#  ST MOTHER THERESA ENGINEERING COLLEGE

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

# Anna University Regulation 2021

**B.E Electronics and Communication Engineering**

# Course Outcomes (CO)

21C101 - HS3151 Professional English – I

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| **CO. No.** | **Course Outcomes** |
| **21C101.1** | Express, listen and comprehend complex academic texts |
| **21C101.2** | Identify and infer the denotative and connotative meanings of technical texts |
| **21C101.3** | Construct definitions, descriptions, narrations and essays on various topics |
| **21C101.4** | Demonstrate fluently and accurately informal and informal communicative contexts |
| **21C101.5** | Interpret their opinions effectively in both oral and written medium of communication |

21C102 - MA3151 Matrices and Calculus

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| **CO. No**. | **COURSE OUTCOMES** |
| **21C102.1** | Apply matrix algebra methods for solving practical problems. |
| **21C102.2** | Apply differential calculus tools in solving various application problems. |
| **21C102.3** | Apply differential calculus ideas on several variable functions. |
| **21C102.4** | Apply different methods of integration in solving practical problems. |
| **21C102.5** | Apply multiple integral ideas in solving areas, volumes and other practical problems. |

21C103 - PH3151 Engineering Physics

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| **CO.No.** | **Course Outcomes** |
| 21C103.1 | Explain the importance of Mechanics |
| 21C103.2 | Demonstrate the knowledge of Electromagnetic waves and its applications. |
| 21C103.3 | Understand the fundamentals in Oscillations, Optics and Laser. |
| 21C103.4 | Extend the importance of Quantum Physics. |
| 21C103.5 | Explain the quantum mechanical principles towards the formation of energy bands. |

21C104 – CY3151 Engineering Chemistry

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| **CO. No** | **Course Outcomes** |
| 21C104.1 | Summarize the water quality parameters and their treatment techniques. |
| 21C104.2 | Describe the preparation and applications of nano materials. |
| 21C104.3 | Interpret the importance of phase diagrams and composites in the field of material science and engineering. |
| 21C104.4 | Illustrate the quality of fuel by its properties. |
| 21C104.5 | Illustrate the methods of harnessing energy from non-conventional energysources. |

21C105 – GE3151 Problem Solving and Python Programming

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| **CO. No** | **Course Outcomes** |
| 21C105.1 | Understand the concepts of algorithmic problem solving techniques and find solutions to simple computational problems. |
| 21C105.2 | Illustrate about python interpreter and develop simple python programs. |
| 21C105.3 | Develop simple Python programs using conditionals, loops and functions for solving problems. |
| 21C105.4 | Utilize Python data structures like lists, tuples, and dictionaries to represent complex data. |
| 21C105.5 | Develop simple python programs to read and write data from/to files. |

21C107 - GE3151 Problem Solving and Python Programming Laboratory

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| **CO. No** | **Course Outcomes** |
| 21C107.1 | Build algorithmic solutions to simple computational problems |
| 21C107.2 | Apply conditionals and loops for solving problems using Python. |
| 21C107.3 | Utilize functions to decompose a Python program |
| 21C107.4 | Make use of compound data using Python data structures. |
| 21C107.5 | Apply Python packages in developing software applications. |
| 21C107.6 | Exhibit ethical principles in engineering practices |
| 21C107.7 | Perform task as an individual and/ or team member to manage thetask in time |
| 21C107.8 | Express the engineering activities with effective presentation andreport. |
| 21C107.9 | Interpret the findings with appropriate technological/ research citation |

21C108- BS3171 Physics and Chemistry Laboratory

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| **CO. No** | **Course Outcomes** |
| 21C108.1 | Explain the physical parameters such as thickness of a wire, band gap of semiconductor both individually and by team by using experiments |
| 21C108.2 | Compare the Young’s modulus and Rigidity modulus of different materials |
| 21C108.3 | List the velocity of ultrasonic waves in different liquids like water and kerosene |
| 21C108.4 | Estimate strength of acids quantitatively based on the conductance and PH level of the solution both individually and in teams |
| 21C108.5 | Estimate water quality parameters such as dissolved oxygen content, chloride content and iron content of the water samples both individually and in teams |
| 21C108.6 | Exhibit ethical principles in engineering practices |
| 21C108.7 | Perform task as an individual and / or team member to manage the task in time |
| 21C108.8 | Express the Engineering activities with effective presentation and report |
| 21C108.9 | Interpret the findings with appropriate technological / research citation. |

 21C110 - HS3251 Professional English – II

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| **CO No.** | **Course Outcomes** |
| 21C110.1 | Associate learners in meaningful language activities to improve their LSRW skills |
| 21C110.2 | Extend learners’ awareness of general rules of writing for specific audience |
| 21C110.3 | Modify learners to understand the purpose, audience, contexts of different types of writing |
| 21C110.4 | Construct analytical thinking skills for problem solving in communicative contexts |
| 21C110.5 | Extend an understanding of job applications and interviews for internship andplacements |

21C111- MA3251 Statistics and Numerical Methods

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| **CO No.** | **Course Outcomes** |
| 21C111.1 | Apply the concept of testing of hypothesis for small and large samples in real lifeproblems. |
| 21C111.2 | Apply the basic concepts of classifications of design of experiments in the field of agriculture. |
| 21C111.3 | Appreciate the numerical techniques of interpolation in various intervals and applythe numerical techniques of differentiation and integration for engineering problems. |
| 21C111.4 | Understand the knowledge of various techniques and methods for solving first andsecond order ordinary differential equations. |
| 21C111.5 | Solve the partial and ordinary differential equations with initial and boundaryconditions by using certain techniques with engineering applications.. |

21C112 PH3202 PHYSICS FOR ELECTRICAL ENGINEERING

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| **CO No.** | **Course Outcomes** |
| 21C112.1 | know basics of dielectric materials and insulation. |
| 21C112.2 | gain knowledge on the electrical and magnetic properties of materials and their applications  |
| 21C112.3 | understand clearly of semiconductor physics and functioning of semiconductor devices |
| 21C112.4 | understand the optical properties of materials and working principles of various optical devices  |
| 21C112.5 | appreciate the importance of nanotechnology and nanodevices. |

21C113 – BE3255 BASIC CIVIL AND MECHANICAL ENGINEERING

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| **CO No.** | **Course Outcomes** |
| 21C113.1 | Understanding profession of Civil and Mechanical engineering. |
| 21C113.2 | Summarise the planning of building, infrastructure and working of Machineries. |
| 21C113.3 | Apply the knowledge gained in respective discipline |
| 21C113.4 | Illustrate the ideas of Civil and Mechanical Engineering applications. |
| 21C113.5 | Appraise the material, Structures, machines and energy. |

21C114 – GE3251 Engineering Graphics

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| **CO.NO** | **Course Outcomes** |
| 21C114.1 | Discuss and draw the various conic curves |
| 21C114.2 | Relate to basic principles of orthographic projection for drawing projection of points, lines and planes. |
| 21C114.3 | Discuss orthographic principle and apply basic principles of orthographic projection for drawing projection of solids like prisms, pyramids, cone and cylinder. |
| 21C114.4 | Show the sectioned view of solids and the development of solid surfaces |
| 21C114.5 | Show the isometric projection and perspective views for simple solids. |

21C115 - EE3251 ELECTRIC CIRCUIT ANALYSIS

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| **CO. No** | **Course Outcomes** |
| 21C115.1 | Explain circuit’s behavior using circuit laws. |
| 21C115.2 | Apply mesh analysis/ nodal analysis / network theorems to determine behavior of the given DC and AC circuit |
| 21C115.3 | Compute the transient response of first order and second order systems to step and sinusoidal input |
| 21C115.4 | Explain the frequency response of series and parallel RLC circuits and the behavior of magnetically coupled circuits. |
| 21C115.5 | Compute power, line/ phase voltage and currents of the given three phase circuit. |

21C118 - GE 3271 ENGINEERING PRACTICES LABORATORY

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| **CO No.** | **Course Outcomes** |
| 21C118.1 | Explain the various manufacturing process in smithy, foundry, fitting,assembling and disassembling and will be able to provide effective presentation. |
| 21C118.2 | Summarize the operations of various machine tools lathe , drilling |
| 21C118.3 | Develop models by using skills achieved from workshop sections likewelding, carpentry, sheet metal and plumbing |
| 21C118.4 | Apply the skills of basic electrical engineering for domestic wiringpractices |
| 21C118.5 | Apply the measuring instruments like energy meter and perform measurements in electrical circuits. |
| 21C118.6 | Exhibit ethical principles in engineering practices |
| 21C118.7 | Perform task as an individual and / or team member to manage the task intime |
| 21C118.8 | Express the Engineering activities with effective presentation and report |
| 21C118.9 | Interpret the findings with appropriate technological / research citation. |

21C119 - EE3271 ELECTRIC CIRCUITS LABORATORY

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| **CO No.** | **Course Outcomes** |
| 21C119.1 | Use simulation and experimental methods to verify the fundamental electrical laws for the given DC/AC circuit (Ex 1) |
| 21C119.2 | CO2: Use simulation and experimental methods to verify the various electrical theorems (Superposition, Thevenin , Norton and maximum power transfer) for the given DC/AC circuit (Ex 2-5) |
| 21C119.3 | CO3: Analyze transient behavior of the given RL/RC/RLC circuit using simulation and experimental methods (Ex 6) |
| 21C119.4 | CO4: Analyze frequency response of the given series and parallel RLC circuit using simulation and experimentation methods (Ex 7-8) |
| 21C119.5 | Analyze the performanceofthe given three-phase circuit using simulation and experimental methods (Ex 9) |

21C120 - GE3272 COMMUNICATION LABORATORY

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| **CO No.** | **Course Outcomes** |
| 21CO120.1 | Speak effectively in group discussions held in formal/semi formal contexts. |
| 21CO120.2 | Discuss, analyse and present concepts and problems from various perspectives to arrive at suitable solutions |
| 21CO120.3 | Write emails, letters and effective job applications. |
| 21CO120.4 | Write critical reports to convey data and information with clarity and precision |
| 21CO120.5 | Give appropriate instructions and recommendations for safe execution of tasks |

21C201 - MA3303 PROBABILITY AND COMPLEX FUNCTIONS

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| **CO No.** | **Course Outcomes** |
| 21C201.1 | Understand the fundamental knowledge of the concepts of probability and have knowledge of standard distributions which can describe real life phenomenon. |
| 21C201.2 | Understand the basic concepts of one and two dimensional random variables and apply in engineering applications. |
| 21C201.3 | To develop an understanding of the standard techniques of complex variable theory in particular analytic function and its mapping property. |
| 21C201.4 | To familiarize the students with complex integration techniques and contour integration techniques which can be used in real integrals. |
| 21C201.5 | To acquaint the students with Differential Equations which are significantly used in engineering problems |

21C202 EC3452 ELECTROMAGNETIC FIELDS

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| **CO No.** | **Course Outcomes** |
| 21C202.1 | Analyze Gradient, Divergence, and Curl operations on electromagneticvector fieldsand identify the electromagnetic sources and their effects. |
| 21C202.2 | Analyse electrostatic fields, electric potential, energy density along with their applications |
| 21C202.3 | Analyse magneto static fields, magnetic flux density, vector potential along with their applications. |
| 21C202.4 | Analyze the different methods of emf generation and Maxwell’s equations |
| 21C202.5 | Understand the concept of electromagnetic waves and characterizing parameters |

21C203- EE3302 DIGITAL LOGIC CIRCUITS

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| **CO No.** | **Course Outcomes** |
| 21C203.1 | Explain various number systems and characteristics of digital logic families |
| 21C203.2 | ApplyK-maps and Quine McCluskey methods to simplify the given Boolean expressions |
| 21C203.3 |  Explain the implementation of combinational circuit such as multiplexers and de multiplexers - code converters, adders, subtractors, Encoders and Decoders |
| 21C203.4 | Design various synchronous and asynchronous circuits using Flip FlopsExplain asynchronous sequential circuits and programmable logic devices |
| 21C203.5 | Use VHDL for simulating and testing RTL, combinatorial and sequential circuits |

21C204 - EC3353 ELECTRONIC DEVICES AND CIRCUITS

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| **CO No.** | **Course Outcomes** |
| 21C04.1 | Explain the structure and working operation of basic electronic devices. |
| 21C04.2 | Construct and analyse amplifiers. |
| 21C04.3 | Make use of the frequency response of BJT & MOSFET amplifiers |
| 21C04.4 | Build & analyze feedback amplifiers & oscillator principles |
| 21C04.5 | Construct & analyze power amplifiers and supply circuits |

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 21C205-EE3303 ELECTRICAL MACHINES - I

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| **CO No.** | **Course Outcomes** |
| 21C205.1 | Apply the laws governing the electromechanical energy conversion for singly and multiple excited systems. |
| 21C205.2 |  Explain the construction and working principle of DC machines. CO3: Interpret various characteristics of DC machines. |
| 21C205.3 | Compute various performance parameters of the machine, by conducting suitable tests. by drawing the equivalent circuit of transformer and predetermine the efficiency and regulation. |
| 21C205.4 | Draw the equivalent circuit of transformer and predetermine the efficiency and regulation. |
| 21C205.5 | Apply the laws governing the electromechanical energy conversion for singly and multiple excited systems. |

 21C206 - **CS3353**  **C PROGRAMMING AND DATA STRUCTURES**

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| **CO No.** | **Course Outcomes** |
| 21C206.1 | Develop C programs for any real world/technical application.  |
| 21C206.2 | Apply advanced features of C in solving problems. |
| 21C206.3 | Formulate functions to implement linear and non–linear data structure operations. |
| 21C206.4 | Suggest and use appropriate linear/non–linear data structure operations for solving a given problem |
| 21C206.5 | Appropriately use sort and search algorithms for a given application. |

21C207 - EC3361 ELECTRONIC DEVICES AND CIRCUITS LABORATORY

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| **CO No.** | **Course Outcomes** |
| 21C207.1 | Analyze the characteristics of PN, Zener diode and BJT in CE,CC,CB configurations and JFET , UJT experimentally |
| 21C207.2 | Analyze frequency response characteristics of a Common Emitter amplifierand the waveforme of oscillatorsexperimentally. |
| 21C207.3 | Analyze the performance of rectifiers and filters |
| 21C207.4 | Analyze the performance of differential ampliofiers |
| 21C207.5 | Understand the working of CRO |
| 21C207.6 | Exhibit ethical principles in engineering practices |
| 21C207.7 | Perform task as an individual and / or team member to manage the task intime |
| 21C207.8 | Express the Engineering activities with effective presentation and report |
| 21C207.9 | Interpret the findings with appropriate technological / research citation. |

21C208 - EE3311 ELECTRICAL MACHINES LABORATORY - I

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| **CO No.** | **Course Outcomes** |
| 21C208.1 |  Construct the circuit with appropriate connections for the given DC machine/transformer.   |
| 21C208.2 |  Demonstrate the speed control techniques for a DC motor for industrial applications.  |
| 21C208.3 | Experimentally determine the characteristics of different types of DC machines..  |
| 21C208.4 | Predetermine the performance parameters of transformers and DC motor.  |
| 21C208.5 | CO6: Understand DC motor starters and 3-phase transformer connections. |

21C209 - CS3362 C PROGRAMMING AND DATA STRUCTURES LABORATORY

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| **CO No.** | **Course Outcomes** |
| 21C209.1 | Develop different operations of C to construct an application. |
| 21C209.2 | Design a function to implement the operations for linear and non-linear data structures. |
| 21C209.3 | Compare and use appropriate operation for a given problem. |
| 21C209.4 | Apply appropriate hash functions to avoid collision. |
| 21C209.5 | Implement Sorting and searching algorithm for a given application. |
| 21C209.6 | Exhibit ethical principles in engineering practices |
| 21C209.7 | Perform task as an individual and / or team member to manage the task intime |
| 21C209.8 | Express the Engineering activities with effective presentation and report |
| 21C209.9 | Interpret the findings with appropriate technological / research citation. |

21C210 - GE3361- PROFESSIONAL DEVELOPMENT

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| **CO No.** | **Course Outcomes** |
| 21C210.1 | Use MS word to create quality documents by organizing their day to day technical and academic requirements |
| 21C210.2 | Use MS Excel to perform data operations and analytics record, retrieve data as per requirements and visualize data for ease of understanding |
| 21C210.3 | Use MS power point to create high quality academic presentation by including common tables, charts, graphs, interlinking other elements andusing other media objects. |

21C211 - GE3451 ENVIRONMENTAL SCIENCES AND SUSTAINABILITY

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| **CO No.** | **Course Outcomes** |
| 21C211.1 | Illustrate the features of Ecosystem & biodiversity |
| 21C211.2 | Choose pollution control methods and waste management . |
| 21C211.3 | Understand the potential for energy generation from wind, solar, geothermal, and other clean or renewable sources. |
| 21C211.4 | Demonstrate the impact on economic viability, environmental protection and social equity. |
| 21C211.5 | Demonstrate an understanding of the role of sustainability incontemporary industry practices. |

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|  21C212 - EE3401 **TRANSMISSION AND DISTRIBUTION** |
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| **CO No.** | **Course Outcomes** |
| 21C212.1 | Understand the structure of power system, computation of transmission line parameters fordifferent configurations. |
| 21C212.2 | Analyze the Model the transmission lines to determine the line performance and to understand the impact of Ferranti effect and corona on line performance. |
| 21C212.3 | Understand theMechanical design of transmission lines, grounding and to understand about the insulators in transmission system. |
| 21C212.4 | Analyze the construction and operation of the underground cables and understand the performance analysis of underground cable |
| 21C212.5 | Understand the modelling, performance analysis and modern trends in distribution system. |

21C213 - EC3451 LINEAR INTEGRATED CIRCUITS

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| **CO No.** | **Course Outcomes** |
| 21C213.1 | Understand the monolithic IC fabrication process and the fabrication of diodes, capacitance, resistance, FETs and PV Cell. |
| 21C213.2 | Analyze the characteristics and basic applications (inverting/non-inverting amplifier, summer, differentiator, integrator, V/I and I/V converter) of Op-Amp |
| 21C213.3 | Anzlyse the circuit and applications of op-amp based instrumentation amplifier, log/antilog amplifier,analog multiplier /divider, active filters, comparators, waveform generators, A/D and D/A converters |
| 21C213.4 | Understand the Functional blocks, characteristics and applications of Timer, PLL, analog multiplier ICs. |
| 21C213.5 | Understand the applications of ICs in Instrumentation amplifier, fixed and variable voltage regulator,SMPS and function generator |

21C214 – EE3403-MEASURMENTS AND INSTRUMENTATION

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| **CO No.** | **Course Outcomes** |
| 21C214.1 | Understand the characteristics and errors of measuring instruments |
| 21C214.2 | Understand the operations of various measuring instruments for measuring, power, energy and magnetic measurments |
| 21C214.3 | Apply comparison based measurements for bridges for measuring various electrical parameters of R,L,C |
| 21C214.4 | Understand the principles of analog, digital storage and display devices |
| 21C214.5 | Understand the operation of various transducers and data acquisition |

21C215 - EE3404 MICROPROCESSOR AND MICROCONTROLLER

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| **CO No.** | **Course Outcomes** |
| 21C215.1 | Ability to write assembly language program for microprocessor and microcontroller  |
| 21C215.2 | Ability to design and implement interfacing of peripheral with microprocessor and microcontroller |
| 21C215.3 | Ability to analyze, comprehend, design and simulate microprocessor based systems used for control and monitoring. |
| 21C215.4 | Ability to analyze, comprehend, design and simulate microcontroller based systems used for control and monitoring. |
| 21C215.5 | Ability to understand and appreciate advanced architecture evolving microprocessor field |

21C216 - EE3405 ELECTRICAL MACHINES - II

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| **CO No.** | **Course Outcomes** |
| 21C216.1 | Analyze performance of synchronous generator using predetermination methods |
| 21C216.2 | Understand the construction and performance of synchronous motor |
| 21C216.3 | Analyze and performance of various types three-phase induction motors by using direct and indirect methods |
| 21C216.4 | Understand the different types of three phase induction motors and their starting methods and speed control  |
| 21C216.5 | Explain the performance of single-phase induction motor and specialelectrical machines. |

21C216 - EE3411 ELECTRICAL MACHINES LABORATORY - II

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| **CO No.** | **Course Outcomes** |
| 21C216.1 | Analyze the performance of three phase alternator based on regulation by various methods. |
| 21C216.2 | Analyze the performance of three phase synchronous motor by plotting “V andinverted- V” curves. |
| 21C216.3 | Analyze the load and no-load characteristics of three phase induction motor. |
| 21C216.4 | Analyze the load and no-load characteristics of single phase induction motor. |
| 21C216.5 | Understand the concept of starters for induction motors. |

21C217 - EC3462 LINEAR INTEGRATED CIRCUITS LABORATORY

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| **CO No.** | **Course Outcomes** |
| 21C217.1 | Simplify and implement Boolean functionin digital ICs |
| 21C217.2 | Construct and analyze counters using specific counter IC. |
| 21C217.3 | Construct and analyze Analyze various applications of IC such as inverting, non inverting amplifier, integrator, differentiator etc. and the voltage regulator LM 317 |

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| 21C217.4 | Analyze the working of timer in monostable and a stable mode voltage frequency charaecteristics of SE 566 |
| 21C217.5 | Construct code converters and apply the same for real world applications |
| 21C217.6 | Exhibit ethical principles in engineering practices |
| 21C217.7 | Perform task as an individual and / or team member to manage the taskin time |
| 21C217.8 | Express the Engineering activities with effective presentation andreport |
| 21C217.9 | Interpret the findings with appropriate technological / research citation. |

**21C301-EE3501-POWER SYSTEM ANALYSIS**

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| **CO No.** |  **Course Outcomes** |
| 21C301.1 | Formulate  the  model of power system into simple electrical circuitand  admittance matrices by applying  mathematical  knowledge  and by using    relevant  IT  software. |
| 21C301.2 | Find solutions toEvaluate various powers and voltages at various buses using iterative Techniques by formulating mathematical models and thereby taking well founded conclusion about various buses. |
| 21C301.3 | Find short circuit current and fault voltages by applying fundemental Thevenin’s theorem by formulating models of various power systems and draw conclusions based on results |
| 21C301.4 | Formulate model the various unsymmetrical faults using sequence network and evaluate short circuit current and post fault voltages and make effective conclusions and communicate results effectively. |
| 21C301.5 | Analyse the stability of power system using various mathematical tools |

**21C302-EE3591-POWER ELECTRONICS**

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| **CO No.** |  **Course Outcomes** |
| 21C302.1 | Understand the operation of semiconductor devices and dynamic characteristics and to design &analyze the low power SMPS  |
| 21C302.2 | Analyze the various uncontrolled rectifiers and design suitable filter circuits  |
| 21C302.3 | Analyze the operation of the n-pulse converters and evaluate the performance parameters  |
| 21C302.4 | Understand various PWM techniques and apply voltage control and harmonic elimination methods to inverter circuits. |
| 21C302.5 | Understand the operation of AC voltage controllers and its applications.  |

**21C303-EE3503-CONTROL SYSTEMS**

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| **CO No.** |  **Course Outcomes** |
| 21C303.1 | Represent simple systems in transfer function and state variable forms |
| 21C303.2 | Analyze simple systems in time domain |
| 21C303.3 | Analyze simple systems in frequency domain. |
| 21C303.4 | Infer the stability of systems in time and frequency domain |
| 21C303.5 | Interpret characteristics of the system and find out solution for simple control problems |

**21C304-EE3006 POWER QUALITY**

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| **CO No.** |  **Course Outcomes** |
| 21C304.1 | Use various definitions of power quality for power quality issues |
| 21C304.2 | Describe the concepts related with single phase / three phase, linear / nonlinear loads and single phase / three phase sinusoidal, non-sinusoidal source |
| 21C304.3 | Solve problems related with mitigation of Power System Harmonics |
| 21C304.4 | Use DSTATCOM for load compensation |
| 21C304.5 | Demonstrate the role of DVR, SAFs UPQC in power distribution systems |

**21C305-EE3012-ELECTRICAL DRIVES**

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| **CO No.** |  **Course Outcomes** |
| 21C305.1 | Understand the basic requirements of motor selection for different load profiles. |
| 21C305.2 | Analyse the steady state behavior and stability aspects of drive systems. |
| 21C305.3 | Analyse the dynamic performance of the DC drive using converter and chopper control. |
| 21C305.4 | Simulate the AC drive. |
| 21C305.5 | Design the controller for electrical drives |

**21C306-EE3016-EMBEDDED SYSTEM DESIGN**

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| **CO No.** |  **Course Outcomes** |
| 21C306.1 |  Understand the hardware functionals required to develop various Embedded systems |
| 21C306.2 | Compare and differentiate various Bus communication standards |
| 21C306.3 | Identify the interrupts and their services  |
| 21C306.4 | Understand the various scheduling algorithms and the inter process communication techniques.. |
| 21C306.5 | Apply the various embedded concepts for developing automation applications. |

**21C307-MX3084-DISASTER AND RISK REDUCTION MANAGEMENT**

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| **CO No.** |  **Course Outcomes** |
| 21C307.1 | To impart knowledge on the concepts of Disaster, Vulnerability and Disaster Risk reduction (DRR) |
| 21C307.2 | To enhance understanding on Hazards, Vulnerability and Disaster Risk Assessment prevention and risk reduction |
| 21C307.3 | To develop disaster response skills by adopting relevant tools and technology |
| 21C307.4 | Enhance awareness of institutional processes for Disaster response in the country |
| 21C307.5 | Develop rudimentary ability to respond to their surroundings with potential Disaster response in areas where they live, with due sensitivity |

**21C308-EE3511-POWER ELECTRONICS LABARATORY**

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| **CO No.** |  **Course Outcomes** |
| 21C308.1 | Determine the characteristics of SCR, IGBT, TRIAC, MOSFET and IGBT |
| 21C308.2 | Find the transfer characteristics of full converter, semi converter, step up and step down choppers by simulation experimentation. |
| 21C308.3 | Analyze the voltage waveforms for PWM inverter using various modulation techniques. |
| 21C308.4 | Design and experimentally verify the performance of basic DC/DC converter topologies used for SMPS. |
| 21C308.5 | Understand the performance of AC voltage controllers by simulation and experimentation |

**21C309-EE3512-CONTROL AND INSTRUMENTATION LAB**

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| **CO No.** |  **Course Outcomes** |
| 21C309.1 | To model and analyze simple physical systems and simulate the performance in analog and digital platform. |
| 21C309.2 | To design and implement simple controllers in standard forms. |
| 21C309.3 | To design compensators based on time and frequency domain specifications. |
| 21C309.4 | To design a complete closed control loop and evaluate its performance for simple physical systems. |
| 21C309.5 | To analyze the stability of a physical system in both continuous and discrete domains |

**21C310-EE3601-PROTECTION AND SWITCH GEAR**

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| **CO No.** |  **Course Outcomes** |
| 21C310.1 | Understand and select proper protective scheme and type of earthing |
| 21C310.2 | Explain the operating principles of various relays. |
| 21C310.3 | Suggest suitable protective scheme for the protection of various power system apparatus |
| 21C310.4 | Analyze the importance of static relays and numerical relays in power system protection |
| 21C310.5 | Summarize the merits and demerits and application areas of various circuit breakers. |

**21C311-EE3602-POWER SYSTEM OPERATION AND CONTROL**

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| **CO No.** |  **Course Outcomes** |
| 21C311.1 | Understand the day – to – day operation of power system |
| 21C311.2 | Model and analyse the control actions that are implemented to meet the minute-tominute variation of system real power demand. |
| 21C311.3 | Model and analyze the compensators for reactive power control and various devices used for voltage control. |
| 21C311.4 | Prepare day ahead and real time economic generation scheduling |
| 21C311.5 | Understand the necessity of computer control of power systems. |

**21C312-EE3011-MULTILEVEL POWER CONVERTERS**

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| **CO No.** |  **Course Outcomes** |
| 21C312.1 | Examine the different topologies of multilevel inverters (MLIs) with and without DC link capacitor. |
| 21C312.2 | Examine the performance of MLIs with Bipolar Pulse Width Modulation (PWM) Unipolar PWM Carrier-Based PWM Schemes Phase Level Shifted Multicarrier Modulation |
| 21C312.3 | Demonstrate the working principles of Cascaded H-Bridge MLI, diode clamped MLI, flying capacitor MLI and MLI with reduced switch count |
| 21C312.4 | Analyze the voltage balancing performance in Diode clamped MLI |
| 21C312.5 | Simulate three level, capacitor clamed and diode clamped MLI with R and RL load |
| 21C312.6 | Simulate MLI with reduced switch configuration using fundamental switching scheme |

**21C313-EE3007-SMART GID**

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| **CO No.** |  **Course Outcomes** |
| 21C313.1 | To understand the importance and objectives of Power System Grid |
| 21C313.2 | To understand the concept of a smart grid and its present need |
| 21C313.3 | To identify and discuss smart metering devices and associated technologies |
| 21C313.4 | To be able to get an overview of Microgrid and Electric Vehicle Technology. |
| 21C313.5 | To be able to have an up to date knowledge on the various computing technologies; to understand the role of Big Data and IoT for effective and efficient operation of Smart Grid |

**21C314-OCS352-IoT Concepts and its Applications**

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| **CO No.** |  **Course Outcomes** |
| 21C314.1 | Ability to Explain the concept of IoT |
| 21C314.2 | Able to understand the communication models and various protocols for IoT. |
| 21C314.3 | Able to design portable IoT using Arduino/Raspberry Pi /open platform |
| 21C314.4 | Able to apply data analytics and use cloud offerings related to IoT. |
| 21C314.5 | Able to analyze applications of IoT in real time scenario. |

**21C315-MX3089-INDUSTRIAL SAFETY**

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| **CO No.** |  **Course Outcomes** |
| 21C315.1 | Understand the basic concept of safety |
| 21C315.2 | Obtain knowledge of Statutory Regulations and standards. |
| 21C315.3 | Know about the safety Activities of the Working Place |
| 21C315.4 | Analyze on the impact of Occupational Exposures and their Remedies |
| 21C315.5 | Obtain knowledge of Risk Assessment Techniques. |

**21C316-EE3611-POWER SYSTEM LABARATORY**

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| **CO No.** |  **Course Outcomes** |
| 21C316.1 | Model and analyze the performance of the transmission lines. |
| 21C316.2 | Perform power flow, short circuit, and stability analysis for any power system network. |
| 21C316.3 | Understand, design, and analyze the load frequency control mechanism. |
| 21C316.4 | Perform optimal scheduling of generators and compute the state of the power system |
| 21C316.5 | Understand, analyze, and apply the relays for power system protection |

**21C401-EE3701-HIGH VOLTAGE ENGINEERING**

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| **CO No.** |  **Course Outcomes** |
| 21C401.1 | Explain various overvoltage’s and its effects on power systems |
| 21C401.2 | Understand the breakdown phenomena in different medium under uniform and nonuniform fields. |
| 21C401.3 | Explain the methodsof generating and measuring High DC, AC, Impulse voltage and currents. |
| 21C401.4 | Suggest and Conduct suitable HV testing of Electrical power apparatus as per Standards |
| 21C401.5 | Explain the Industrial Applications of Electrostatic Fields. |

**21C402-GE3791-HUMAN VALUES AND ETHICS**

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| **CO No.** |  **Course Outcomes** |
| 21C402.1 | Identify the importance of democratic, secular and scientific values in harmonious functioning of social life |
| 21C402.2 | Practice democratic and scientific values in both their personal and professional life. |
| 21C402.3 | Find rational solutions to social problems. |
| 21C402.4 | Behave in an ethical manner in society |
| 21C402.5 | Practice critical thinking and the pursuit of truth. |

**21C403-GE3792-INDUSTRIAL MANAGEMENT**

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| **CO No.** |  **Course Outcomes** |
| 21C403.1 | Explain basic concepts of management; approaches to management; contributors to management studies; various forms of business organization and trade unions function in professional organizations. |
| 21C403.2 | Discuss the planning; organizing and staffing functions of management in professionalorganization. |
| 21C403.3 | Apply the leading; controlling and decision making functions of management in professional organization. |
| 21C403.4 | Discuss the organizational theory in professional organization. |
| 21C403.5 | Apply principles of productivity and modern concepts in management in professional organization. |

**21C404-CME365-RENEWABLE ENERGY TECHNOLOGIES**

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| **CO No.** |  **Course Outcomes** |
| 21C404.1 | Discuss the Indian and global energy scenario. |
| 21C404.2 | Describe the various solar energy technologies and its applications |
| 21C404.3 | Explain the various wind energy technologies. |
| 21C404.4 | Explore the various bio-energy technologies. |
| 21C404.5 | Discuss the ocean and geothermal technologies |

**21C405-OCS351-ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING FUNDEMENTALS**

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| **CO No.** |  **Course Outcomes** |
| 21C405.1 | Understand the foundations of AI and the structure of Intelligent Agents |
| 21C405.2 | Use appropriate search algorithms for any AI problem |
| 21C405.3 | Study of learning methods |
| 21C405.4 | Solving problem using Supervised learning |
| 21C405.5 | Solving problem using Unsupervised learning |

**21C406-OME 352-ADDITIVE MANUFACTURING**

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| **CO No.** |  **Course Outcomes** |
| 21C406.1 | Recognize the development of AM technology and how AM technology propagated into various businesses and developing opportunities. |
| 21C406.2 | Acquire knowledge on process vat polymerization and material extrusion processes and its applications. |
| 21C406.3 | Elaborate the process and applications of powder bed fusion and binder jetting. |
| 21C406.4 | Evaluate the advantages, limitations, applications of material jetting and directed energy deposition processes |
| 21C406.5 | Acquire knowledge on sheet lamination and direct write technology. |