURSE CODE	COURSE NAME	CO NO	Description of the Course Outcome
18SC1103	Single variable calculus and matrix algebra	CO1	Understand the basic Structures , relations and permutations & combinations , probability
		CO2	Model and solve the relevant physical problems mathematically as a system of linear equations .
		CO3	Apply the rules of Propositional logic to establish valid resultsof mathematical arguments, Induction and solve recurrence relations .
		CO4	understand the graphs and analyze different problems associated with computer , logic design.
		CO5	Describe the Aptitude & Reasoning skills
18SC1101	PROBLEM SOLVING AND COMPUTER PROGRAMMING	CO1	Illustrate how problems are solved using computers and programming.
		CO2	Illustrate and use Control Flow Statements in C.
		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 by the course to solve real world problems.
18EC1002	Engineering Graphics & Design for Electronics and Computer Engineers	CO1	Practice design thinking by developing artistic skills
		CO2	Visualize and practice innovative design by final drafting using photogrammetric and model the design using prototyping technique
		CO3	Apply the concept of AI & Data analytics & finalize the requirements to design his idea
		CO4	Draft a report of his project from the initial stage & make a report which include scope, time and cost management of his project
18SC1106	TECHNICAL SKILLS - 1(CODING)	CO1	Apply the concepts of basic programming to solve the basic problems, pattern based problems
		CO2	Build solutions for problems on Numbers and array based
		CO3	Solve problems solutions for character/string based problems and pointers
		CO4	Build solutions to programs on Data structures concepts.

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18SC1103	Single variable calculus and matrix algebra	CO1	Apply differential and integral calculus to find maxima & minima of functions and evaluate the integrals
		CO2	Model and solve the relevant phenomena as a differential equation.
		CO3	Demonstrate Fourier series and Analytic functions
		CO4	Describe probability , Random Variables and Algebraic structures
18SC2009R	OBJECT ORIENTED PROGRAMMING	CO1	Understand basic Concepts of OOP, fundamentals of java 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 requiremens and design to implement lab-based project with SDLC in students
18SC1202	DATA STRUCTURES	CO1	Apply measures of efficiency on algorithms and 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.
		CO5	Develop and Evaluate common practical applications for linear and non-linear data structures.
18EC1202	COMPUTER ORGANIZATION & ARCHITECTURE	CO1	Understanding of computer system and its modules
		CO2	Understanding the CPU Design
		CO3	Applications of Input/Output Devices
		CO4	Applications of RISC and CISC paradigm
18SC1207	TECHNICAL SKILLS - 2(CODING)	CO1	Apply the concepts of basic programming to solve the basic problems, pattern based problems
		CO2	Build solutions for problems on Numbers and array based problems,functions, recursion
		CO3	Solve problems solutions for character/string based problems
		CO4	Build solutions to programs on Data structures concepts.
18CS1003	Workshop Practice for Computer Engineers	CO1	Practice the design ideology by artistic skill
		CO2	Visualize the design ideology by using VR technology
		CO3	Visualize the design ideology by incorporating VR technique
		CO4	Visualize and present his design idea by applying AR technique

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18CS2102R	OPERATING SYSTEMS	CO1	Understanding the basic algorithms for subsystem components
		CO2	Understand memory and process virtualization
		CO3	Design and solve synchronization problems, and multi-threading llibraries
		CO4	Understand persistence concepts
		CO5	Develop application programs using different platforms and languages
18CS2103R	SOFTWARE ENGINEERING	CO1	Understand the software development life cycle and associated process models and reverse engineering
		CO2	Illustrate Requirement modelling and Agile and Extreme programming
		CO3	Examine Agile Models such as Scrum, Kanban and SAFe methodology
		CO4	Categorize various testing strategies, Test Driven Development and CMMI,SIX SIGMA TECHNIQUES
18EC2103	ANALOG ELECTRONIC CIRCUIT DESIGN	CO1	Analysis of BJT's and Various application in Amplifiers
		CO2	Understand various types of FET's, IC Types and analyze FET as an Amplifier
		CO3	Understand the Linear & Non-linear application of Op-AMP and analyze active filters
		CO4	Analysis of different types of oscillators, filter and regulators.
		CO5	Design and Testing of Analog circuits for realistic applications
18EM2101	Processors and Controllers	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
18TS503	Skilling for Engineers - 3 (Embedded C)	CO1	Must acquire basic knowledge about embedded systems, hardware devices used and the general discussion about at mega Controller.
		CO2	Must be able to use IDE and Free RTOS to develop firmware using embedded C
		CO3	Must be able to develop small applications for reading input from the sensors and writing output to the actuators
		CO4	Understand the purpose and basic functioning of RTOS and be able to implement sample applications

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			through use of RTOS functions
		CO5	Able to develop a prototype for a real time embedded application using project-based labs.
18EC3109	Data communication Network Protocols	CO1	Understand OSI and TCP/IP models
		CO2	Illustrate the Link, MAC and Network layer concepts.
		CO3	Illustrate Transport and Application layer concepts
		CO4	Understand and Apply Network Security Techniques.
18TS504	Skilling for Engineers - 4 (Machine Learning using Python)	CO1	Apply different types of regression models to solve prediction problems
		CO2	analyse Bayesian models for solving classification and prediction problems
		CO3	create neural network techniques to solve classification and prediction problems
		CO4	create Support Vector Machines to solve classification problems.
		CO5	Create machine learning models using python
18CS2205R	DATABASE MANAGEMENT SYSTEMS	CO 1	Illustrate the functional components of DBMS, importance of data modelling in design of a database.
		CO 2	Build queries using SQL and concepts of PL/SQL
		CO 3	Apply normalization techniques and indexing to construct and access decent database.
		CO 4	Identify the importance of transaction processing, concurrency control and recovery techniques
		CO 5	Develop a good database and define SQL queries for data analysis
18CS2206R	ARTIFICAL INTELLIGENCE	CO 1	Introduction to AI, Understand about intelligence, knowledge and Artificial Intelligence, techniques of AI as a State space search, Production Systems.
		CO 2	Problem solving by Search, Heuristic Search, Randomized search techniques and Finding Optimal paths
		CO 3	Analyze the appropriate methodologies for problem decompositions, planning and constraint data constraint satisfactions.
		CO 4	Understand Knowledge Representation using Predicate Logic, Representing Knowledge using Rules, Semantics Nets, Frames and Conceptual dependencies.
18EM2201	WEB APPLICATION DEVELOPMENT	CO1	Able to create Static Web pages using basic HTML &apply CSS
		CO2	Able to apply JavaScript features for form validations and event handling
		CO3	Able to create databases using MYSQL and apply JDBC concepts to connect to a database.
		CO4	Able to create dynamic web pages using servlets & JSP

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		CO5	Must be able to design WEB site considering the user interface, navigation and interaction with the database using project-based LABS
18CS3261	Data Science using R	CO1	Understand Data science, Exploratory Data Analysis, Data Extraction, Wrangling
		CO2	Demonstrate proficiency with statistical analysis of data
		CO3	Analyse the linear and logistic regression solutions for real world problems
		CO4	Examine the inference from Time series models, integrate R and Hadoop
		CO5	Implement the Statistical and Data Analytical Algorithms using R
18EC2208	VLSI DESIGN	CO1	Understand the MOS device fabrication process
		CO2	Analysis of MOS operation principles, characteristics and scaling process
		CO3	Constructing the Transistor Level Logic circuits and understand the MOS layout design rules
		CO4	Study of MOS circuit performance and testing principles
		CO5	Create the MOS circuit modules through project-oriented approach using e-CAD tools
18TS502	Technical Proficiency - 2 (Design Analysis and Algorithms in java)	CO1	Design algorithms using appropriate design techniques (brute-force, greedy, dynamic programming, etc.)
		CO2	Implement a variety of algorithms such as sorting, graph related, combinatorial, etc., in a high level language.
		CO3	Analyze and compare the performance of algorithms using language features.
		CO4	Apply and implement learned algorithm design techniques and data structures to solve real world problems
18UC0008	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
18EM3201	SIGNAL PROCESSING	CO1	Understand basic concepts related to Signal Processing System
		CO2	Ability to Analyse the Signal Processing Algorithms
		CO3	Ability to Analyse the Filter design Methodologies
		CO4	Ability to Analyse Signal Processing algorithms in different case studies
18UC0009	ECOLOGY AND	CO1	Understand the importance of Environmental education and conservation of natural resources.

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	ENVIRONMENT	CO2	Understand the importance of ecosystems and biodiversity.
		CO3	Apply the environmental science knowledge on solid waste management, disaster management and EIA process.
		CO4	Understand the importance of Environmental education and conservation of natural resources.
18TS505	Skilling for Engineers - 6 (Advanced Data Structures in Java)	CO1	Understand advanced data structures
		CO2	Apply nonlinear data structures(graphs) to implement graph applications
		CO3	Apply more advanced algorithms for solve Realtime problems
		CO4	Understand advanced algorithms and analysis.
		CO5	Apply advanced data structures and algorithms to solve real time
18EM3004	WEB PROGRAMMING WITH PYTHON AND DJANGO	CO1	Able to understand Python and Django, Working with templates and models
		CO2	Able to get the data from data base and working with query sets
		CO3	Able to use Django Forms, creating view CBV
		CO4	Able to handle session with middleware.
		CO5	Must be able to create Django project and application development
18EM3105	AngularJS	CO1	Able to understand when to use AngularJS services instead of controllers
		CO2	Able to implement single-page applications, using Route to selectviews and navigation
		CO3	Able to create applications that can communicate with a server to fetch and store data
		CO4	Able to create custom angularjs filter and perform unit testing directives
		CO5	Must be able to develop a large, maintainable, and performant application with AngularJS.
18EM4104	MongoDB	CO1	Able to understand NoSQL databases and MongoDB use cases
		CO2	Able to understand different concepts of data modelling in MongoDB
		CO3	Able to import and export data from/ to MongoDB
		CO4	Able to understand the replica set and concept of sharing in MongoDB
		CO5	Must be able to build data models and data access patterns using MongoDB
18EM4105	WEB SERVICES	CO1	Acquire fundamental knowledge related to developing an application using the WEB services related Technologies.
		CO2	Acquire fundamental knowledge related to various technologies used for implementing WEB services that include SOAP, WSDL, and UDDI

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		CO3	Should be able to develop small WEB services-oriented applications through the use of XML language
		CO4	Should be able to develop applications using third part services which are launched on different servers
		CO5	Must be able to develop a large, maintainable, and perform applications
18EM4107	BIGDATA ANALYTICS	CO1	Ability to find and transmit data emanated from different embedded and IoT devices
		CO2	Ability to use HADOOP and MAP reduce tools in the process of undertaking Analytics
		CO3	Ability to develop data Modelling, Structuring and Analytics using "R" Language
		Co4	Ability to conduct various kinds of analytics on the big data especially using text
18EM3001	EMBEDDED SYSTEM DESIGN WITH ARM	CO1	Able to describe the architecture of ARM7 Processor (LPC2148)
		CO2	Able to interface various devices to ARM processor and program the same using Embedded C Language
		CO3	Able to describe Interrupts and A/D, D/A of ARM7 Controller
		CO4	Able to interface various devices through Communication protocols
18EM3102	EMBEDDED LINUX	CO1	Able to Understand the Linux operating system
		CO2	Able to understand and apply file system structures and Linux root file system
		CO3	Able to understand kernel, Boot initialisation and Thread concepts.
		CO4	Able to understand and apply device drivers for various applications, interfacing and optimisation techniques
18EM4101	NETWORKING OF EMBEDDED SYSTEMS	CO1	Able to understand and describe serial communication protocols using 8051 and LPC2148 controllers.
		CO2	Able to understand and describe I2C and USB communication protocols.
		CO3	Able to understand and describe CAN communication protocol
		CO4	Able to understand and describe wireless communication protocols
18EM3103	HARDWARE SOFTWARE CODESIGN	CO1	Able to understand hardware and software codesign models
		CO2	Able to understand the different methodologies for hardware/software codesign
		CO3	Able to understand the interfacing techniques for hardware and software.
		CO4	Able to understand the high-level synthesis model and analyze RTL optimization.

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18EM4102	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
18EM4103	EMBEDDED SECURITY	CO1	Able to understand security trends and policies
		CO2	Able to understand embedded operating system security techniques.
		CO3	Able to understand and describe software security developments and upgrades.
		CO4	Able to understand and describe cryptography techniques.
18EM3110	FUNDAMENTALS OF IOT	CO1	Understand functional blocks of IoT devices
		CO2	Demonstrate the Technologies involved in IoT based Systems
		CO3	Apply different wireless technologies used for the development of IoT based Networks
		CO4	Analyse various IOT Real time application design Components
18EM3107	IOT:SENSING AND ACTIVATING DEVICES	CO 1	Understand the role of sensor and actuators in real time aspects and Analog and Digital Actuators
		CO 2	Analyse the role of signal conditioning circuits and Impedance Matching circuits
		CO 3	Understand different generation of sensors for the development of IoT based Networks
		CO 4	Analyse the role of different Energy sources and power management in IoT
18EM4108	IOT ARCHITECTURE AND PROTOCOLS	CO 1	To Understand the Architectural Overview of IoT
		CO 2	To Understand the IoT Reference Architecture and Real World Design Constraints
		CO 3	To Apply the various IoT Protocols in Datalink and Network layers
		CO 4	To Apply the various IoT Protocols in Transport and Session Layers
18EM4109	WIRELESS SENSOR NETWORKS	CO 1	To Understand the Architectural Overview of IoT
		CO 2	To Understand the IoT Reference Architecture and Real World Design Constraints
		CO 3	To Apply the various IoT Protocols in Datalink and Network layers
		CO 4	To Apply the various IoT Protocols in Transport and Session Layers
18EM5214	CLOUD COMPUTING FOR IOT	CO 1	To understand the differences between traditional deployment and cloud computing
		CO 2	Understand different cloud infrastructures and service models

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		CO 3	Apply the concepts of data analytics
		CO 4	Analyze the statistical data analysis and methods for evaluation
18EM40B2	E-COMMERCE	CO1	Should gain fundamental knowledge related to development of E-commerce sites / portals
		CO2	Should be able to design, develop and Host small e-commerce sites /portals
		CO3	Should be able to implement security enforcement mechanisms within e-commerce sites /portals
		CO4	Should be able to implement different payment mechanisms within e-commerce sites / portals
18EM40B1	LINUX PROGRAMMING	CO1	Must have full understanding of Linux Commands and Bourn shell programming
		CO2	Ability to develop Bourn shell programs interfaced with LINUX utilities
		CO3	Ability to develop Bourn shell programs interfaced with SED and AWK user interface systems and File management systems
		CO4	Ability to develop Bourn shell programs that implements inter process communication and process management
18TS501	Technical Proficiency - 1 (Data analytics)	CO1	Understand the data analytics and types
		CO2	Apply different types of data analytics techniques
		CO3	Demonstrate data visualization tools for visualize the data for decision making.
		CO4	Demonstrate machine learning techniques for data analysis
18TS506	Skilling for Engineers - 5 (IoT programming using Python)	CO1	Develop applications using python for home automation
		CO2	Develop REST services for smart applications
		CO3	Develop applications using python for intrusion detection
		CO4	Develop applications using python for smart parking
18EM4201	Security in Internet of Things	CO1	Understand the security requirements of IoT
		CO2	Understand the cryptographic fundamentals for IoT
		CO3	Understand the privacy and trust models for IoT
		CO4	Analyse various Cloud IoT Security controls
18SC1105	Logic and Reasoning	CO1	Understand how to use Venn diagrams to find the conclusion of statements, solve puzzles using binary logic.
		CO2	Understand to solve problems on clocks, calendars and problems on Non verbal reasoning.
		CO3	Understand the available models for Venn diagrams with given data, solve problems relating to cubes and number and letter series.
		CO4	Understand the techniques used to solve problems puzzles using analytical reasoning on coding and decoding and blood relations

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18UC1101	Basic English	CO1	Apply the practical knowledge of using action words in sentence construction.
		CO2	Apply and analyse the right kind of pronunciation with regards to speech sounds and able to get different types of pronunciations.
		CO3	Apply the concept of fundamental principle of counting to solve the problems on linear, circular permutations and also for the problems on selections. Apply the concept of probability, while doing the problems on Leap year & Non-Leap year problems, coins, dice, balls and cards.
		CO4	Analyze the given conditions and finding out all the possible arrangements in linear & circular order. Analyze the given numbers or letters to find out the hidden analogy and apply that analogy to find solutions. Finding the odd man out by observing the principle which makes the others similar.
18EC1101	Digital System Design	CO1	Describe the concepts of number systems with codes and logic gates usage in digital circuit design and identify the logical expressions in different forms and their minimization techniques for logical circuit optimization
		CO2	Design of Combinational logic circuits and verification through hardware description language
		CO3	Substantiation of Sequential logic circuits and verification through hardware description language
		CO4	Implementation of digital circuits using PAL, PLA, FPGA and CPLD
18MT1201	Multivariate Calculus	CO1	Determine extreme values for functions of several variables
		CO2	Determine area, volume and moment of inertia through multiples integrals
		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	Obtain analytical and numerical solutions of Heat and wave equations
18UC2204	Aptitude Builder 1	CO1	Apply the concept of Critical Reading and Analytical Reading and comprehend the keyideas and gist of a passage.Understand the importance of the presentation skills, analyze the given topic, apply various strategies and the principles of grammar in written expression.
		CO2	Apply the concepts of grammar, various strategies and the usage of formal language in written expression. By using synonyms rewrite the same text in the same format and meaning. Write the gist of the given text.

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		CO3	Apply the concepts of Numbers to solve the problems related to divisibility rules, problems based on Unit's digit, Remainders, Successive Division, Prime Factorization, LCM & HCF problems. Apply the concepts of Averages &Alligations, students will be able to solve the problems related to Averages as well as problems based on Mixtures.
		CO4	Apply the various concepts of cubes to find out how to cut a cube to get the maximum number of smaller identical pieces, how to minimize the number of cuts required to cut a cube into the given number of smaller identical pieces, how to count the number of smaller cubes which satisfy the given painting scheme. Apply the principles of binary logic to solve problems involving truth-tellers, liars and alternators. Analyze the given data to form an ordered arrangement from an unorganized raw data.
18UC1202	English Proficiency	CO1	Apply the concepts of accurate English while writing and become equally at ease in using good vocabulary and language skills.
		CO2	Understand the importance of pronunciation and apply the same day to day conversation.
		CO3	Apply the concepts of Ratios, Percentages, Averages and Analysing the given information, a student is required to understand the given information and thereafter answer the given questions on the basis of comparative analysis of the data in the form of tabulation, bar graphs, pie charts, line graphs. Analyse the given data to find whether it is sufficient or not.
		CO4	Apply the basic functionality of Clocks and Calendars to find the solutions for the problems. Analyze the given symbols to understand the hidden meaning of the given expression and finding the solutions. Analyze the given conditions and finding out all the possible arrangements in linear & circular order.
18SC2008	Discrete Mathematics	CO1	Understand the notion of mathematical thinking, mathematical proofs, and algorithmic thinking, and be able to apply them in problem solving.
		CO2	Understand the basics of discrete probability and number theory and be able to apply the methods from these subjects in problem solving.
		CO3	Be able to use effectively algebraic techniques to analyse basic discrete structures and algorithms.
		CO4	Understand some basic properties of graphs and related discrete structures, and be able to relate these to practical examples
18UC3105	Aptitude Builder 2	CO1	Apply the strategies and techniques learnt in carrying out conversations in different contexts. Analyse the different parameters and formats of written technical

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			communication and apply in everyday work and life.
		CO2	Analyse the concepts of critical and analytical reading skills. Apply the strategies and techniques learnt in handling interviews in different contexts.
		CO3	Apply the concepts of Ratio & Proportion, Percentages, Profit &Loss, Simple & Compound Interest, students will be able to solve the problems based on Ratios, problems involving Percentages, problems related to cost price, selling price, profit, loss, marked price and discounts, problems involving interest.
		CO4	Analyze the given series of numbers to predict the next number in the series. Analyze the given set of numbers or letters to find the analogy. Analyze the given data to find the code which is used to encode a given word and use the same code in the process of decoding. Apply the given set of conditions to select a team from a group of members.

Academic Professor I/C

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