

DEPARTMENT NAME	COMPUTER SCIENCE AND ENGINEERING
PROGRAMME NAME	B.E.- COMPUTER SCIENCE AND ENGINEERING
REGULATIONS	R-2022

	<h2>COURSE OUTCOMES (COs)</h2>
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SEMESTER I

COURSE CODE: 22MA1101 COURSE NAME: MATRICES AND CALCULUS

CO1	Compute Eigen values and Eigen vectors of the given matrix and transform given quadratic form into canonical form.
CO2	Apply the concept of differentiation to identify the maximum and minimum values of curve.
CO3	Compute partial derivatives of function of several variables and write Taylor's series for functions with two variables.
CO4	Evaluate multiple integral and its applications in finding area, volume.
CO5	Apply the concept of vector calculus in two and three dimensional spaces

COURSE CODE: 22CY1151 COURSE NAME: ENGINEERING APPLICATIONS OF CHEMISTRY

CO1	List out the chemicals used in food, soaps and detergents, drugs, cosmetics and plastics
CO2	Differentiate hard and soft water and solve the related problems on water purification in domestic as well as in industries.
CO3	Develop knowledge on the basic principles of electrochemistry and understand the causes of corrosion, its consequences to minimize corrosion to improve industrial design
CO4	Develop knowledge about the renewable energy resources and batteries along with the need of new materials to improve energy storage capabilities
CO5	List out the applications of spectroscopic techniques in various engineering fields.

COURSE CODE: 22HE1151 COURSE NAME: ENGLISH FOR ENGINEERS

CO1	To communicate in a professional forum
CO2	To speak or write a content in the proficient language
CO3	To maintain and use appropriate one of the communication.
CO4	To read ,write and present in a professional way.
CO5	To follow the etiquettes in formal communication.

COURSE CODE: 22IT1152	
COURSE NAME: INTRODUCTION TO WEB APPLICATION DEVELOPMENT	
CO1	Basic understanding of development of software life cycle.
CO2	Understanding the basic HTML Tags.
CO3	Designing a simple web application using HTML.
CO4	Understanding about the usage of Cascading Style Sheet.
CO5	Creating a front end Web application using HTML and CSS

COURSE CODE: 22CS1151	
COURSE NAME: PROBLEM SOLVING USING C PROGRAMMING	
CO1	Develop simple algorithms for arithmetic and logical problems.
CO2	Test and execute the programs and correct syntax and logical errors
CO3	Implement conditional branching, iteration and recursion
CO4	Decompose a problem into functions and synthesize a complete program and use arrays, pointers, strings and structures to formulate algorithms and programs.
CO5	Use files to perform read and write operations

COURSE CODE: 22HE1151	
COURSE NAME: ENGLISH FOR ENGINEERS	
CO1	To communicate in a professional forum
CO2	To speak or write a content in the proficient language
CO3	To maintain and use appropriate one of the communication.
CO4	To read ,write and present in a professional way.
CO5	To follow the etiquettes in formal communication.

SEMESTER II

COURSE CODE: 22MA2103	
COURSE NAME: DIFFERENTIAL EQUATIONS AND LINEAR ALGEBRA	
CO1	Apply few methods to solve different types of first order differential equations.
CO2	Evaluate the solutions of higher order ordinary differential equations and its properties.
CO3	Compute the solution of first order partial differential equations.
CO4	Infer the knowledge of vector space
CO5	Infer the knowledge of Inner product space space

COURSE CODE: 22PH2101	
COURSE NAME: BASICS OF MATERIAL SCIENCE	
CO1	Understand the Crystal systems and crystal structures in the field of Engineering
CO2	Illustrate the fundamental of electrical properties of materials
CO3	Discuss concept of acceptor or donor levels and the band gap of a semiconducting materials
CO4	Develop the technology of the magnetic materials and its applications in engineering field
CO5	Understand the advanced technology of new engineering materials in the field of Engineering

COURSE CODE: 22HE2151	
COURSE NAME: EFFECTIVE TECHNICAL COMMUNICATION	
CO1	To the business procedure and promotion skills.
CO2	To make oral and written presentation in corporate forum.
CO3	To schedule official events and participate in official discussions without reluctance.

CO4	To take an effective role and manage in an organizational sector.
CO5	To prepare and demonstrate a professional presentation

COURSE CODE: 22PH2151
COURSE NAME: PHYSICS FOR CIRCUIT ENGINEERING

CO1	C01: Understand the advanced technology of LASER and optical communication in the field of engineering
CO2	C02: Illustrate the fundamental properties of matter
CO3	C03: Discuss the Oscillatory motions of particles
CO4	C04: Understand the dual nature of matter and the Necessity of quantum mechanics.
CO5	C05: Develop the Ultrasonics technology and its applications in NDT.

COURSE CODE: 22IT2251
COURSE NAME: PYTHON PROGRAMMING AND PRACTICES

CO1	Develop algorithmic solutions to simple computational problems
CO2	Read, write, execute by hand simple Python programs
CO3	Structure simple Python programs for solving problems and Decompose a Python program into functions
CO4	Represent compound data using Python lists, tuples, dictionaries
CO5	Read and write data from/to files in Python Programs

COURSE CODE: 22IT2253
COURSE NAME: DYNAMIC WEB DESIGN

CO1	Design simple dynamic web pages
CO2	Develop a web page using prompt and using functions.
CO3	Creation of dynamic web page using Control Statements
CO4	Creating an interactive webpage using Arrays and Objects
CO5	Design a web page that handles Events

COURSE CODE: 22ME2001
COURSE NAME: ENGINEERING PRACTICES

CO1	Fabricate wooden components and pipe connections including plumbing works
CO2	Fabricate simple weld joints.
CO3	Fabricate different electrical wiring circuits and understand the AC Circuits.

COURSE CODE: 22HE2071
COURSE NAME: DESIGN THINKING

CO1	Develop a strong understanding of the Design Process
CO2	Learn to develop and test innovative ideas through a rapid iteration cycle.
CO3	Develop teamwork and leadership skills

COURSE CODE: 22HE2072
COURSE NAME: SOFT SKILLS AND APTITUDE

CO1	Students will analyze interpersonal communication skills. public speaking skills.
CO2	Students will exemplify tautology, contradiction and contingency by logical thinking.
CO3	Students will be able to develop an appropriate integral form to solve all sorts of quantitative problems.
CO4	Students can produce a resume that describes their education, skills, experiences and measurable achievements with proper grammar, format and brevity
CO5	Students will be developed to acquire the ability to use English language with an error while making optimum use of grammar

SEMESTER III

COURSE CODE: 22MA3104
COURSE NAME: DISCRETE MATHEMATICS AND GRAPH THEORY

CO1	Evaluate the notion of mathematical thinking, mathematical proofs, and algorithmic thinking and be able to apply them in problem solving.
CO2	Solve problems using counting techniques and recurrence relations.
CO3	Understand the knowledge about Lattices and Boolean Algebra.
CO4	Apply the properties of graphs and related discrete structures in computer networks.
CO5	Analyze the various types of trees and their properties.

COURSE CODE: 22CS3201
COURSE NAME: DATA STRUCTURES

CO1	Comprehend the working of linear data structures and identify their applications
CO2	Acquire knowledge the most common abstractions for data collections (e.g., stacks, queues).
CO3	Understand the various tree data structures for efficient storage and retrieval of data.
CO4	Apply Algorithms for solving problems like sorting and searching.
CO5	Employ graph data structure for solving real world problems

COURSE CODE: 22CS3202
COURSE NAME: OPERATING SYSTEMS

CO1	Design various Scheduling algorithms
CO2	Design deadlock, prevention and avoidance algorithms.
CO3	Compare and contrast various memory management schemes.
CO4	Design and Implement a prototype file systems.
CO5	Study the distributed operating systems

COURSE CODE: 22CS3251**COURSE NAME: OBJECT ORIENTED PROGRAMMING USING JAVA**

CO1	Apply Java based code for solving low complexity problems
CO2	Utilize Object Oriented Features in Java for solving medium complexity problems
CO3	Exploit polymorphism, abstraction, inheritance and interfaces in Java.
CO4	Develop Packages, Collections and Multi-Threaded Java Applications.
CO5	Utilize appropriate Java Classes to solve data structure based problems.

COURSE CODE: 22CS3203**COURSE NAME: DIGITAL PRINCIPLES AND COMPUTER ORGANIZATION**

CO1	Design various combinational digital circuits using logic gates
CO2	Design sequential circuits and analyze the design procedures
CO3	State the fundamentals of computer systems and analyze the execution of an instruction.
CO4	Explain the structure of processing architectures
CO5	Demonstrate knowledge about state-of-the-art I/O, memory , Interrupts and Interfaces

COURSE CODE: 22CS3003**COURSE NAME: DATA STRUCTURES LABORATORY**

CO1	Understand the methodical way of solving problem.
CO2	comprehend the different methods of organizing large amount of data.
CO3	Implement the different data structures.
CO4	Understand the concepts of Sorting, Searching and Hashing techniques
CO5	Understand graph algorithms for solving real world problems

COURSE CODE: 22CS3001**COURSE NAME: DIGITAL PRINCIPLES AND COMPUTER ORGANIZATION LABORATORY**

CO1	Design various combinational digital circuits using logic gates
CO2	Design sequential circuits and analyze the design procedures
CO3	State the fundamentals of computer systems and analyze the execution of an instruction.
CO4	Explain the structure of processing architectures
CO5	Demonstrate knowledge about state-of-the-art I/O, memory , Interrupts and Interfaces

COURSE CODE: 22CS3002**COURSE NAME: OPERATING SYSTEMS LABORATORY**

CO1	Identify the need of an Linux Operating system
CO2	Know the Manage files of an Linux Operating system
CO3	Understand the need of local Linux users and groups in Linux Operating system
CO4	Know the Storage management method of a Linux Operating system
CO5	Understand the Installation and updation of software packages in Linux Operating system

COURSE CODE: 22HE3071**COURSE NAME: Soft Skills and Aptitude - II**

CO1	Students will avoid the various fallacies that can arise through the misuse of logic
CO2	Students would opt for alternate methods to solve the problems rather than conventional methods.
CO3	Students will heighten their awareness of correct usage of English grammar in writing and speaking
CO4	Students will be concise and clear, using professional language for placements.

COURSE CODE: 22MC3191	
COURSE NAME: ESSENCE OF INDIAN TRADITIONAL KNOWLEDGE	
CO1	Identify the concept of Traditional knowledge and its importance.
CO2	Explain the need and importance of protecting traditional knowledge.
CO3	Explain the need and importance of Itihas and Dharma Shastra.
CO4	Interpret the concepts of Intellectual property to protect the traditional knowledge.
CO5	Interpret the concepts of indian philosophy to protect the traditional knowledge.

COURSE CODE: 22CS3253	
COURSE NAME: CLEAN CODING AND DEVOPS	
CO1	Understand the importance of comments in the applications.
CO2	Understand the data and object antisymmetric.
CO3	Understand Cloud computing concepts.
CO4	Explain why DevOps on cloud and various DevOps services available on IBM Cloud.

SEMESTER IV

COURSE CODE: 22MA4152	
COURSE NAME: Applied Statistics with R Programming and Queuing theory	
CO1	Understand the concepts of random variables.
CO2	Express the phenomenon of two dimensional random variables..
CO3	Compute correlation and predict unknown values using regression together with R studio.
CO4	Understand the concepts of statistical methods for testing the hypothesis along with R studio.
CO5	Identify the queuing models in the given system, analyze the result.

COURSE CODE: 22CS4201	
COURSE NAME: DATABASE MANAGEMENT SYSTEMS	
CO1	Design database using ER model
CO2	Construct SQL Queries using relational algebra and normalize the database
CO3	Construct queries to handle transaction processing and maintain consistency of the database
CO4	Compare and contrast various indexing strategies and apply the knowledge to tune the performance of the database.
CO5	Appraise how advanced databases differ from Relational Databases and find a suitable database for the given requirement

COURSE CODE: 22CS4203	
COURSE NAME: SOFTWARE DESIGN WITH UML	
CO1	Understand and gain knowledge to implement projects using OO concepts.
CO2	Understand the functional requirements of UML analysis and design diagrams.
CO3	Apply the UML diagrams to understand the conceptual classes and class hierarchies
CO4	Apply appropriate design patterns
CO5	Understand the concepts of use case modeling

COURSE CODE: 22CS4202**COURSE NAME: MICROPROCESSORS AND MICRO CONTROLLERS**

CO1	Design and implement programs on 8085 AND 8086 microprocessor
CO2	Apply the concepts to implement ALP using 8086.
CO3	Design Memory Interfacing circuits and bus structure
CO4	Design various interfacing and its programming methodologies
CO5	Evaluate the architecture of 8051.

COURSE CODE: 22CS4251**COURSE NAME: DESIGN AND ANALYSIS OF ALGORITHM**

CO1	Analyze the efficiency of recursive and non-recursive algorithms mathematically.
CO2	Analyze the efficiency of brute force, divide and conquer, decrease and conquer, Transform and conquer algorithmic techniques
CO3	Implement and analyze the problems using dynamic programming and greedy algorithmic techniques.
CO4	Solve the problems using iterative improvement techniques for optimization
CO5	Compute the limitations of algorithmic power and solve the problems using backtracking and branch and bound techniques

COURSE CODE: 22CS4001**COURSE NAME: DATABASE MANAGEMENT SYSTEMS LABORATORY**

CO1	Use typical data definitions and manipulation commands
CO2	Design applications to test Nested and Join Queries
CO3	Implement simple applications that use Views
CO4	Critically analyze the use of Tables, Views, Functions and Procedures
CO5	Implement applications that require a Front-end Tool

COURSE CODE: 22CS4204**COURSE NAME: DATA VISUALIZATION**

CO1	Know the history of data visualization and its connection with computer graphics
CO2	Students understand the foundations and characteristics of data, which forms the beginning of the visualization pipeline
CO3	Understand the role of user interaction within visualizations, understand the visualization design process.
CO4	Students know some commercial data visualization packages with functionality.

COURSE CODE: 22CS4003**COURSE NAME: DATA VISUALIZATION LABORATORY**

CO1	Know the history of data visualization and its connection with computer graphics
CO2	Students understand the foundations and characteristics of data, which forms the beginning of the visualization pipeline
CO3	Understand the role of user interaction within visualizations, understand the visualization design process
CO4	Students know some commercial data visualization packages with functionality

COURSE CODE: 22CS4002

**COURSE NAME: MICROPROCESSORS AND MICROCONTROLLERS
LABORATORY**

CO1 Write ALP Programmes for Arithmetic Operations

CO2 Write ALP for arithmetic and logical operations in 8086 and 8051

CO3 Generate waveforms using Microprocessors.

CO4 Explain the difference between simulator and Emulator

CO5 Execute Programs in 8051

COURSE CODE: 22HE4071


COURSE NAME: Soft Skills and Aptitude - III

CO1 Students will excel in the complex reasoning.

CO2 Students will be proficient to create and verify their own conjectures.

CO3 Imbibe effective relevant knowledge in English.

CO4 Students will identify different life skills required in personal and professional life.

DEPARTMENT NAME	COMPUTER SCIENCE AND ENGINEERING
PROGRAMME NAME	B.E.- COMPUTER SCIENCE AND ENGINEERING
REGULATIONS	R-2019
	COURSE OUTCOMES (COs)

SEMESTER V

COURSE CODE: 21CS5201

COURSE NAME: THEORY OF COMPUTING

CO1	Understand the theoretical concepts of automata and equivalence of automata.
CO2	Remember the automata in applying to obtain regular expressions and languages.
CO3	Apply the normalization in context free grammar to obtain optimized CFG.
CO4	Understand PDA and turing machines and apply for making mathematical models.
CO5	Understand the decidability and tractability problems and apply for developed models.

COURSE CODE: 21CS5202

COURSE NAME: COMPUTER NETWORKS

CO1	Learn about the Protocol Layering and Physical Level Communication.
CO2	Understand the Data Communication System and the purpose of Layered Architecture.
CO3	Analyze the concepts of Routing Methods and Sub netting.
CO4	Design protocols for various functions in the Network.
CO5	Understand the functions and Protocols of the Transport Layer.

COURSE CODE: 21EC5231

COURSE NAME: PRINCIPLES OF MICROPROCESSORS AND MICRO CONTROLLERS

CO1	Design and implement programs on 8086 microprocessor.
CO2	Design I/O circuits.
CO3	Design Memory Interfacing circuits.
CO4	Design and implement 8051 microcontroller based systems.
CO5	Design various interfacing and its programming methodologies.

COURSE CODE: 21CS5252

COURSE NAME: OBJECT ORIENTED ANALYSIS AND DESIGN

CO1	Express software design with UML diagrams.
CO2	Design software applications using OO concepts.
CO3	Identify various scenarios based on software requirements.
CO4	Transform UML based software design into pattern based design using design patterns.
CO5	Understand the various testing methodologies for OO software.

COURSE CODE: 21EC5031	
COURSE NAME: PRINCIPLES OF MICROPROCESSORS AND MICROCONTROLLERS LABORATORY	
CO1	Write ALP programmes for Arithmetic Operations.
CO2	Write ALP for arithmetic and logical operations in 8086 and 8051.
CO3	Generate waveforms using Microprocessors.
CO4	Execute Programs in 8051.
CO5	Write ALP Programmes for Arithmetic Operations.

COURSE CODE: 21CS5253	
COURSE NAME: DATA MINING AND WAREHOUSING	
CO1	Explain data warehouse, OLAP technology concepts.
CO2	Discuss the basic concepts of Data Mining..
CO3	Explain the concepts of data preprocessing and frequent patterns.
CO4	Demonstrate various classification algorithms using mining tool.
CO5	Represent concepts of prediction and clustering

COURSE CODE: 21CS5601	
COURSE NAME: DATA STRUCTURES AND DESIGN	
CO1	Comprehend the working of linear data structures and identify their applications.
CO2	Apply recursion on specific applications
CO3	Understand the various tree data structures for efficient storage and retrieval of data.
CO4	Employ graph data structure for solving real world problems
CO5	Apply suitable methods for efficient data access through hashing

COURSE CODE: 21CS5205	
COURSE NAME: PUBLIC KEY INFRASTRUCTURE AND TRUST MANAGEMENT	
CO1	Distinguish between public key technology and a public key infrastructure.
CO2	Understand the relationship of identity management to PKI
CO3	Understand the components of a public key infrastructure.
CO4	Understand the issues related to Trust management mechanisms.
CO5	Understand Secure Crypto protocols like SSL and so on.

COURSE CODE: 21CS5206	
COURSE NAME: WEB TECHNOLOGY	
CO1	Construct a basic website using HTML and Cascading Style Sheets
CO2	Build dynamic web page with validation using Java Script objects and by applying different event handling mechanisms
CO3	Develop server side programs using Servlets and JSP
CO4	Construct simple web pages in PHP
CO5	Represent data in XML format

COURSE CODE: 21HE5071
COURSE NAME: SOFT SKILLS - I

CO1	Students will have clarity on their career exploration process and to match their skills and interests with a chosen career path.
CO2	Students will develop knowledge, skills, and judgment around human communication that facilitate their ability to work collaboratively with others.
CO3	Students will understand how teamwork can support leadership skills.
CO4	Students will be able to make sense of problems, develop strategies to find solutions, and persevere in solving them.
CO5	Students will demonstrate an enhanced ability to draw logical conclusions and implications to solve logical problems.

COURSE CODE: 21HE5072
COURSE NAME: DESIGN THINKING

CO1	Develop a strong understanding of the Design Process.
CO2	Learn to develop and test innovative ideas through a rapid iteration cycle.
CO3	Develop teamwork and leadership skills.

COURSE CODE: 21CS5251
COURSE NAME: INTRODUCTION TO DESIGN THINKING

CO1	Students develop a strong understanding of the Design Process and how it can be applied in a variety of business settings.
CO2	Students learn to build empathy for target audiences from different "cultures".
CO3	Students learn to research and understand the unique needs of a company around specific challenges.
CO4	Students learn to develop and test innovative ideas through a rapid iteration cycle.
CO5	Students learn how to map insights from user research.

COURSE CODE: 21CS5351
COURSE NAME: INTERNET AND WEB TECHNOLOGY

CO1	Understand the concepts of OOP paradigm
CO2	Understand the basics of world wide web.
CO3	Understand the Principles behind the design and construction of Web applications.
CO4	Apply the concepts of JDBC.
CO5	Understand about server side programming.



COURSE OUTCOMES (COs)

SEMESTER VI

COURSE CODE: 21CS6181

COURSE NAME: PRINCIPLES OF MANAGEMENT

CO1	Understand the functions and responsibilities of managers
CO2	Interpret the planning, policies, various tools and techniques.
CO3	Solve organizational problems and develop optimal managerial decisions.
CO4	Importance of proper vocabularies to articulate ones own position and communicate effectively.
CO5	Grasp both qualitative and quantitative information and formulate best control methods.

COURSE CODE: 21CS6201

COURSE NAME: ARTIFICIAL INTELLIGENCE

CO1	Understand the various characteristics of Intelligent agents
CO2	Learn the different search strategies in AI
CO3	Learn to represent knowledge in solving AI problems
CO4	Understand the different ways of designing software agents
CO5	Learn about the various applications of AI.

COURSE CODE: 21CS6251

COURSE NAME: COMPILER DESIGN

CO1	Learn the design principles of a Compiler.
CO2	Learn about the Lexical analysis.
CO3	Learn about Syntax analysis.
CO4	Apply the concepts for syntax directed translation and run time environment.
CO5	Apply the concepts of code optimization and code generation.

COURSE CODE: 21CS6252

COURSE NAME: MOBILE COMPUTING AND APPLICATION DEVELOPMENT

CO1	Explain the basics of mobile telecommunication systems and develop mobile applications using GUI, Layouts and Event Listener.
CO2	Illustrate the generations of telecommunication systems in wireless networks and to develop mobile applications using GPS
CO3	Determine the functionality of MAC, network layer and Identify a routing protocol for a given Ad hoc network.
CO4	Explain the functionality of Transport layer.
CO5	Understand about the functionality of Application Layer and to analyze and discover own mobile application for simple needs.

COURSE CODE: 21CS6306	
COURSE NAME: DEVELOPMENT OF MACHINE LEARNING MODELS	
CO1	Analyze methods and theories in the field of machine learning
CO2	Understand an introduction to the basic principles, techniques
CO3	Watson studio helps enterprises simplify the process of experimentation to deployment, speed data exploration and model development and training
CO4	Demonstrate AI model. Analyze AI model
CO5	Analyze methods and theories in the field of machine learning

COURSE CODE: 21CS6253	
COURSENAME:PREDICTIVE MODELING	
CO1	Understand design, build, evaluate and implement predictive models for various business applications.
CO2	Compare the underlying predictive modeling techniques.
CO3	Select appropriate predictive modeling approaches.
CO4	Apply predictive modeling approaches using a suitable package such as SPSS Modeler. To advice on when and how to use each model. Also learn how to combine two or more models to improve prediction
CO5	Understand design, build, evaluate and implement predictive models for various business applications.

COURSE CODE: 21HE6071	
COURSE NAME: SOFT SKILLS - II	
CO1	Students will have learnt to keep going according to plan, coping with the unfamiliar, managing disappointment and dealing with conflict.
CO2	Students will Actively participate meetings, Group Discussions / interviews, and prepare & deliver presentations
CO3	Students will define professional behavior and suggest standards for appearance, actions, and attitude in a business environment
CO4	Students will be able to apply quantitative reasoning and mathematical analysis methodologies to understand and solve problems.
CO5	Students will excel in complex reasoning.

COURSE CODE: 21HE6072	
COURSE NAME: INTELLECTUAL PROPERTY RIGHTS	
CO1	Identify different types of Intellectual Properties (IPs), the right of ownership, scope of protection as well as the ways to create and to extract value from IP.
CO2	Recognize the crucial role of IP in organizations of different industrial sectors for the purposes of product and technology development.
CO3	Identify, apply and assess ownership rights and marketing protection under intellectual property law as applicable to information, ideas, new products and product marketing.
CO4	Identify different types of trademarks and procedure for registration
CO5	Recognize the concept of design, geographical indication and procedure for registration

COURSE CODE: 21CS6303	
COURSE NAME: INTERNET OF THINGS	
CO1	Explain the concept of IoT and various building blocks
CO2	Understand various architectures and working of state-of-the-art IoT systems
CO3	Design IoT system using Rasperry Pi
CO4	Apply data analytics related to IoT and evaluate security issues related to the Internet of things.
CO5	Analyze applications of IoT in real time scenario.

COURSE CODE: 21CS6304	
COURSE NAME: BIG DATA ANALYTICS AND TOOLS	
CO1	Understand the concepts of OOP paradigm.
CO2	Understand the basics of world wide web.
CO3	Understand the Principles behind the design and construction of Web applications.
CO4	Apply the concepts of JDBC.
CO5	Understand about server side programming.

COURSE CODE: 21CS6601	
COURSE NAME: Databases and SQL	
CO1	Understand the functional components of DBMS and datamodels
CO2	Able to write SQL queries
CO3	Analyze a system and design ER diagram and Relational Schema
CO4	Able to perform normalization and write queries using normalization criteria
CO5	Illustrate the concepts for transaction processing, concurrency control and recovery procedures for RDBMS.

COURSE CODE: 21CS6602	
COURSE NAME: Principles of Internet Of Things	
CO1	Associate and classify the architecture of various communication systems
CO2	Elaborate the IoT infrastructure and data processing methodologies
CO3	Interpret the various networking protocols used in IoT
CO4	Acquire the concepts of fog and cloud computing in IoT
CO5	Illustrate the various real-life applications of IoT

COURSE CODE: 21CS6205	
COURSE NAME: Introduction to block chain	
CO1	Understand the basic concepts of distributed database and cryptography
CO2	Evaluate block chain systems and its applications.
CO3	Analyze the distributed consensus and energy utilization
CO4	Evaluate the crypto currency related performance measurements.
CO5	Apply the logics crypto currency and block chain technologies.

COURSE CODE: 21CS6206**COURSE NAME: Cryptocurrency**

CO1	Understand emerging abstract models for Blockchain Technology
CO2	Identify major research challenges and technical gaps existing between theory and practice in the crypto currency domain.
CO3	It provides conceptual understanding of the function of Blockchain as a method of securing distributed ledgers, how consensus on their contents is achieved, and the new applications that they enable.
CO4	Apply hyperledger Fabric and Ethereum platform to implement the Block chain Application
CO5	Understand the applications of block chain technologies

COURSE CODE: 21CS6207**COURSE NAME: FRONT END DEVELOPMENT WITH REACT AND TYPESCRIPT**

CO1	Explore the fundamental concepts of React
CO2	Develop applications in React Framework.
CO3	Develop applications using Redux and GraphQL.
CO4	Design Programs using TypeScript.
CO5	Implement applications using Typescript and React.

COURSE CODE: 21CS6258**COURSE NAME: Back End Development with NodeJS**

CO1	Understand the basics of javascript and Node JS
CO2	Implement and architect the server side of the web application
CO3	Develop Connection to database
CO4	Architect RESTful APIs , Express.js and Testing.
CO5	Implement a full-stack Single Page Application using React, NodeJS and MongoDB and deploy on Cloud.



COURSE OUTCOMES (COs)

SEMESTER VII

COURSE CODE: 19CS7201

COURSE NAME: CRYPTOGRAPHY AND NETWORK SECURITY

CO1	Explain the fundamentals of networks security, security architecture, threats and vulnerabilities.
CO2	Classify the symmetric encryption techniques.
CO3	Illustrate various Public key cryptographic techniques
CO4	Discuss on the various Authentication schemes.
CO5	Understand various Security practices and System security standards.

COURSE CODE: 19CS7202

COURSE NAME: CLOUD COMPUTING

CO1	Understand the concept of cloud computing.
CO2	Visualizes the different clouds models with respect to services and cloud ecosystem.
CO3	Knowledge of cloud offering and cloud management.
CO4	Understand the different cloud enabling technologies.
CO5	Understand about different implementations of virtualizations, management software.

COURSE CODE: 19CS7002

COURSE NAME: SECURITY LABORATORY

CO1	Develop code for classical Encryption Techniques to solve the problems.
CO2	Build cryptosystems by applying symmetric and public key encryption algorithms.
CO3	Construct code for authentication algorithms
CO4	Develop a signature scheme using Digital signature standard
CO5	Demonstrate the network security system using open source tools

COURSE CODE: 19CS7001

COURSE NAME: CLOUD COMPUTING LABORATORY

CO1	Configure various virtualization tools such as Virtual Box, VMware workstation.
CO2	Design and deploy a web application in a PaaS environment.
CO3	Learn how to simulate a cloud environment to implement new schedulers.
CO4	Install and use a generic cloud environment that can be used as a private cloud.
CO5	Manipulate large data sets in a parallel environment.

COURSE CODE: 19CS7251	
COURSE NAME: MACHINE LEARNING TECHNIQUES	
CO1	Explain theory underlying machine learning.
CO2	Construct algorithms to learn linear and non-linear models.
CO3	Implement data clustering algorithms.
CO4	Construct algorithms to learn tree and rule-based models.
CO5	Apply reinforcement learning techniques for real life problems.

PROFESSIONAL ELECTIVE III

COURSE CODE: 19CS7302	
COURSE NAME: CYBER FORENSICS	
CO1	Explain the basics of computer forensics.
CO2	Use a number of different computer forensic tools to a given scenario.
CO3	Apply and validate forensics data.
CO4	Understand about Ethical hacking.
CO5	Implement real-world hacking techniques in Ethical hacking.

COURSE CODE: 19CS7305	
COURSE NAME: SOFTWARE TESTING	
CO1	Prepare test planning based on the document.
CO2	Design test cases suitable for a software development for different domains.
CO3	Use automatic testing tools.
CO4	Develop and validate a test plan.
CO5	Document test plans and test cases designed.

COURSE CODE: 19CS7901	
COURSE NAME: PROJECT PHASE ONE	
CO1	Analyze the problem, formulation and solution of the selected project
CO2	Develop solutions for contemporary problems using modern tools for sustainable development.
CO3	Demonstrate ethical and professional sustainability while working in a team and communicate effectively for the benefit of the society.
CO4	Understand the engineering, finance and management principles.

PROFESSIONAL ELECTIVE V

COURSE CODE: 19CS8307	
COURSE NAME: USER INTERFACE DESIGN	
CO1	Learn the basics of User Interface Design.
CO2	Analyze the requirements of User Interface Design Process and Business functions.
CO3	Understand and analyze various controls of screen, web systems, windows and menus.
CO4	Design web pages using multimedia.
CO5	Analyze the user interface requirements and design process.

COURSE CODE: 19CS8311R

COURSE NAME: INTRODUCTION TO INTERNET OF THINGS


CO1	Explain the concept of IoT and various building blocks
CO2	Understand various architectures and working of state-of-the-art IoT systems
CO3	Design IoT system using Raspberry Pi
CO4	Apply data analytics related to IoT and evaluate security issues related to the Internet of things.
CO5	Analyze applications of IoT in real time scenario.

INDUSTRY CORE COURSES

COURSE CODE: 19CS7306

COURSE NAME: AI ANALYST

CO1	Recognize various machine learning techniques utilized in designing AI systems and applications to address real-world problems.
CO2	Utilize these techniques in applications that involve perception, reasoning, and learning.
CO3	Perform analysis and design of a real-world problem to facilitate implementation and gain comprehension of the dynamic behavior of a system.
CO4	Explain the role of agents and how it is related to the environment and the way of evaluating it and how agents can act by establishing goals
CO5	Acquire the knowledge of real-world Knowledge representation


Chairman, Board of Studies
Chairman - BoS
CSE - HiCET


Dean-Academics
Dean (Academics)
HiCET



Hindusthan College of Engineering and Technology
(An Autonomous Institution, Affiliated to Anna University)
Coimbatore 641 032

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

COURSE OUTCOMES

The curriculum of the program is designed with core and elective courses by considering Vision, Mission, Program Educational Objectives (PEOs), Program Outcomes (POs), Program Specific Outcomes (PSOs), model curriculum of premier institutions and feedback received from the stakeholders.

Course Outcomes (CO) are statements that are framed in the view of what the learners will demonstrate by the completion of a course. Courses have five course outcomes depending on its significance which are mapped with the POs and PSOs.

SEMESTER I

S. No.	Course	Course Name	CO	Statement
1.	C101	Matrices And Calculus	C101.1	Compute Eigen values and Eigen vectors of the given matrix and transform given quadratic form into canonical form.
			C101.2	Apply the concept of differentiation to identify the maximum and minimum values of curve.
			C101.3	Compute partial derivatives of function of several variables and write Taylor's series for functions with two variables
			C101.4	Evaluate multiple integral and its applications in finding area, volume
			C101.5	Apply the concept of vector calculus in two and three dimensional spaces
2.	C102	Chemistry For Circuit Engineering	C102.1	List out the chemicals used in food, soaps and detergents, drugs, cosmetics and plastics
			C102.2	Differentiate hard and soft water and solve the related problems on water purification in domestic as well as in industries

S. No.	Course	Course Name	CO	Statement
			C102.3	Develop knowledge on the basic principles of electrochemistry and understand the causes of corrosion, its consequences to minimize corrosion to improve industrial design
			C102.4	Develop knowledge about the renewable energy resources and batteries along with the need of new materials to improve energy storage capabilities
			C102.5	List out the applications of spectroscopic techniques in various engineering fields
3.	C103	English For Engineers	C103.1	To communicate in a professional forum
			C103.2	To speak or write a content in the proficient language
			C103.3	To maintain and use appropriate one of the communication
			C103.4	To read ,write and present in a professional way
			C103.5	To follow the etiquettes in formal communication
4.	C104	Electron Devices	C104.1	Explain the structure and working operation of PN junction and Zener diodes
			C104.2	Demonstrate the characteristics of different types of BJT and compare
			C104.3	Infer and compare the characteristics of JFET and MOSFET
			C104.4	Understand and relate various special semiconductor devices
			C104.5	Interpret and associate the usage of different power and display devices
5.	C105	Python Programming And Practices	C105.1	Develop algorithmic solutions to simple computational problems
			C105.2	Read, write, execute by hand simple Python programs
			C105.3	Structure simple Python programs for solving problems and Decompose a Python program into functions
			C105.4	Represent compound data using Python lists, tuples, dictionaries
			C105.5	Read and write data from/to files in Python Programs
6.	C106	Object Oriented Programming Using Python	C106.1	Understanding the basic concepts to read, write and execute simple python programs
			C106.2	Apply the conditional and looping concepts for solving problems

S. No.	Course	Course Name	CO	Statement
			C106.3	Apply functions to decompose larger complex programs
			C106.4	Understanding the OOPS concepts and writing programs using classes and objects
			C106.5	Understand to read and write data from/to files in Python Programs

SEMESTER II

S. No.	Course	Course Name	CO	Statement
7	C107	Differential Equations And Laplace Transform	C107.1	Apply few methods to solve different types of first order differential equations
			C107.2	Evaluate the solutions of higher order ordinary differential equations and its properties
			C107.3	Compute the solution of first order partial differential equations
			C107.4	Apply Laplace transform and its properties to solve periodic functions
			C107.5	Solve certain linear differential equations using inverse Laplace Transform
8	C108	Environmental Studies	C108.1	Discuss the importance of ecosystem and biodiversity for maintaining ecological balance.
			C108.2	Identify the causes of environmental pollution and hazards due to manmade activities
			C108.3	Develop an understanding of different natural resources including renewable resources
			C108.4	Demonstrate an appreciation for need for sustainable development and understand the various social issues and solutions to solve the issues
			C108.5	Describe about the importance of women and child education, existing technology to protect environment
9	C109	Basics of Material Science	C109.1	Understand the Crystal systems and crystal structures in the field of Engineering
			C109.2	Illustrate the fundamental of electrical properties of materials

S. No.	Course	Course Name	CO	Statement
			C109.3	Discuss concept of acceptor or donor levels and the band gap of a semiconducting materials
			C109.4	Develop the technology of the magnetic materials and its applications in engineering field
			C109.5	Understand the advanced technology of new engineering materials in the field of Engineering
10	C110	Physics For Circuit Engineering Programme	C110.1	Understand the advanced technology of LASER and optical communication in the field of engineering
			C110.2	Illustrate the fundamental properties of matter
			C110.3	Discuss the Oscillatory motions of particles
			C110.4	Understand the dual nature of matter and the Necessity of quantum mechanics
			C110.5	Develop the Ultrasonic technology and its applications in NDT
11	C111	Effective Technical Communication	C111.1	Understand about basic grammar and elements of professional communication.
			C111.2	Assess formal and technical communication
			C111.3	Apply the basic elements of grammar and communication in professional situation.
			C111.4	Analyze and interpret different styles of correspondence.
			C111.5	Compose official letters and technical proposals and make presentations.
12	C112	Programming Using C	C112.1	Develop simple algorithms for arithmetic and logical problems
			C112.2	Test and execute the programs and correct syntax and logical errors
			C112.3	Implement conditional branching, iteration and recursion
			C112.4	Decompose a problem into functions and synthesize a complete program and use arrays, pointers, strings and structures to formulate algorithms and programs
			C112.5	Use files to perform read and write operations
13	C113	Java Fundamentals	C113.1	Understanding the OOPS and basic concepts of Java
			C113.2	Understand how to program using user defined packages and interfaces

S. No.	Course	Course Name	CO	Statement
			C113.3	Apply multithreading concepts based on appropriate problems
			C113.4	Understand generics and collections framework in java
			C113.5	Apply event handling classes and swing concepts to create different applications in java
14	C114	Engineering Practices	C114.1	Build wooden components and pipe connections including plumbing works
			C114.2	Develop simple weld joints
			C114.3	Create different electrical wiring circuits and understand the AC Circuits.
			C114.4	Construct wooden components and pipe connections including plumbing works.
			C114.5	Create simple weld joints.

SEMESTER III

S. No.	Course	Course Name	CO	Statement
15	C201	Complex Analysis And Transforms	C201.1	Understand the concept of analytic functions and discuss its properties
			C201.2	Evaluate various integrals by Cauchy's residue theorem and classify singularities and derive Laurent series expansion
			C201.3	Understand the principles of Fourier series which helps them to solve physical problems of Engineering
			C201.4	Apply Fourier transform technique which extend its application.
			C201.5	Illustrate the Z- transforms for analyzing discrete-time signals and systems
16	C202	Electronic Circuits	C202.1	Understanding the need, methods, and thermal stability of biasing BJT and FET, including biasing for switching circuits.

S. No.	Course	Course Name	CO	Statement
			C202.2	Analyze small signal amplifiers using h-parameters and understand their frequency responses and configurations, including CE and multistage amplifiers.
			C202.3	Classify and analyze large signal amplifiers and wave shaping circuits like integrators, differentiators, clipper, clamper and diode comparators.
			C202.4	Comprehend the effects of negative feedback on gain, frequency response, distortion noise, and impedance in various feedback configurations.
			C202.5	Analyze the principles, design and operation of various oscillators and multi vibrators, including Hartley, Colpitt's, RC phase shift.
17	C203	Signals And Systems	C203.1	Understand and apply signal representation, Nyquist theorem, and signal reconstruction.
			C203.2	Analyze CT signals using Fourier and Laplace transform, including ROC and properties.
			C203.3	Examine CT systems using Fourier and Laplace transforms to derive transfer functions and appraise impulse responses.
			C203.4	Utilize DTFT and z-transform for signal analysis, including convolution operations.
			C203.5	Represent and evaluate DT systems by applying DTFT and z- transform to determine transfer functions and system responses.
18	C204	Digital Electronics	C204.1	Understand Boolean operations, algebra simplification methods, and implement logic gates using NAND and NOR.
			C204.2	Structuring and design combinational circuits for arithmetic operations and components including parity checkers.
			C204.3	Analyze and design synchronous sequential circuits, including flip-flops, counters, and shift registers, using state diagram and tables.

S. No.	Course	Course Name	CO	Statement
			C204.4	Integrating and design asynchronous sequential circuits with state and flow table reduction, race-free state assignment, and hazard elimination.
			C204.5	Construct memory classification, operation, decoding, PLDs, and the characteristics of various digital logic families like TTL,ECL, and CMOS.
19	C205	Circuits And Networks	C205.1	Understand circuit element, laws (Ohm's, Kirchoff's),and analyze circuits using mesh and nodal methods for both DC and AC scenarios.
			C205.2	Apply network reduction techniques/network theorems and determine behavior of the given DC and AC circuits.
			C205.3	Analyze series and parallel resonance, impedance variation with frequency, Q factor, and coupled circuits.
			C205.4	Evaluate natural, forced, and transient responses of RC, RL, and RLC circuits to various excitation signals.
			C205.5	Comprehend and assess two port networks utilizing Z,Y, ABCD, and H parameter, and their interrelationships(series, parallel, cascade).
20	C206	Object Oriented Programming Using Java	C206.1	Understand the concept of OOPs.
			C206.2	Simulate the syntax, semantics and classes in Java language.
			C206.3	Design program using User Defined packages and interfaces.
			C206.4	Develop applications using Exception handling in java
			C206.5	Implement the use of multithread programming.
21	C207	Electronics Circuits Lab	C207.1	Design and analyze the biasing circuits
			C207.2	Construct and analyze various amplifier configurations
			C207.3	Construct and analyze the performance of signal generators for a specified frequency
			C207.4	Design and analyze the multi vibrator circuits
			C207.5	Analyze the performance of electronic circuits using PSPICE.
22.	C208	Digital Electronics Lab	C208.1	Construct the performance of various combinational circuits.

S. No.	Course	Course Name	CO	Statement
			C208.2	Implement and develop various synchronous logic circuits.
			C208.3	Analyze the performance of various combinational circuits.
			C208.4	Design and develop various synchronous logic circuits.
			C208.5	Formulate the design procedure of combinational and sequential digital circuits using Hardware Description Language
			23	C209
			C209.2	Identify technical ideas, strategies and methodologies.
			C209.3	Develop solutions using new tools & techniques, test and validate the results for betterment of mankind
			C209.4	Prepare report and present the oral demonstrations
			C209.5	Identify the requirement and develop the design solutions.

SEMESTER IV

S. No.	Course	Course Name	CO	Statement
24	C210	Intellectual Property Rights (IPR) And Start-Ups	C210.1	Identify different types of Intellectual Properties (IPs), the right of ownership, scope of protection as well as the ways to create and to extract value from IP
			C210.2	Recognize the crucial role of IP in organizations of different industrial sectors for the purposes of product and technology development
			C210.3	Identify, apply and assess ownership rights and marketing protection under intellectual property law as applicable to information, ideas, new products and product marketing
			C210.4	Identify different types of trademarks and procedure for registration
			C210.5	Recognize the concept of design, geographical indication and procedure for registration

S. No.	Course	Course Name	CO	Statement
S. No	Course	Course Name	CO	Statement
25	C211	Electro Magnetic Fields	C211.1	Interpret complex electromagnetic phenomena, applying concepts such as vector calculus, integral theorems and fundamental laws
			C211.1	Interpret complex electromagnetic phenomena, applying concepts such as vector calculus, integral theorems and fundamental laws
			C211.2	Analyze electric field characteristics in both conductors and dielectrics and along boundaries of different media
			C211.3	Apply the magnetic field laws to calculate the magnetic potentials and inductance for various configurations
			C211.4	Apply these concepts of Maxwell's equations to analyze and predict electromagnetic wave propagation in various media.
			C211.5	Interpret the behavior of electromagnetic waves under normal and oblique incidences on perfect conductors and dielectrics
26	C212	Analog Communication	C212.1	Apply the concepts in selecting suitable amplitude modulation techniques for various applications
			C212.2	Apply the concepts in selecting appropriate angle modulation techniques for a message signal
			C212.3	Analyze the impact of noise on analog communication systems
			C212.4	Interpret the concepts of modulation schemes and apply in the design of communication systems
			C212.5	Apply the concepts in selecting appropriate analog pulse modulation technique for various applications
27	C213	Linear Integrated Circuits	C213.1	Understand the characteristics of Op-amp
			C213.2	Create any one application of Op-amp
			C213.3	Apply the various wave generating and shaping circuits
			C213.4	Apply ADC and DAC for Op-amp applications

S. No.	Course	Course Name	CO	Statement
			C213.5	Analyze the concepts of PLL and voltage regulators
S. No.	Course	Course Name	CO	Statement
28	C214	Transmission Lines And Wave Guides	C214.1	Interpret the physical meaning of transmission lines
			C214.2	Determine transmission line characteristics at radio frequencies
			C214.3	Solve impedance matching problems in transmission lines using tools such as Smith chart
			C214.4	Understand and analyze the behavior of waves between parallel planes
			C214.5	Develop solutions using the governing equations for wave propagation in rectangular and circular waveguides
29	C215	Control Systems	C215.1	Compute the mathematically modeling of control systems
			C215.2	Analysis the time domain specifications and steady state errors concept
			C215.3	Interpret the concepts of various frequency response plots
			C215.4	Analysis the stability using root locus and Routh Hurwitz
			C215.5	Illustrate the concepts of state space and implement in a state variable approach
30	C216	Data Communication and Networks	C216.1	Demonstrate the networking strategies
			C216.2	Identify the technical issues related to networking technologies
			C216.3	Discriminate various routing techniques
			C216.4	Illustrate the web applications
			C216.5	Implement various network algorithms and protocols
31	C217	Linear Integrated Circuits Lab	C217.1	Interpret about the basic concepts for the circuit configuration for the design of linear integrated circuits and develops skill to solve engineering problems
			C217.2	Develop skills to design simple circuits using OP-AMP

S. No.	Course	Course Name	CO	Statement
			C217.3	Develop skills to design simple filter circuits and various amplifiers and solve problems
			C217.4	Analyze various multiplier circuits
			C217.5	Design various modulators and demodulators
S. No.	Course	Course Name	CO	Statement
32	C218	Analog Communication Laboratory	C218.1	Analyze the performance of various modulation and demodulation methods
			C218.2	Design the Transmitters and Receivers for analog communication and analyze the impact of noise in analog communication
			C218.3	Able to analyze multiplexing techniques in signal reception
			C218.4	Evaluate Spectral Characteristics of AM
			C218.5	Assess Spectral Characteristics of FM

SEMESTER V

S. No.	Course	Course Name	CO	Statement
33	C301	Microprocessor and Microcontroller	C301.1	Understand 8086 microprocessor and execute the assembly Language programs using 8086 microprocessor
			C301.2	Interpret System Bus Structure and implement the Multiprocessor Configuration.
			C301.3	Assess the various peripheral devices interfacing with 8086 microprocessors.
			C301.4	Analyze 8051 microcontroller and execute the assembly Language programs using 8051 microcontroller
			C301.5	Design 8051 microcontroller for interfacing various peripheral devices and construct the water level indicator and Zigbee interfacing.
34	C302	Transmission lines and Wave Guides	C302.1	Understand the characteristics of transmission lines and its losses
			C302.2	Analyze the standing wave ratio and input impedance in high frequency transmission lines

S. No.	Course	Course Name	CO	Statement
			C302.3	Analyze impedance matching for high frequency lines using smith charts
			C302.4	Interpret the behavior of guided waves between parallel planes
			C302.5	Assess the Characteristics of guided waves in rectangular and circular waveguides
35	C303	VLSI Design	C303.1	Understand the basics of to analyze CMOS and MOS transistors
			C303.2	Analyze passive components required for physical design.
			C303.3	Analyze timing issues of sequential logic
			C303.4	Understand advanced semiconductor processing materials and data processing architecture
			C303.5	Acquire knowledge on the programming concepts of Verilog HDL language.
36	C304	Professional Elective I Measurement and Instrumentation	C304.1	Understand the measurements concept and usage of AC/DC bridges.
			C304.2	Identify various types of transducers and their working.
			C304.3	Explain the different types of function generators and CRO.
			C304.4	Explore knowledge on Digital instruments.
			C304.5	Learn the various process of computer-controlled instrumentation.
37	C305	Data Communication and Networks	C305.1	Demonstrating the network layer Strategies
			C305.2	Identify the technical issues related to networking technologies.
			C305.3	Discriminate various routing techniques.
			C305.4	Discuss the various application layer protocols for web applications
			C305.5	Elaborate and compare various wide area networks
38	C306	Digital Signal Processing	C306.1	Apply DFT for the analysis of digital signals & systems
			C306.2	Design IIR Butterworth and Chebyshev filters

S. No.	Course	Course Name	CO	Statement
			C306.3	Design FIR filters and apply them in real time applications of information processing
			C306.4	Illustrate finite word length effects on filters
			C306.5	Design and implement Multirate filters
39	C307	VLSI Design Lab	C307.1	Write HDL code for basic as well as advanced digital integrated circuits.
			C307.2	Import the logic modules into FPGA Boards and Synthesize digital logics on FPGA
			C307.3	Design the layouts of Analog IC Blocks using EDA tools.
			C307.4	Simulate the layouts of Analog IC Blocks using EDA tools.
			C307.5	Extract the layouts of Analog IC Blocks using EDA tools.
40	C308	Microprocessors and Microcontrollers Lab	C308.1	Understand and implement programs on 8086 microprocessors.
			C308.2	Design I/O circuits.
			C308.3	Assess Memory Interfacing circuits.
			C308.4	Interpret and implement 8051 microcontroller-based systems.
			C308.5	Develop various interfacing and its programming methodologies

SEMESTER VI

S. No.	Course	Course Name	CO	Statement
41	C309	Digital Communication	C309.1	Understand the fundamental concepts of sampling and waveform coding.
			C309.2	Design and implement of various base band transmission schemes.
			C309.3	Design and implement of various Digital Modulation Techniques.
			C309.4	Estimation of errors detection and correction in transmission and reception.

S. No.	Course	Course Name	CO	Statement
			C309.5	Describe the attractive feature of secure and reliable communication in Spread spectrum
42	C310	Antenna and Wave Propagation	C310.1	Understand the radiation phenomena and the antenna parameters
			C310.2	Interpret the radiation characteristics of different types of aperture and slot antennas
			C310.3	Discriminate the radiation mechanism of various types of array antennas.
			C310.4	Analyze the purpose on special antennas and some of the basic antenna measurements
			C310.5	Understand the characteristics of different types of radio wave propagation at different frequencies
43	C311	Principles of Management	C311.1	Analyze strategies to handle the given issues in management
			C311.2	Discuss the nature of decision-making process
			C311.3	Analyze the types of organization structure and departmentation.
			C311.4	Evaluate the theories of leadership.
			C311.5	Understand the techniques of budgetary and non – budgetary control
44	C312	Professional Elective II / Medical Electronics	C312.1	Understand the human body electro- physiological parameters and recording of bio-potentials
			C312.2	Comprehend the non-electrical physiological parameters and their measurement – body temperature, blood pressure, pulse, blood cell count, blood flow meter etc.
			C312.3	Interpret the various assist devices used in the hospitals viz. pacemakers, defibrillators, dialyzers and ventilators
			C312.4	Understand the physical medical methods like ultrasonic, shortwave, microwave surgical diathermies
			C312.5	Discuss about recent trends in medical instrumentation.
45	C313	Embedded Systems and IOT	C313.1	Design and development of embedded systems applications.

S. No.	Course	Course Name	CO	Statement
			C313.2	Analyze the real time operating system concepts and scheduling of the process.
			C313.3	Apply the concepts of RTOS using Raspberry Pi /open platform.
			C313.4	Understand the IoT fundamentals using IoT enabling Technologies.
			C313.5	Explore deployment platforms for IoT applications and automation
46	C314	Digital Communication Lab	C314.1	Design sampling and reconstruction for given signal
			C314.2	Interpret multiplex signals without aliasing effect.
			C314.3	Analyze the performance of various Pulse Modulations and Demodulation.
			C314.4	Understand & Implement the various bandpass modulation/demodulation schemes
			C314.5	Design a communication channel
47	C315	Internship	C315.1	Ability to articulate what was learned and how it will be apply to your professional goals
			C315.2	Identify about of professions that may be of interest as a result of this experiences
			C315.3	Develop additional skills that will need to be developed to ensure
			C315.4	Create a new technology, career readiness include learning a new technology..
			C315.5	Develop a broader network, additional coursework

SEMESTER VII

S. No.	Course	Course Name	CO	Statement
48	C401	Digital Image Processing	C401.1	Explain and relate the concepts of digital image fundamentals.

S. No.	Course	Course Name	CO	Statement
			C401.2	Choose appropriate technique for image enhancement both in spatial and frequency domains.
			C401.3	Restore good quality images from the degraded one and Segment different aspects of the image
			C401.4	Categorize various compression techniques and interpret image compression standards.
			C401.5	Represent the image with various features and recognize an image from its features
49	C402	Optical and Microwave Engineering	C402.1	Realize basic elements in optical fibers, different modes and configurations
			C402.2	Analyze the transmission characteristics associated with dispersion and polarization techniques.
			C402.3	Design optical sources, detectors and coupling techniques with their use in optical communication system
			C402.4	Analyze various microwave semiconductor devices.
			C402.5	Analyze various waveguide components and performance of microwave tubes and Measurements
50	C403	Wireless Communication	C403.1	Demonstrate the signal propagation over wireless radio channel.
			C403.2	Illustrate the performance of digital modulation technique over AWGN channels
			C403.3	Infer the idea of multicarrier modulation in wireless system.
			C403.4	Describe the cellular concepts for solving spectral congestion and user capacity.
			C403.5	Summarize various Multiple Access Techniques for wireless channel.
51	C404	Digital Image processing Lab	C404.1	Analyze color image processing
			C404.2	Enhance the visual quality of an image
			C404.3	Detect the edges and boundary in an image

S. No.	Course	Course Name	CO	Statement
			C404.4	Demonstrate the applications of segmentation algorithms
			C404.5	Classify different pattern classes.
52	C405	Optical Communication and Microwave Lab	C405.1	Analyze the performance of various microwave links.
			C405.2	Evaluate the performance of various optical links.
			C405.3	Interpret test microwave components
			C405.4	Analyze the radiation of pattern of antenna.
			C405.5	Understand & implement test optical components
53	C406	Professional Elective III/Professional Readiness for Innovation, Employability and Entrepreneurship	C406.1	Develop and enhance a range of skills relevant to innovation, employability, and entrepreneurship.
			C406.2	Improve deeper understanding of innovation processes, industry trends, market analysis, business models, and relevant technologies.
			C406.3	Creating innovative solutions to pressing societal or industry challenges, potentially leading to positive social, environmental, or economic impact
			C406.4	Formulate long-term career development by fostering a mindset of continuous learning, adaptation, and innovation.
			C406.5	Develop critical thinking, problem-solving, communication, teamwork, adaptability, and creativity.
54	C407	Project Work – Phase I	C407.1	Understand a real-world problem, identify the requirement and develop the design solutions.
			C407.2	Identify technical ideas, strategies and methodologies.
			C407.3	Develop solutions using new tools & techniques, test and validate the results for betterment of mankind
			C407.4	Prepare report and present the oral demonstrations
			C407.5	Identify the requirement and develop the design solutions.

SEMESTER VIII

S. No.	Course	Course Name	CO	Statement
55	C408	Professional Elective –IV Satellite Communication	C408.1	Interpret the working principle and operation of various sub systems of satellite and earth station.
			C408.2	Examine the effects of radio wave propagation impairments and Polarization of satellite signals
			C408.3	Categorize various communication techniques for satellite applications
			C408.4	Analyze and design satellite communication link
			C408.5	Discuss advanced techniques and elaborate the regulatory aspects of satellite communication in various applications
56	C409	Professional Elective- V Artificial Intelligence	C409.1	Implement appropriate search algorithms for any AI problem.
			C409.2	Represent a problem using first order and predicate logic Write Genetic Algorithm to solve the optimization problem
			C409.3	Provide the apt agent strategy to solve a given problem.
			C409.4	Interpret learning methods for the different types of problem
			C409.5	Design applications for NLP that use Artificial Intelligence
57	C410	Project Work – Phase II	C410.1	Understand a real-world problem, identify the requirement and develop the design solutions.
			C410.2	Identify technical ideas, strategies and methodologies.
			C410.3	Develop solutions using new tools & techniques, test and validate the results for betterment of mankind
			C410.4	Prepare report and present the oral demonstrations
			C410.5	Identify the requirement and develop the design solutions.

HOD/ECE



DEPARTMENT OF ELECTRONICS AND INSTRUMENTATION ENGINEERING
COURSE OUTCOMES

REGULATION 2022

SEMESTER III

COURSE CODE & NAME: 22EI3201 & Electronic Instrumentation

Course Outcome	CO1: Define the construction and working nature of A.C and D.C analog instruments.
	CO2: Summarize the signal generators and analyzers for various parameter measurements.
	CO3: Demonstrate the working of oscilloscope, recorders and display devices.
	CO4: Implement digital measuring instruments for applications.
	CO5: Build a computer controlled digital instruments and transducers for suitable industrial applications.

COURSE CODE & NAME: 22EI3202 & Electric Circuit Analysis

Course Outcome	CO1: Apply basic laws to electrical circuits.
	CO2: Solve electrical circuits using network theorems
	CO3: Explain the concept of resonance and solve coupled circuit problems
	CO4: Carryout problems in DC and AC transients
	CO5: Analyse and calculate three phase AC circuit parameters

COURSE CODE & NAME: 22EI3203 & Sensors and Transducers

Course Outcome	CO1: Interpret the basics of measurement systems and their characteristics.
	CO2: Expertise in working and application of various resistive transducers.
	CO3: Outline an adequate knowledge about various inductive transducers.
	CO4: Make use of capacitive transducers on industrial parameters measurement.
	CO5: Outline the role of different industrial transducers and smart sensors.

COURSE CODE & NAME: 22EI3251 & Digital Electronics

Course Outcome	CO1: Apply the knowledge acquired about Boolean functions. CO2: Summarize the concepts of combinational circuits.
	CO3: Transform the acquired skill in designing the synchronous sequential circuits.
	CO4: Ability to understand and analyze the asynchronous sequential circuits.
	CO5: Outline the concepts of HDL

COURSE CODE & NAME: 22EE3001 & Electric Circuits Laboratory

Course Outcome	CO1: Verify ohm's law and Kirchoff's law
	CO2: Understand and verify theorems
	CO3: Perform mesh and nodal analysis
	CO4: Understand transient response of RL, RC circuits for DC input
	CO5: Evaluate frequency response of series, parallel resonant circuits and tuned circuits

COURSE CODE &NAME: 22EI3002& Sensors and Transducers Laboratory

Course Outcome	CO1: Make use of sensors and transducers to measure the industrial parameters. CO2: Analyze the characteristics of different transducers. CO3: Discuss the various techniques of active and passive element measurements. CO4: Represent the designing knowledge in signal conditioning circuits. CO5: Impart knowledge to the students in handling the different kinds of transducers which they often meet in different aspects of transducers.
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COURSE CODE &NAME: 22HE3072& Fundamentals of JAVA Programming

Course Outcome	CO1: Identify and reproduce the features of Object Oriented programming paradigm. CO2: Interpret the fundamental concepts of collection framework algorithms and its uses CO3: Understand the basis of Package, multithreading, and interface concepts CO4: Use I/O functionality to code basic file operations and experiment with exceptions handling CO5: Apply the concepts of Applets, AWT and Event handling mechanism to solve a given problems.
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REGULATION 2022

SEMESTER IV

COURSE CODE &NAME: 22EI4201&Electrical Machines

Course Outcome	CO1: State the principle of operation and construction of D.C. Generator CO2: Ability to write the DC motor operation and DC machine testing CO3: List the operation of transformer CO4: Illustrate the operation of induction and special electrical machines CO5: Explain the operation and control of synchronous
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COURSE CODE &NAME: 22EE4202&Integrated Circuits and Its Applications

Course Outcomes	CO1 Interpret the IC fabrication procedure. CO2 Analyze the characteristics of operational amplifiers. CO3 Outline the applications of OP-AMP. CO4 Understand the working principle of special IC's. CO5 Outline the function of voltage regulator as special IC's.
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COURSE CODE & NAME: 22EI4203&Industrial Instrumentation-I

Course Outcome	CO1: Interpret the measurement of Speed, Force and Torque in instrumentation CO2: Classify the Instruments used for measurement of Acceleration, Vibration, Density and Viscosity CO3: Choose the instruments used for the measurement of pressure CO4: Design temperature measuring instruments CO5: Identify the methods used for the measurement of temperature
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COURSE CODE & NAME: 22EI4204&Analytical Instrumentation

Course Outcome	CO1: Understand the principle of Spectrophotometers CO2: Identify liquid and gas chromatographic techniques. CO3: Gain knowledge about industrial gas analyzers and pollution monitoring instruments. CO4: Analyze pH measurements and Impart awareness on dissolved component analyzer. CO5: Explain the principle of nuclear magnetic resonance and microscopic techniques.
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COURSE CODE & NAME:22EI4251&Electrical and Electronic Measurements

	CO1: Definition of errors, error analysis and characteristics of different measurement systems.
	CO2: In-depth knowledge about different electrical measurements.
Course	CO3: Analyze the operation and characteristics of different bridges.
Outcome	CO4: Ability to interpret the working of both analog and digital instruments.
	CO5: Illustrate the method of measurement using Oscilloscope, Signal generators and wave analyzers.

COURSE CODE & NAME:Electrical Machines Laboratory

	CO1: Demonstrate the principle of DC generators, DC motors.
	CO2: Explain the principle and to conduct test on transformers.
Course	CO3: Validate suitable test to compute the characteristics of motors.
Outcome	CO4: Establish suitable experiments on generators.
	CO5: Demonstrate about starting methods of motors.

COURSE CODE & NAME:22EE4002&Integrated Circuits Laboratory

	CO1: Understand the performance characteristics of Op-amp.
Course	CO2: Implementation of various applications of Op-amp.
	CO3: Understand the performance of filters and converters.
Outcome	CO4: Construct multivibrator and regulated power supply circuits using IC
	CO4: Assimilate the knowledge on VCO and PLL ICS.

REGULATION 2019 with Amendments

SEMESTER V

COURSE CODE & NAME: 21EI5201 & Industrial Instrumentation-II

	CO1: Identify the methods of force and torque measurements
	CO2: Understand the operation of mechanical flow meter.
Course	CO3: Understand the operation of electrical and other flow meter.
Outcome	CO4: Choose the instruments for displacement and angle measurement
	CO5: Differentiate the speed and velocity measuring instruments. Outline sound measurement.

COURSE CODE & NAME: 21EI5202 & Control Systems

	CO1: Apply the gained knowledge for modeling of mechanical, electrical control systems.
	CO2: Deduct the different order systems with various inputs and their response.
Course	CO3: Estimate the various frequency domain specifications by phase analysis.
Outcome	CO4: Investigate the control systems stability and compensator design.
	CO5: Develop a state models and discrete control systems for any application.

COURSE CODE & NAME: 21EI5203 & Microprocessors and Microcontrollers

	CO1 Study the architecture of 8085 microprocessor and programming concept involved in 8085.
Course	CO2 Understand the commonly used peripheral/ interfacing IC's with its programming.
	CO3 Understand the architecture and programming concepts of 8051 microcontroller.
Outcomes	CO4 Learn the advanced controller fundamentals and programming.
	CO5 Understand the applications and role of advanced microcontrollers.

COURSE CODE & NAME: 21EI5204 & Analytical Instrumentation

Course Outcome	CO1: Understand the principle of Spectrophotometers
	CO2: Identify liquid and gas chromatographic techniques.
	CO3: Gain knowledge about industrial gas analyzers.
	CO4: Analyze pH measurements and Impart awareness on safety Measures
	CO5: Explain the principle of nuclear magnetic resonance and microscopic techniques.

COURSE CODE & NAME: 21EI5251 & Programmable Logic Controllers and SCADA

Course	CO1 Describe the architecture of PLCs with the analogy of relay logic components
	CO2 Develop ladder logic program for any applications
Outcomes	CO3 Characterize the different instructions available in PLC and implement them.
	CO4 Explain on SCADA, DCS and its networking with PLC.
	CO5 Summarize the impact on PLC and SCADA for various industrial automation processes.

COURSE CODE & NAME: 21EI5001 & Industrial Instrumentation Laboratory

Course Outcome	CO1: Illustrate the characteristics of Pressure, Temperature, flow, level, density and viscosity measurements.
	CO2: Analyze the measured value for displaying or controlling the physical variables
	CO3: Categorise different field instruments for different applications.
	CO4: Demonstrate the principles involved in different measuring techniques.
	CO5: Examine the bio medical related measuring devices.

COURSE CODE & NAME: 21EI5002 & Microprocessors and Microcontrollers Laboratory

Course Outcome	CO1: Understand the 8085architecture and its programming execution.
	CO2: Learn interfacing knowledge with different applications.
	CO3: Study the simple and interfacing programming concepts of 8051.
	CO4: Understand the Interfacing and basic programming concept of Arduino.
	CO5: Understand the industrial application of microcontroller by various programming concepts.

REGULATION 2019 with Amendments

SEMESTER VI

COURSE CODE & NAME: 21EI6181 &Industrial Safety Management

Course Outcome	CO1: Explain the concepts of Engineering Safety and its acts.
	CO2: Understand and apply the various industrial safety standards and regulations.
	CO3: Appraise the accident investigation strategies for an industry.
	CO4: Summarize the various Safety performance monitoring and apply them.
	CO5: Elaborate the various electrical hazards prevention systems and its methods.

COURSE CODE & NAME: 21EI6201 &Process Control

- CO1: Develop a mathematical model for any process control systems.
- CO2: Classify the different controller modes and its design methodologies.
- Course Outcome CO3: Distinguish the valves, positioner and their operation on environment.
- CO4: Choose a proper tuning method for P, I, D controllers and capable to simulate them.
- CO5: Implementing conventional control architectures with advanced multi-loop technique with piping and instrumentation diagrams.

COURSE CODE & NAME:21EI6202 &Discrete Time and Signal Processing

- CO1: Understand about discrete time signals and systems.
- CO2: Demonstrate the use of z transforms for signal processing applications.
- Course Outcome CO3: Apply mathematical tools for all DSP techniques.
- CO4: Analyse linear digital filters both FIR and IIR using different techniques and their associated structures.
- CO5: Illustrate the selection of DSP processors for different applications.

COURSE CODE & NAME: 21EI6251&Embedded Systems

- CO1: Understand The Basic Structure of Embedded Processors.
- CO2: Acquire the knowledge in the architecture of Embedded System.
- Course Outcome CO3: Articulate the knowledge in operating systems for embedded process.
- CO4: Outline RTOS concepts and issues in embedded system design process.
- CO5: Demonstrate the design and implementation process of real time products

COURSE CODE & NAME: 21EI6001&Process Control Laboratory

- CO1: Infer the effect of different control modes on various processes.
- CO2: Design the controller parameters using different tuning process.
- Course Outcome CO3: Evaluate the servo and regulator response for various process control systems.
- CO4: Analyze and verify the complex multi loop control system characteristics.
- CO5: Demonstrate the control system response for servo motor applications

COURSE CODE & NAME: 21EI6002 &Virtual Instrumentation Laboratory

- CO1: Discuss about basic concepts of virtual instrumentation and its programming.
- CO2: Generalize the graphical programming knowledge with data flow concept.
- Course Outcome CO3: Compose the data acquisition concepts for interfacing real-instrument.
- CO4: Transform the circuit simulation concept to the hardware implementation using NI MULTISIM and ELVISmx
- CO5: Evaluate the process control applications with graphical programming environment.

COURSE CODE & NAME: 21EI6701 &Internship Training

- CO1: Employ the skills to communicate efficiently and gain management skills related to industry / research organizations.
- Course Outcomes CO2: Extend the boundaries of knowledge through research and development.
- CO3: Discriminate the knowledge and skills acquired at the workplace to their on-campus studies.

**REGULATION 2019
SEMESTER VII**

COURSE CODE & NAME: 19EI7201 & Computer Control of Process

- Course Outcome
- CO1: Summarize the need of computer in process industry.
 - CO2: Demonstrate the use of z transforms for signal processing applications.
 - CO3: Build the concepts of process dynamics.
 - CO4: Understand the modeling and identification of process.
 - CO5: Explain the concepts of multivariable regulatory control

COURSE CODE & NAME: 19EI7202 & Industrial Electronics

- Course Outcome
- CO1: Outline the operation of power semiconductor devices and their switching characteristics.
 - CO2: Illustrate the operation of power electronic rectifier circuits.
 - CO3: Identify the appropriate chopper circuit for various applications.
 - CO4: Choose the appropriate mode of operation of inverter.
 - CO5: Compile the operation of AC to AC converters.

COURSE CODE & NAME: 19EI7251 & Bio-Medical Instrumentation

- Course Outcome
- CO1: Summarize the concepts of physiology.
 - CO2: Elaboration on biopotential and electrodes.
 - CO3: Understand the measurement techniques of biomedical recording and monitoring instruments.
 - CO4: Elaborate the basic principles in imaging techniques.

COURSE CODE & NAME: 19EI7001R & Computer Control of Process Laboratory

- Course Outcome
- CO1: Compare various linear system simulated responses.
 - CO2: Evaluate the discrete controller parameters using different tuning process.
 - CO3: Compile various discrete controller algorithms for different systems.
 - CO4: Practice of basic PLC programming using ladder diagram.
 - CO5: Demonstrate PLC based control applications and its working in real time.

COURSE CODE & NAME: 19EI7002 & Instrumentation System Design Laboratory

- Course Outcome
- CO1 : Design various types of filter circuits and amplifiers.
 - CO2 : Suggest a suitable power supply circuit.
 - CO3 : Able to analyse the performance of thermocouple, strain gauge and RTD.
 - CO4 : Plot the performance of control valve.
 - CO5 : Design a data acquisition system.

COURSE CODE & NAME: 19EI7901 & Project Work - Phase I

- Course Outcome
- CO1: Realize the skills acquired in the previous semesters to solve complex engineering problems.
 - CO2: Develop an innovative model / prototype of an idea related to the field of specialization.
 - CO3: Create the work individually to identify, troubleshoot and build products for environmental and Societal issues.

COURSE CODE & NAME: 19EI5301 & Power Plant Instrumentation

- Course Outcome
- CO1: Outline the various methods of power generation.
 - CO2: Correlate the important measurement of various parameters instruments associated with power plants.
 - CO3: Identify the appropriate control loop in boilers.
 - CO4: Appraise the burner and furnace management for boilers.
 - CO5: Outline the operation of turbines.

COURSE CODE & NAME: 19EI6301&VLSI Design

Course Outcome	CO1: Explain the fabrication of basic CMOS circuit.
	CO2: Design combinational logic circuits.
	CO3: Demonstrate sequential CMOS logic circuits.
	CO4: Build VHDL programming for digital circuits.
	CO5: Establish digital system using FPGA.

**REGULATION 2019
SEMESTER VIII**

COURSE CODE & NAME: 19EI8301&Fiber Optics and Laser Instruments

Course Outcome	CO1: Apply the basic concepts of optical fibers in applications.
	CO2: Demonstrate fibre optic instrumentation system in industrial applications.
	CO3: Develop applications based on lasers.
	CO4: Validate the industrial applications of lasers
	CO5: Establish industrial application of holography and medical applications of lasers

COURSE CODE & NAME: 19EI8183 &Professional Ethics for Engineers

Course Outcome	CO1: Practice engineering ethics and human values for a moral life.
	CO2: Develop the codes of conduct for engineers in the society.
	CO3: Experiment the safety measures as a responsible engineer.
	CO4: Interpret the responsibilities, professional rights and moralities for enhancement of an organization.
	CO5: Validate the broad range of contemporary global issues.



Hindusthan College of Engineering and Technology

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Department of Electrical and Electronics Engineering

Course Outcomes

Course Outcomes (COs)

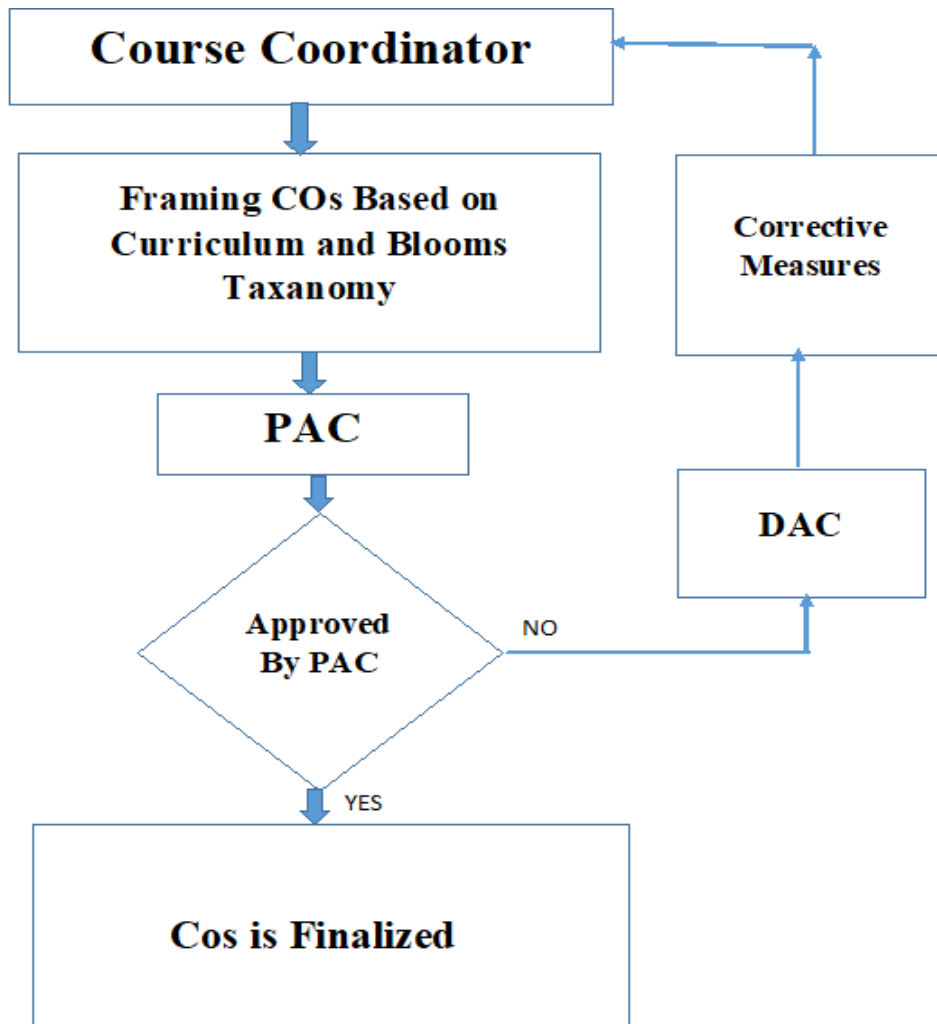
Statements indicating what a student can do after the successful completion of a course. Every Course leads to some Course Outcomes. The CO statements are defined by considering the course content covered in each module of a course. For every course there may be 5 or 6 COs. The keywords used to define COs are based on Bloom's Taxonomy.

The COs are established through the following process steps:

The Vision, Mission PEOs of the Department along with the 12 Graduate Attributes given by the NBA are used in defining the COs.

1. Course Coordinator consults the key constituents: faculty and collects their views and prepares the draft version of the COs.
2. The Course Coordinator then gather views from the Professional Body representatives, Industry representatives / Employer along with the faculty and revise the draft.
3. The Program Assessment Committee analyze and express its opinion on the revised COs and forwards the same for final approval to Department Advisory Board.
4. Department Advisory Board deliberate on the views expressed by the Program Assessment Committee and formulate the accepted views based on which COs are to be established.

FLOW CHART: PROCESS TO DEFINE COURSE OUTCOMES OF THE DEPARTMENT



REGULATION-2019

SEMESTER I

COURSE CODE & NAME: 19HE1101 - TECHNICAL ENGLISH

Course Name:	19HE1101	Technical English	Course Year:	2019-2020
CO1	Trained to maintain coherence and communicate effectively.			
CO2	Practiced to create and interpret descriptive communication.			
CO3	Introduced to gain information of the professional world.			
CO4	acquired various types of communication and etiquette.			
CO5	Taught to improve interpersonal and intrapersonal skills.			

COURSE CODE & NAME: 19MA1103 - CALCULUS AND DIFFERENTIAL EQUATIONS

Course Name:	19MA1103	Calculus and Differential Equations	Course Year:	2019-2020
CO1	Apply the concept of differentiation in any curve.			
CO2	Identify the maximum and minimum values of surfaces.			
CO3	Apply double integrals to compute the area of plane curves.			
CO4	Evaluation of triple integrals to compute volume of solids.			
CO5	Develop sound knowledge of techniques in solving ordinary differential equations that model engineering problems			

COURSE CODE & NAME: 19PH1151 – APPLIED PHYSICS

Course Name:	19PH1151	Applied Physics	Course Year:	2019-2020
CO1	Illustrate the fundamental properties of matter			
CO2	Discuss the Oscillatory motions of particles			
CO3	Analyze the wavelength of different colors			
CO4	Understand the advanced technology of LASER in the field of Engineering			
CO5	Develop the technology of fiber optical communication in engineering field			

COURSE CODE & NAME: 19CY1151 - CHEMISTRY FOR ENGINEERS

Course Name:	19CY1151	Chemistry for Engineers	Course Year:	2019-2020
CO1	Differentiate hard and soft water and to solve the related problems on water purification and its significance in industries and daily life.			
CO2	Acquire the basic knowledge of polymers, composites and FRP and their significance.			
CO3	Develop knowledge on the basic principles of electrochemistry and understand the causes of corrosion, its consequences to minimize corrosion to improve industrial design.			

CO4	Develop knowledge about the renewable energy resources and batteries along with the need of new materials to improve energy storage capabilities.
CO5	Identify the structure and characteristics of unknown/new compound with the help of spectroscopy

COURSE CODE & NAME: 19CS1151 - PYTHON PROGRAMMING AND PRACTICES

Course Name:	19CS1151	Python Programming and Practices	Course Year:	2019-2020
CO1	Develop algorithmic solutions to simple computational problems			
CO2	Read, write, execute by hand simple Python programs			
CO3	Structure simple Python programs for solving problems and Decompose a Python program into functions			
CO4	Represent compound data using Python lists, tuples, dictionaries			
CO5	Read and write data from/to files in Python Programs.			

COURSE CODE & NAME: 19ME1152 - ENGINEERING DRAWING

Course Name:	19ME1152	Engineering Drawing	Course Year:	2019-2020
CO1	Understand and interpret the engineering drawings in order to visualize the objects and draw the conics and special curves.			
CO2	Draw the orthogonal projections of straight lines and planes.			
CO3	Interpret the projections of simple solid objects in plan and elevation.			
CO4	Draw the projections of section of solids and development of surfaces of solids.			
CO5	Draw the isometric projections and the perspective views of different objects.			

COURSE CODE & NAME: 19HE1071: LANGUAGE COMPETENCY ENHANCEMENT COURSE-I

Course Name:	19HE1071	Language Competency Enhancement Course-I	Course Year:	2019-2020
CO1	Trained to maintain coherence and communicate effectively			
CO2	Practiced to create and interpret descriptive communication.			
CO3	Introduced to gain information of the professional world.			
CO4	Acquired various types of communication and etiquette			
CO5	Taught to improve interpersonal and intrapersonal skills			

SEMESTER II

COURSE CODE & NAME: 19HE2101 - BUSINESS ENGLISH FOR ENGINEERS

Course Name:	19HE2101	Business English for Engineers	Course Year:	2019-2020
CO1	Introduced to different modes and types of business communication.			
CO2	Practiced to face and react to various professional situations efficiently			
CO3	learnt to practice managerial skills.			
CO4	Familiarized with proper guidance to business writing.			
CO5	Trained to analyze and respond to different types of communication.			

COURSE CODE & NAME: 19MA2102 - COMPLEX VARIABLES AND TRANSFORM CALCULUS

Course Name:	19MA2102	Complex Variables and Transform Calculus	Course Year:	2019-2020
CO1	Calculate Eigen values and Eigen vectors for a matrix which are used to determine the natural frequencies.			
CO2	Solve Partial Differential Equations using various methods.			
CO3	Infer the knowledge of construction of analytic functions and conformal mapping.			
CO4	Evaluate real and complex integrals over suitable closed paths or contours.			
CO5	Apply Laplace transform and its properties to solve certain linear differential equations.			

COURSE CODE & NAME: 19PH2151 - MATERIAL SCIENCE

Course Name:	19PH2151	Material Science	Course Year:	2019-2020
CO1	Understand the purpose of acceptor or donor levels and the band gap of a semiconductor			
CO2	Interpret the basic idea behind the process of magnetism and its applications in everyday			
CO3	Discuss the behavior of super conducting materials			
CO4	Illustrate the types and importance of crystal systems			
CO5	Evaluate the production of ultrasonics and its applications in NDT			

COURSE CODE & NAME: 19CY2151 - ENVIRONMENTAL STUDIES

Course Name:	19CY2151	Environmental Studies	Course Year:	2017-2018
CO1	Develop an understanding of different natural resources including renewable resources.			
CO2	Realise the importance of ecosystem and biodiversity for maintaining ecological balance.			
CO3	Understand the causes of environmental pollution and hazards due to manmade activities.			

CO4	Demonstrate an appreciation for need for sustainable development and understand the various social issues and solutions to solve the issues.
CO5	Gain knowledge about the importance of women and child education and know about the existing technology to protect environment

COURSE CODE & NAME: 19CS2152 - ESSENTIALS OF C & C++ PROGRAMMING

Course Name:	19CS2152	Essentials of C & C++ Programming	Course Year:	2019-2020
CO1	Develop simple applications in C using basic constructs			
CO2	Apply solutions to real world problems using basic characteristics of C++.			
CO3	Write object-oriented programs using operator overloading, constructors and destructors.			
CO4	Develop programs with the concepts of inheritance and polymorphism.			
CO5	Understand and define solutions with C++ advanced features such as templates and exception handling.			

COURSE CODE & NAME: 19EE2151 - CIRCUIT THEORY

Course Name:	19EE2151	Circuit Theory	Course Year:	2019-2020
CO1	Apply basic laws to electrical circuits.			
CO2	Solve electrical circuits using network theorems.			
CO3	Explain the concept of resonance and solve coupled circuit problems.			
CO4	Carryout problems in DC and AC transients.			
CO5	Evaluate the three phase power measurement in balanced circuits.			

COURSE CODE & NAME: 19ME2001 - ENGINEERING PRACTICES

Course Name:	19ME2001	Engineering Practices	Course Year:	2019-2020
CO1	Fabricate wooden components and pipe connections including plumbing works.			
CO2	Fabricate simple weld joints.			
CO3	Fabricate different electrical wiring circuits and understand the AC Circuits.			

COURSE CODE & NAME: 19HE2071 - LANGUAGE COMPETENCY ENHANCEMENT COURSE-II

Course Name:	19HE2071	Language Competency Enhancement Course-II	Course Year:	2019-2020
CO1	Introduced to different modes and types of communication.			
CO2	Practiced to face and react to various professional situation efficiently.			
CO3	Learn to practice managerial skills.			
CO4	Familiarization with proper guidance to writing			
CO5	Trained to analyze and respond to different types of communication			

SEMESTER III

COURSE CODE & NAME: 19MA3102 - FOURIER ANALYSIS AND TRANSFORMS

Course Name:	19MA3102	Fourier Analysis And Transforms	Course Year:	2019-2020
CO1	Understand the principles of Fourier series which helps them to solve physical problems of engineering.			
CO2	Employ Fourier series in solving the boundary value problems.			
CO3	Understand Fourier series in solving the two dimensional heat equations.			
CO4	Apply Fourier transform techniques which extend its applications.			
CO5	Illustrate the Z- transforms for analyzing discrete-time signals and systems.			

COURSE CODE & NAME: 19EE3201- ELECTRONIC DEVICES AND CIRCUITS

Course Name:	19EE3201	Electronic Devices and Circuits	Course Year:	2019-2020
CO1	Apply the knowledge acquired about electronic devices.			
CO2	Summarize the concepts of transistors.			
CO3	Transform the acquired skill in designing an amplifier circuit.			
CO4	Illustrate the nature of large signal amplifiers.			
CO5	Outline the concepts of feedback amplifiers, conditions for oscillation and types of oscillators.			

COURSE CODE & NAME: 19EE3202 – ELECTRICAL MACHINES I

Course Name:	19EE3202	Electrical Machines I	Course Year:	2019-2020
CO1	Describe the coupled coil calculate the self and mutually induced emf.			
CO2	Analyze the operation of transformer in different loading condition			
CO3	Explain the concept of field energy and co-energy in single and multiple excited systems			
CO4	Demonstrate the construction of D.C machines and operation of DC Generator			
CO5	Derive the performance equation of D.C motor under various load condition			

COURSE CODE & NAME: 19EE3203 - FIELD THEORY

Course Name:	19EE3203	Field Theory	Course Year:	2019-2020
CO1	Apply the Vector calculus application in Electromagnetics			
CO2	Analyse the concepts of Electromagnetics			
CO3	Evaluate the concepts of Magnetostatics			
CO4	Analyse the propagation of plane Electromagnetic wave.			
CO5	Compare the concepts of Plane wave reflection,refraction and penetration.			

COURSE CODE & NAME: 19EE3251 – ELECTRICAL AND ELECTRONIC MEASUREMENTS

Course Name:	19EE3251	Electrical and Electronic Measurements	Course Year:	2019-2020
CO1	Definition of errors, error analysis and characteristics response of different order transducers.			
CO2	In-depth knowledge about resistive transducers.			
CO3	Outline an adequate knowledge about various inductive transducers			
CO4	Make use of capacitive transducers on industrial parameters measurement.			
CO5	Summarize the role of different industrial transducers and sensors.			

COURSE CODE & NAME: 19EE3001 - ELECTRONIC DEVICES AND CIRCUITS LABORATORY

Course Name:	19EE3001	Electronic Devices and Circuits Laboratory	Course Year:	2019-2020
CO1	Understand the characteristics of semiconductor devices			
CO2	Develop various electronic circuit configurations			
CO3	Demonstrate the frequency response of amplifiers.			
CO4	Examine the current series feedback amplifier and RC phase shift oscillator.			
CO5	Construct and testing the of rectifier circuits.			

COURSE CODE & NAME: 19EE3002 - ELECTRICAL MACHINES LABORATORY I

Course Name:	19EE3002	Transformers and DC Machines Laboratory	Course Year:	2019-2020
CO1	Ability to operate the DC generators and motors.			
CO2	Ability to choose the type of DC machine for specific applications.			
CO3	Determine the performance characteristics of DC motor by conducting direct and indirect tests.			
CO4	Ability to model the transformer and their application to power system.			
CO5	Determine the performance characteristics of DC shunt and Compound generator by conducting load tests.			

COURSE CODE & NAME: 19MC3191 - INDIAN CONSTITUTION

Course Name:	19MC3191	Indian Constitution	Course Year:	2019-2020
CO1	Understand the functions of the Indian government			
CO2	Understand and abide the rules of the Indian constitution.			

SEMESTER IV

COURSE CODE & NAME: 19MA4101 - NUMERICAL METHODS

Course Name:	19MA4101	Numerical Methods	Course Year:	2019-2020
CO1	Solve the system of linear algebraic equations representing steady state models and non linear equations arising in the field of engineering.			
CO2	Apply various methods to find the intermediate values for the given data.			
CO3	Identify various methods to perform numerical differentiation and integration			
CO4	Classify and solve ordinary differential equations by using single and multi step methods.			
CO5	Illustrate various methods to find the solution of ordinary and partial differential equations.			

COURSE CODE & NAME: 19EE4201 – ELECTRICAL MACHINES II

Course Name:	19EE4201	Electrical Machines II	Course Year:	2019-2020
CO1	Analyze and draw the performance characteristics of the three phase induction motor.			
CO2	Demonstrate the starters for starting and control the speed of three phase induction motors.			
CO3	State the fundamentals and evaluate the performance of single phase induction motors.			
CO4	Apply different methods to obtain the regulation of synchronous generator under various load condition.			
CO5	Draw the performance characteristics of synchronous motor under different excitation conditions.			

COURSE CODE & NAME: 19EE4202 - INTEGRATED CIRCUITS AND ITS APPLICATIONS

Course Name:	19EE4202	Integrated Circuits and its Applications	Course Year:	2019-2020
CO1	Interpret the IC fabrication procedure.			
CO2	Analyze the characteristics of operational amplifiers.			
CO3	Outline the applications of OP-AMP.			
CO4	Understand the working principle of special IC's.			
CO5	Outline the function of voltage regulator as special IC's.			

COURSE CODE & NAME: 19EE4203 – DIGITAL SIGNAL PROCESSING

Course Name:	19EE4203	Digital Signal Processing	Course Year:	2019-2020
CO1	Classify the different types of signals and systems and Analyze a Discrete Time linear invariant Systems.			
CO2	Apply z-transform and inverse Z transform and analyze discrete time systems			

CO3	Apply Radix-2 Decimation in Time (DIT) and Decimation in Frequency (DIF) FFT Algorithm to Compute Discrete Fourier Transform
CO4	Realize structure and design Infinite Impulse Response (IIR) filters and Finite Impulse Response (FIR) filters.
CO5	Discuss the various architectures of Digital signal processors

COURSE CODE & NAME: 19EE4251 - DIGITAL LOGIC CIRCUITS

Course Name:	19EE4251	Digital Logic Circuits	Course Year:	2019-2020
CO1	Apply the knowledge acquired about Boolean functions.			
CO2	Summarize the concepts of combinational circuits.			
CO3	Transform the acquired skill in designing the synchronous sequential circuits.			
CO4	Ability to understand and analyze the asynchronous sequential circuits.			
CO5	Outline the concepts of HDL.			

COURSE CODE & NAME: 19EE4001 – ELECTRICAL MACHINES LABORATORY II

Course Name:	19EE4001	Electrical Machines Laboratory II	Course Year:	2019-2020
CO1	Perform load test on Induction motors and comment their performance characteristics.			
CO2	Predetermine the regulation of three phase alternator by EMF, MMF, and ZPF and slip test.			
CO3	Draw the performance characteristics of three phase synchronous motor			
CO4	Execute no load and blocked rotor test on induction motors to draw equivalent circuit.			
CO5	Analyse and calculate the losses of three phase induction motor			

COURSE CODE & NAME: 19EE4002 – INTEGRATED CIRCUITS LABORATORY

Course Name:	19EE4002	Integrated Circuits Laboratory	Course Year:	2019-2020
CO1	Understand the performance characteristics of Op-amp.			
CO2	Implementation of various applications of Op-amp.			
CO3	Understand the performance of filters and converters.			
CO4	Construct multivibrator and regulated power supply circuits using IC			
CO5	Assimilate the knowledge on VCO and PLL ICS.			

COURSE CODE & NAME: 19MC4191 - ESSENCE OF INDIAN TRADITIONAL KNOWLEDGE/ VALUE EDUCATION

Course Name:	19MC4191	Essence of Indian tradition knowledge/Value Education	Course Year:	2019-2020
CO1	Ability to understand the structure of Indian system of life.			
CO2	Connect up and explain basics of Indian Traditional knowledge in modern scientific perspective.			

SEMESTER V**COURSE CODE & NAME: 19EE5201- DESIGN OF ELECTRICAL MACHINES**

Course Name:	19EE5201	Design of Electrical Machines	Course Year:	2019-2020
CO1	Apply the knowledge acquired from Specific loading and rating of electrical machines.			
CO2	Understand the design concepts and apply to design the Main dimensions of DC Machine.			
CO3	Provide the solutions for Transformer cooling			
CO4	Understand the design concepts and apply to design the Main dimensions of Induction Machine.			
CO5	Analyze and design the Main dimensions of Synchronous machines.			

COURSE CODE & NAME: 19EE5202 - RENEWABLE AND NON RENEWABLE ENERGY SOURCES

Course Name:	19EE5202	Renewable Energy Sources	Course Year:	2019-2020
CO1	Understand the concepts and operation of solar photovoltaic power generation			
CO2	Articulate the construction and working of the components used in wind power generation			
CO3	Comprehend the concept of power generation using fuel cell, geothermal and ocean energy sources			
CO4	Demonstrate the concepts of the components used in coal based thermal power plants.			
CO5	Exhibit the concepts of the components used in Hydro and Nuclear power plants.			

COURSE CODE&NAME:19EE5203- MICROPROESSORS AND MICROCONTROLLERS

Course Name:	19EE5203	Microprocessors and Microcontrollers	Course Year:	2019-2020
CO1	Study the architecture of 8085 microprocessor and programming concept involved in 8085.			
CO2	Understand the commonly used peripheral/ interfacing IC's with its programming.			
CO3	Understand the architecture and programming concepts of 8051 microcontroller.			
CO4	Learn the advanced controller fundamentals and programming.			
CO5	Understand the applications and role of advanced microcontrollers.			

COURSE CODE & NAME: 19EE5204 - TRANSMISSION AND DISTRIBUTION

Course Name:	19EE5204	Transmission And Distribution	Course Year:	2019-2020
CO1	Differentiate the types of transmission and distribution systems and illustrate the structure of power system.			
CO2	Develop the expressions for calculation of transmission line parameters and their effects			

CO3	Evaluate the performance of transmission line using T and π method.
CO4	Analyze the voltage distribution in insulator strings and cables; identify methods to improve the voltage distribution.
CO5	Analyze and design tower distance in transmission line by computing sag and tension of line conductor.

**COURSE CODE & NAME: 19EE5301 - FIBRE OPTICS
AND LASER INSTRUMENTS**

Course Name:	19EE5301	Fibre Optics and Laser Instruments	Course Year:	2019-2020
CO1	Enumerate the properties of optical fibres.			
CO2	Apply the optical fibres for industrial applications.			
CO3	Describe the fundamentals and types of laser.			
CO4	Choose the lasers for industrial applications.			
CO5	Illustrate holography and medical applications of lasers.			

COURSE CODE & NAME: 19EE5251 - CONTROL SYSTEMS ENGINEERING

Course Name:	19EE5251	Control Systems Engineering	Course Year:	2019-2020
CO1	Apply the gained knowledge for modeling of mechanical, electrical control systems.			
CO2	Deduct the different order systems with various inputs and their response			
CO3	Estimate the various frequency domain specifications by phase analysis.			
CO4	Investigate the control systems stability and compensator design			
CO5	Develop a state models and discrete control systems for any application			

**COURSE CODE & NAME: 19EE5001 – CONTROL AND INSTRUMENTATION
LABORATORY**

Course Name:	19EE5001	Control and Instrumentation Laboratory	Course Year:	2019-2020
CO1	Estimate the effect of P, PI, PID controllers for the given system specifications.			
CO2	Determine the stability analysis of linear systems.			
CO3	Deduce the transfer functions of D.C machine.			
CO4	Construct the AC and DC bridges.			
CO5	Analyze the performance characteristics of various transducers.			

**COURSE CODE & NAME: 19EE5002 - MICROPROCESSORS AND
MICROCONTROLLERS LABORATORY**

Course Name:	19EE5002	Microprocessors and Microcontroller s Laboratory	Course Year:	2019-2020
CO1	Understand the 8085architecture and its programming execution			
CO2	Learn interfacing knowledge with different applications.			
CO3	Study the simple and interfacing programming concepts of 8051.			
CO4	Understand the Interfacing and basic programming concept of Arduino.			
CO5	Understand the industrial application of microcontroller by various programming concepts.			

COURSE CODE & NAME: 19HE5071: SOFT SKILLS - I

Course Name:	19HE5071	Soft Skills - I	Course Year:	2019-2020
CO1	Students will have clarity on their career exploration process and to match their skills and interests with a chosen career path			
CO2	Students will develop knowledge, skills, and judgment around human communication that facilitate their ability to work collaboratively with others			
CO3	Students will understand how teamwork can support leadership skills			
CO4	Students will be able to make sense of problems, develop strategies to find solutions, and persevere in solving them.			
CO5	Students will demonstrate an enhanced ability to draw logical conclusions and implications to solve logical problems.			

COURSE CODE & NAME: 19HE5072: DESIGN THINKING

Course Name:	19HE5072	Design Thinking	Course Year:	2019-2020
CO1	Develop a strong understanding of the Design Process			
CO2	Learn to develop and test innovative ideas through a rapid iteration cycle.			
CO3	Develop teamwork and leadership skills			

SEMESTER VI**COURSE CODE & NAME: 19EE6181 - INDUSTRIAL SAFETY MANAGEMENT**

Course Name:	19EE6181	Industrial Safety Management	Course Year:	2019-2020
CO1	Explain the concepts of Engineering Safety and its acts.			
CO2	Understand and analyze on Safety Management levels.			
CO3	Appraise the investigation strategies for an industry.			
CO4	Summarize the various Safety performance monitoring and apply them.			
CO5	Elaborate the safety education and its various training methods.			

COURSE CODE & NAME: 19EE6201 - POWER ELECTRONICS

Course Name:	19EE6201	Power Electronics	Course Year:	2019-2020
CO1	Articulate the Power semiconductor switches in various circuits.			
CO2	Understand the various converters.			
CO3	Plan and operate the DC-DC Converters on real time applications.			
CO4	Understand the inverters and Pulse width Modulated Inverter.			
CO5	Understand AC to AC converters and apply the UPS for specific applications.			

COURSE CODE & NAME: 16EE6202 - POWER SYSTEM ANALYSIS

Course Name:	16EE6202	Power System Analysis	Course Year:	2019-2020
CO1	Develop knowledge on mathematical model of power system components.			
CO2	Interpret the mechanisms to address load flow problems in power system.			
CO3	Create computational models for analysis symmetrical conditions in power systems.			
CO4	Create computational models for analysis unsymmetrical conditions in power systems			
CO5	Analyze the stability of the Power System.			

COURSE CODE & NAME: 19EE6303 - FLEXIBLE AC TRANSMISSION SYSTEMS

Course Name:	19EE6303	Flexible AC Transmission Systems	Course Year:	2019-2020
CO1	Study and describe the reactive power control techniques.			
CO2	Understand the modelling of static VAR compensators and its applications.			
CO3	Learn the modelling of TCSC and their applications.			
CO4	Acquire knowledge on VSC FACTS Controllers and Thyristor controlled series capacitors.			
CO5	Understand the various FACTS controller and apply the relevant algorithms in appropriate applications			

COURSE CODE & NAME: OPEN ELECTIVE– I**INTRODUCTION TO PROGRAMMABLE LOGIC CONTROLLERS**

Course Name:	19EI7401	Introduction To Programmable Logic Controllers	Course Year:	2019-2020
CO1	Describe the architecture of PLCs with the analogy of relay logic components.			
CO2	Develop the ladder logic program for any applications.			
CO3	Characterize the different instructions available in PLC and implement them			
CO4	Classify the communication protocols used in PLC and to establish network with other systems			
CO5	Summarize the impact on PLC and SCADA for various industrial automation processes			

COURSE CODE & NAME: 19EE6251 – EMBEDDED SYSTEMS

Course Name:	19EE6251	Embedded Systems	Course Year:	2019-2020
CO1	Understand The Basic Structure of Embedded Processors			
CO2	Acquire the knowledge in the architecture of Embedded System			
CO3	Articulate the knowledge in operating systems for embedded process			
CO4	Outline RTOS concepts and issues in embedded system design process.			
CO5	Demonstrate the design and implementation process of real time products			

**COURSE CODE & NAME: 19EE6002 - CONTROL WIRING AND CIRCUIT DESIGN
LABORATORY**

Course Name:	19EE6002	Control Wiring and Circuit Design Laboratory	Course Year:	2019-2020
CO1	Construct and test the different control circuits of induction motor.			
CO2	Provide control circuit for single phasing and reversal of motor.			
CO3	Experimentally verify the control circuit for starters.			
CO4	Develop the voltage control circuits using electronic components.			
CO5	Understand the various components and working of an inverter.			

COURSE CODE & NAME: INTERNSHIP/INDUSTRIAL TRAINING

Course Name:	19EE6701	Internship/Industrial Training	Course Year:	2019-2020
CO1	Improve the skills to communicate efficiently and gain management skills related to industry / research organizations.			
CO2	Extend the boundaries of knowledge through research and development.			
CO3	Discriminate the knowledge and skills acquired at the workplace to their on-campus studies			
CO4	Develop greater clarity about academic and career goals.			
CO5	:Visualize the impact of engineering solutions to the society.			

COURSE CODE & NAME: 19HE6071 :SOFT SKILLS-II

Course Name:	19HE6071	Soft Skills-Ii	Course Year:	2019-2020
CO1	Students will have learnt to keep going according to plan, coping with the unfamiliar, managing disappointment and dealing with conflict.			
CO2	Students will Actively participate meetings, Group Discussions / interviews and prepare & deliver presentations			
CO3	Students will define professional behavior and suggest standards for appearance, actions and attitude in a Business environment			
CO4	Students will be able to apply quantitative reasoning and mathematical analysis methodologies to understand and solve problems.			
CO5	Students will excel in complex reasoning.			

COURSE CODE & NAME: 19HE6072: INTELLECTUAL PROPERTY RIGHTS (IPR)

Course Name:	19HE6072	INTELLECTUAL PROPERTY RIGHTS (IPR)	Course Year:	2019-2020
CO1	Identify different types of Intellectual Properties (IPs), the right of ownership, scope of protection as well as the ways to create and to extract value from IP.			
CO2	Recognize the crucial role of IP in organizations of different industrial sectors for the purposes of product and technology development.			
CO3	Identify, apply and assess ownership rights and marketing protection under intellectual property law as applicable to information, ideas, new products and product marketing.			
CO4	Identify different types of trademarks and procedure for registration			
CO5	Recognize the concept of design, geographical indication and procedure for registration			

SEMESTER VII

COURSE CODE & NAME: 19EE7201-SOLID STATE DRIVES

Course Name:	19EE7201	Solid State Drives	Course Year:	2019-2020
CO1	Analyze the stability of the system depending on load.			
CO2	Identify the type of electric motor applicable for various applications.			
CO3	Analyze the operation of the converter and chopper fed dc drive.			
CO4	Design the speed controllers for a closed loop solid state DC motor drives.			
CO5	Design the speed controllers for induction motors to control and maintain the speed.			

COURSE CODE & NAME: 19EE7202- PROTECTION AND SWITCHGEAR

Course Name:	19EE7202	Protection and Switchgear	Course Year:	2019-2020
CO1	Analyze the causes of faults in electrical apparatus and power system			
CO2	Evaluate the characteristics and function of relays.			
CO3	To gain knowledge the various apparatus protection techniques and their applications			
CO4	Solve the problems associated with the circuit interruptions by circuit breakers.			
CO5	Classify the types of circuit breaker and their testing			

COURSE CODE & NAME: 19EE7301- MICROCONTROLLER BASED SYSTEM DESIGN

Course Name:	19EE73	Professional Elective - III Microcontroller Based System Design	Course Year:	2019-2020
CO1	Experience of working at the architecture of the PIC microcontrollers			
CO2	Identify factors moving the data transfer and interrupts and timer in PIC microcontroller.			
CO3	Programme the controller for typical industrial Electronics application			
CO4	write ARM Assembly Language program.			
CO5	Embed the code in ARM processor for stand-alone system for embedded system designs.			

COURSE CODE & NAME: 19EE7203-POWER SYSTEM OPERATION AND CONTROL

Course Name:	16EE7251	Power System Operation and Control	Course Year:	2019-2020
CO1	Interpret the overview of power system operations.			
CO2	Analysis the single area and multi-area system using frequency control			
CO3	Summarize the various voltage control methods of power system			
CO4	Solve the economic load dispatch, optimum unit commitment for a power system			
CO5	Illustrate the functional content of SCADA, and related systems			

**COURSE CODE & NAME: 19EE7001- ELECTRIC DRIVES AND CONTROL
LABORATORY**

Course Name:	19EE7001	Electric Drives and Control Laboratory	Course Year:	2019-2020
CO1	Develop a power electronic circuit using simulation software's.			
CO2	Simulates a closed loop control of converter fed electrical drives.			
CO3	Identify a suitable power electronic converter for ac and dc motor.			
CO4	Evaluate the speed controlling techniques for BLDC motor using DSP.			
CO5	Examine the configuration of PLC drives for ac motor.			

**COURSE CODE & NAME: 19EE7002- POWER SYSTEM SIMULATION
LABORATORY**

Course Name:	19EE7002	Power System Simulation Laboratory	Course Year:	2019-2020
CO1	Realize the skills acquired in the previous semesters to solve complex engineering problems			
CO2	Build up an innovative model / prototype of an idea related to the field of specialization.			
CO3	Create the work individually to identify, troubleshoot and build products for environmental and Societal issues.			
CO4	Effective presentation of ideas with clarity.			
CO5	Evaluate surveys towards developing a product which helps in life time learning.			

COURSE CODE & NAME: 19EE7901- PROJECT PHASE I

Course Name:	19EE7901	Project Phase I	Course Year:	2019-2020
CO1	Realize the skills acquired in the previous semesters to solve complex engineering problems.			
CO2	Build up an innovative model / prototype of an idea related to the field of specialization.			
CO3	Create the work individually to identify, troubleshoot and build products for environmental and Societal issues.			
CO4	Effective presentation of ideas with clarity.			
CO5	Evaluate surveys towards developing a product which helps in life time learning.			

**COURSE CODE & NAME: 19EE8301 - APPLICATION OF POWER
ELECTRONICS FOR RENEWABLE ENERGY SYSTEMS**

Course Name:	19EE8301	<i>Professional Elective – IV</i> Application of Power Electronics for Renewable Energy Systems	Course Year:	2019-2020
CO1	Familiarized the basic of renewable energy systems..			
CO2	Design the different power converters namely AC to DC, DC to DC and AC to AC converters for renewable energy systems.			
CO3	Analysis the operation of solar and wind systems at stand alone and Grid integrated system			
CO4	Develop the hybrid renewable energy systems			
CO5	Intend the algorithm of MPPT technique used in wind energy systems.			

**COURSE CODE & NAME: 19EE8302- COMPUTER AIDED DESIGN OF
ELECTRICAL APPARATUS**

Course Name:	19EE8302	<i>Professional Elective – V</i> Computer Aided Design of Electrical Apparatus	Course Year:	2019-2020
CO1	Identify an appropriate design using finite element analysis for electromagnetic study.			
CO2	Derive the power and energy equations and calculate the electrical losses			
CO3	Develop the mathematical model of steady state analysis for AC machines			
CO4	Explain the concepts of organization of CAD packages.			
CO5	Select the appropriate design procedures of different Electrical apparatus.			

COURSE CODE & NAME: 19EE8901- PROJECT WORK

Course Name:	19EE8901	Project Work	Course Year:	2019-2020
CO1	Implement the skills acquired in the previous semesters to solve complex engineering problems.			
CO2	Develop a model / prototype of an idea related to the field of specialization.			
CO3	Establish the work individually or in a team to identify, troubleshoot and build products for environmental and societal issues.			
CO4	Effective presentation of ideas with clarity.			
CO5	Evaluate surveys towards developing a product which helps in life time learning.			

PROFESSIONAL ELECTIVE I

**COURSE CODE & NAME: 19EE5301 - FIBRE OPTICS
AND LASER INSTRUMENTS**

Course Name:	19EE5301	Fibre Optics and Laser Instruments	Course Year:	2019-2020
CO1	Enumerate the properties of optical fibres.			
CO2	Apply the optical fibres for industrial applications.			
CO3	Describe the fundamentals and types of laser.			
CO4	Choose the lasers for industrial applications.			
CO5	Illustrate holography and medical applications of lasers.			

COURSE CODE & NAME: 19EE5302-BIOMEDICAL INSTRUMENTATION

Course Name:	19EE5302	Biomedical Instrumentation	Course Year:	2019-2020
CO1	Explain the human physiological system and fundamentals of biomedical engineering.			
CO2	Examine the non-electrical parameters measurement systems.			
CO3	Evaluate the electrical parameters measurement systems and electrical safety.			
CO4	Analyze the various imaging techniques.			
CO5	Enumerate the life assisting and therapeutic equipments.			

COURSE CODE & NAME: 19IT5331- FUNDAMENTALS OF JAVA PROGRAMMING

Course Name:	19IT5331	Fundamentals of Java Programming	Course Year:	2019-2020
CO1	Understand basic Java programs with concepts			
CO2	Develop Java programs using OOP principles and inheritance			
CO3	Develop Java programs with the concepts interfaces.			
CO4	Build Java applications using exceptions and I/O streams			
CO5	Develop Java applications with threads and generics classes			

COURSE CODE & NAME: 19EE5304- COMPUTER NETWORKS

Course Name:	19EE5304	Computer Networks	Course Year:	2019-2020
CO1	Identify the components required to build different types of networks and aware of media access control			
CO2	Understand the data communication system and the purpose of layered architecture.			
CO3	Analyze the concepts of Routing methods and Subnetting.			
CO4	Design protocols for various functions in the network			
CO5	Understand the working of protocols for various Applications			

COURSE CODE & NAME: 19EE5305- CONTROL OF ELECTRICAL APPARATUS

Course Name:	19EE5305	Control of Electrical Apparatus	Course Year:	2019-2020
CO1	Apply basic knowledge for electrical control apparatus.			
CO2	Obtain the knowledge on control of circuit Components.			
CO3	Demonstrate the Control circuit of three phase induction motor starters.			
CO4	Illustrate the power control circuits for real-time applications.			
CO5	Exhibit basic concepts of advanced industrial controllers.			

PROFESSIONAL ELECTIVE II

COURSE CODE & NAME: 19EE6301- INDUSTRIAL AUTOMATION

Course Name:	19EE6301	Industrial Automation	Course Year:	2019-2020
CO1	Understand the parts and operation of Programmable Logic Controller.			
CO2	Understand the PLC programming and ladder diagram.			
CO3	Understand the PLC instructions and apply in various case studies.			
CO4	Remember the architecture and interfaces of SCADA System.			
CO5	Remember various protocols and applications of SCADA.			

COURSE CODE & NAME: 19EE6302- ELECTRIC VEHICLE MECHANICS AND CONTROL

Course Name:	19EE6302	Electric Vehicle Mechanics and Control	Course Year:	2019-2020
CO1	Understand the architecture and dynamics of EVs and HEVs			
CO2	Design an EV for standard drive cycle			
CO3	Understand the electrical motors' characteristics and its application for vehicle dynamics			
CO4	Workout the energy requirements and energy sources for EV application			
CO5	Understand the mode of operation and control architecture			

COURSE CODE & NAME: 19EE6303 - FLEXIBLE AC TRANSMISSION SYSTEMS

Course Name:	19EE6303	Flexible AC Transmission Systems	Course Year:	2019-2020
CO1	Study and describe the reactive power control techniques.			
CO2	Understand the modelling of static VAR compensators and its applications.			
CO3	Learn the modelling of TCSC and their applications.			
CO4	Acquire knowledge on VSC FACTS Controllers and Thyristor controlled series capacitors.			
CO5	Understand the various FACTS controller and apply the relevant algorithms in appropriate applications			

COURSE CODE & NAME: 19EE6304- ELECTRICAL ESTIMATION AND COSTING

Course Name:	19EE6304	Electrical Estimation and Costing	Course Year:	2019-2020
CO1	Identify various elements of estimation and wiring types			
CO2	Design circuits for lighting, fan and alarm			
CO3	Estimate electrical installation for residential buildings			
CO4	Design control circuit for power and motor control			
CO5	Estimate various connections for power and apply Indian electricity rules			

COURSE CODE & NAME: 19EE6305-PRINCIPLES OF ROBOTICS

Course Name:	19EE6305	Principles of Robotics	Course Year:	2019-2020
CO1	Understand the basics of robotics.			
CO2	Develop different model for a given Robotic manipulator.			
CO3	Describe the trajectory planning for robotics.			
CO4	Generalize role of sensors and machine vision in Robotics.			
CO5	Study on robot programming and languages.			

PROFESSIONAL ELECTIVE III**COURSE CODE & NAME: 19EE7301- HIGH VOLTAGE ENGINEERING**

Course Name:	19EE7301	High Voltage Engineering	Course Year:	2019-2020
CO1	Categorize the various types of over voltages in power system and protection methods.			
CO2	Analyze the various breakdown mechanisms in different dielectrics.			
CO3	Classify the various generating techniques of high AC, DC and Impulse voltage.			
CO4	Construct the circuits for high voltage and high current measurement.			
CO5	Describe the high voltage testing of power apparatus and insulation coordination			

COURSE CODE & NAME: 19EE7302- ELECTRICAL ENERGY UTILIZATION AND CONSERVATION

Course Name:	19EE7302	Electrical Energy Utilization and Conservation	Course Year:	2019-2020
CO1	Categorize the hierarchy of an organization.			
CO2	Discuss the type of plans and understand decision making processes.			
CO3	Justify the need for organization structure, delegation of authority.			
CO4	Describe the organization culture, creativity, leadership, communication etc.			
CO5	Estimate budgetary and non budgetary control techniques and understand the processes of controlling			

COURSE CODE & NAME: 19EE7303- INTERNET OF THINGS

Course Name:	19EE7303	Internet of Things	Course Year:	2019-2020
CO1	Differentiate the the various microcontrollers used for internet of things.			
CO2	Various wired networking systems.			
CO3	Evaluate the various networking system			
CO4	Analyze the components of smart grids.			
CO5	:Analyze and design smart transmission technologies.			

COURSE CODE & NAME: 19EE7304 -NANO TECHNOLOGY

Course Name:	19EE7304	Nano Technology	Course Year:	2019-2020
CO1	Students will be able to understand the significance and implication of nanotechnology			
CO2	To be able to apply the concept of nanotechnology for Electrical and Electronics Engineering Applications.			
CO3	Familiar with Rules and guidelines of clean room standards			
CO4	Understanding the Fabrication methods and characterization techniques			
CO5	Students will be able to know the recent trends of nanotechnology			

COURSE CODE & NAME: 19EE7305- WIRELESS SENSOR NETWORK

Course Name:	19EE7305	Wireless Sensor Network	Course Year:	2019-2020
CO1	Understand the basics of wireless sensor network			
CO2	Summarize the different protocol networks.			
CO3	Describe the routing matrices and management aspects for network layer			
CO4	Observe the time synchronizations in wireless sensor network.			
CO5	Study on fundamentals of security network.			

PROFESSIONAL ELECTIVE IV

COURSE CODE & NAME: 19EE8301- SPECIAL ELECTRICAL MACHINES

Course Name:	19EE8301	Special Electrical Machines	Course Year:	2019-2020
CO1	Identify various special electrical motors for specific applications.			
CO2	Control the speed of the Stepper motor using an appropriate controller.			
CO3	Select an appropriate power converter of Switched Reluctance Motor drive for different applications.			
CO4	Develop a speed controller for Brushless DC Motors using microprocessor.			
CO5	Illustrate the working of Permanent Magnet Synchronous Motor by using sensorless control.			

COURSE CODE& NAME: 19EE8302- MICROCONTROLLER BASED SYSTEM DESIGN

Course Name:	19EE8302	Microcontroller Based System Design	Course Year:	2019-2020
CO1	Understand the working of the architecture for PIC microcontrollers			
CO2	Identify the factors for data transfer in interrupts and understand the timer function of PIC microcontroller			
CO3	Observe the peripherals and interfacing of microcontroller-based embedded systems.			
CO4	Interpret the ARM Architecture and Assembly Language Programming			
CO5	Employ the role of arm organization			

COURSE CODE & NAME: 19EE8303- SMART GRID

Course Name:	19EE8303	Smart Grid	Course Year:	2019-2020
CO1	Understand the features of smart grid			
CO2	Assess the role of automation in Transmission and Distribution			
CO3	Describe the concepts and principles of communications technologies for smart grid			
CO4	Apply evolutionary algorithms for the smart Grid			
CO5	Understand several applications of smart grid			

COURSE CODE & NAME: 19EE8304- ADVANCED SOFT COMPUTING

Course Name:	19EE8304	Advanced Soft Computing	Course Year:	2019-2020
CO1	Understand the concepts of ANN, different features of fuzzy logic and their modelling, control aspects and different hybrid control schemes.			
CO2	Understand the basics of artificial neural network			
CO3	Remember the modelling and control of neural network			
CO4	Remember on modelling and control of fuzzy control schemes.			
CO5	Acquire knowledge on hybrid control schemes.			

COURSE CODE & NAME: 19EE8305-POWER QUALITY

Course Name:	19EE8305	Power Quality	Course Year:	2019-2020
CO1	Able to classify power quality disturbances, their causes, detrimental effects and knowledge about national and international Power quality standards.			
CO2	Ability to assess the impact of harmonics in single phase and three phase distribution systems.			
CO3	Capability to adopt passive harmonic mitigation techniques for load compensation and voltage regulation.			
CO4	Able to employ dynamic harmonic current compensation methods in distribution systems.			
CO5	Able to employ dynamic voltage regulation methods in distribution systems.			

PROFESSIONAL ELECTIVE V

COURSE CODE & NAME: 19EE8306- PREVENTIVE MAINTENANCE OF ELECTRICAL APPARATUS

Course Name:	19EE8306	Preventive Maintenance of Electrical Apparatus	Course Year:	2019-2020
CO1	Understand the concepts of maintenance of electrical equipments			
CO2	Articulate the importance of preventive maintenance & understand the concepts of safety measures.			
CO3	Demonstrate the concepts of maintenance and troubleshooting for AC and DC motors.			
CO4	Exhibit the maintenance schedule and troubleshooting for transformer and domestic appliances.			
CO5	Understand the concept of maintenance of storage batteries.			

COURSE CODE & NAME: 19EE8307- High Voltage Direct Current Transmission

Course Name:	19EE8307	High Voltage Direct Current Transmission	Course Year:	2019-2020
CO1	Educate Planning and Modern trends in HVDC technology.			
CO2	Understand the different types of HVDC converter system.			
CO3	Summarize the converter control used in HVDC transmission			
CO4	Generalize filters for eliminating harmonics and study of AC filters.			
CO5	Criticize the power flow analysis and HVDC system simulation			

COURSE CODE & NAME: 19EE8308- ENERGY AUDITING AND ENERGY MANAGEMENT

Course Name:	19EE8308	Energy Auditing and Energy Management	Course Year:	2019-2020
CO1	Apply the knowledge to calculate the efficiency, energy conservation of various utilities.			
CO2	Design suitable energy monitoring system to analyze and optimize the energy consumption.			
CO3	Improve the efficiency by designing suitable energy efficient systems.			
CO4	Use the energy auditing tools learnt to save energy expenditure.			
CO5	Carry out the cost- benefit analysis of various investment alternatives for meeting the energy needs			

COURSE CODE & NAME: 19EE8309- APPLICATION OF POWER ELECTRONICS FOR RENEWABLE ENERGY SYSTEMS

Course Name:	19EE8309	Application of Power Electronics For Renewable Energy Systems	Course Year:	2019-2020
CO1	Familiarized the basic of renewable energy systems.			
CO2	Features of electrical machines used in renewable energy conversion are studied.			
CO3	Various topologies of power converters used for interfacing renewable energy system are studied			
CO4	Analysis the operation of solar and wind systems at stand alone and Grid integrated system			
CO5	Intend the algorithm of MPPT technique used in wind energy systems.			

COURSE CODE & NAME: 19EE8310- INTELLECTUAL PROPERTY RIGHTS

Course Name:	19EE8310	Intellectual Property Rights	Course Year:	2019-2020
CO1	Understand Intellectual Property portfolio to enhance the value of the firm.			
CO2	Understand the basics Registration of IPRs.			
CO3	Acquire knowledge on Agreements and Legislations.			
CO4	Interpret the digital products and law			
CO5	Acquire knowledge on Enforcement IPRs			

LIST OF OPEN ELECTIVES

COURSE CODE & NAME: 19EE6401- FUNDAMENTALS OF SOLAR ENERGY & ITS APPLICATIONS

Course Name:	19EE6401	Fundamentals of Solar Energy & its Applications	Course Year:	2019-2020
CO1	Ability to identify the energy demand and environmental impacts.			
CO2	Ability to explain the different solar measurement techniques.			
CO3	Ability to develop the solar modules.			
CO4	Ability to understand different supporting components of Solar PV systems.			
CO5	Ability to explain the applications of Solar PV systems			

COURSE CODE & NAME: 19EE7401- ELECTRIC VEHICLES

Course Name:	19EE7401	Electric Vehicles	Course Year:	2019-2020
CO1	Identify the Importance of EVs and HEVs			
CO2	State a suitable drive scheme for developing an electric hybrid vehicle depending on resources			
CO3	Design and develop basic drive schemes of electric vehicles and hybrid electric vehicles			
CO4	Choose proper energy storage systems for vehicle applications			
CO5	Identify various characteristics of Braking Energy.			