CHAITANYA BHARATHI INSTITUTE OF TECHNOLOGY (Autonomous)
Department of Electrical and Electronics Engineering

1. **VISION & MISSION OF THE INSTITUTE:**

    Vision: To be center of excellence in technical education and research

    Mission: To address the emerging needs through quality technical education and advanced research.

2. **VISION & MISSION OF THE DEPARTMENT:**

    Department Vision

    To achieve Academic and Professional Excellence in Teaching and Research in the frontier areas of Electrical and Electronics Engineering **Vis-a -Vis** serve as a Valuable Resource for Industry and Society.

    Department Mission

    Empowering the Faculty and Student Rendezvous to Nurture Interest for Conceptual Keystone, Applied Multidisciplinary Research, Inspiring Leadership, and Efficacious Entrepreneurship culture, Impeccable Innovation in frontier areas to be synergetic with Environmental, Societal and Technological Developments of the National and International community for Universal Intimacy.

    M1: Emphasis on providing Strong Theoretical Foundation & Engineering Leadership Eminence, infusion of Creativity and Management skill while maintaining Ethics and Moral for Sustainable Development. (Individual development)

    M2: Enable the Faculty and Student Interactions to trigger interest for Applied Multidisciplinary Research and Entrepreneurship Culture resulting in Significant Advancement of the field of Specialization with Involvement of Industries and Collaborative Educational Networks. (Sense of Ownership, Networking, and Eco system development).

    M3: Extend the Conducive Neighbourhoods for Innovation in frontier areas to keep pace with Environmental, Societal and Technological Developments of the National and International Community to Serve Humanity. (Service to Society, Atmanirbhar Bharat)

3. **PROGRAM EDUCATIONAL OBJECTIVES (PEOS):**

❖ **PEO1.** Graduates will **ennoble** in offering Design solutions for Complex Engineering Problems using appropriate modern Software tools, with the specified need of the Industry and Protagonist in transforming the Society into a Knowledge Society.

❖ **PEO2-** Graduates will **elevate** Engineering Leadership and will be recognized as Experts working in in Government, Consulting firms, International organizations with their Creativity in Design of Experiments, Analysis and Interpretation of Data and Synthesis of Information.

❖ **PEO 3-** Graduates will **exalt** in their Professional career by Persistence in Team work, Ethical behaviour, Proactive involvement, and Effective Communication.

❖ **PEO 4-** Graduate will **excel** by becoming Researches , Professors and Entrepreneurs who will create and Disseminate new knowledge in the frontier areas of Engineering , Technology and Management

4. **PROGRAM SPECIFIC OUTCOMES (PSOS):**

PSO 1:   Evaluate complex Engineering Problems to meet the distinct need of Industry & Society, by utilizing knowledge of Mathematics, Science, Emerging Technologies such as AI, Block chain & IT tools.

PSO 2:   Exhibit Latent talent in understanding the Engineering and Administration standards at work place as a team leader to manage Projects in the Multi-Disciplinary Environments.

PSO 3:   Establish Engineering Expertise in Power system, Machines and Drives Systems and also Pursue Research in the Frontier areas such as Embedded systems, Renewable Energy, EMobility and Smart grid.

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5. PO - PROGRAM OUTCOMES:

1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

2. **Problem Analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

3. **Design/Development of Solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations

4. **Conduct Investigations of Complex Problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions

5. **Modern Tool Usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

6. **The Engineer and Society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

7. **Environment and Sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

8. **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

9. **Individual and Team Work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

10. **Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

11. **Project Management and Finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

12. **Life-long Learning**: Recognize the need for, and have the preparation and ability to engage in independent and lifelong learning in the broadest context of technological change.
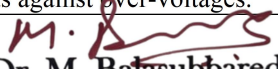
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CHAITANYA BHARATHI INSTITUTE OF TECHNOLOGY (Autonomous)
Department of Electrical and Electronics Engineering
Course outcomes statements BE-EEE

SNo	R22 - Course Code	R22 - Course Name	Course outcomes statements
1	22EEC01	Basic Electrical Engineering	1. Understand the concepts of Kirchhoff's laws and their application various theorems to get solution of simple dc circuits.
			2. Predict the steady state response of RLC circuits with AC single phase/three phase supply.
			3. Infer the basics of single phase transformer
			4. Describe the construction, working principle of DC machine and 3-phase Induction motor.
			5. Acquire the knowledge of electrical wires, cables, earthing, Electrical safety precautions to be followed in electrical installations and electric shock and its safety and energy calculations.
2	22EEC02	Basic Electrical Engineering Lab	1. Comprehend the circuit analysis techniques using various circuital laws and theorems.
			2. Analyse the parameters of the given coil and measurement of power and energy in AC circuits
			3. Determine the turns ration/performance parameters of single-phase transformer
			4. Infer the characteristics of DC shunt motor different tests.
			5. Illustrate different parts and their function of electrical components, equipment and machines.

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	Course		
Sl. No	Code	Title	Course outcomes statements
1.	18EEE23	Smart Grid	1. Discuss the components and operation of Smart Grid at transmission and distribution level. 2. Select the communication technology required for smart grid applications. 3. Illustrate components and operation of smart metering and implementation of demand side integration. 4. Analyze the different types of micro grid, storage systems and communication infrastructure. 5. Explain the equipment used in distribution automation and implement the distribution management system functions.
2.	18EGO02	Gender sensitization	1. Understand the difference between "Sex" and "Gender" and be able to explain socially constructed theories of identity. 2. Recognize shifting definitions of "Man" and "Women" in relation to evolving notions of "Masculinity" and "Femininity". 3. Appreciate women's contributions to society historically, culturally and politically. 4. Analyze the contemporary system of privilege and oppressions, with special attention to the ways gender intersects with race, class, sexuality, ethnicity, ability, religion, and nationality. 5. Demonstrate an understanding of personal life, the workplace, the community and active civic engagement through classroom learning.
3.	18ITO02	Python Programming	1. Understand the fundamental concepts and control structures of python programming. 2. Write user defined iterative & recursive functions, identify appropriate predefined functions and perform file handling Operations. 3. Use suitable data structures such as sequences, dictionaries and sets in python programming. 4. Apply concepts of OOP, exception handling and build regular expressions using Python. 5. Design and Develop GUI based applications and visualize the data.
4.	18EEC31	Technical Seminar	1. Collect, Organize, Analyze and Consolidate information about emerging technologies from the literature. 2. Exhibit effective communication skills, stage courage, and confidence. 3. Demonstrate intrapersonal skills. 4. Explain new innovations/inventions in the relevant field. 5. Prepare and experience in writing the Seminar Report in a prescribed format.
5.	18EEC32	Project Part 2	1. Recall the details of the approach for the selected problem. 2. Interpret the approach to the problem relating to the assigned topic. 3. Determine the action plan to conduct investigation. 4. Analyze and present the model / simulation /design as needed. 5. Evaluate, present and report the results of the analysis and justify the same.
6.	18EEC25	Power System Protection	1. Understand basic terminology of relays and types of over current protection of power system. 2. Distinguish the type of distance protection with principle & their application to three phase transmission lines. 3. Choose suitable differential scheme for the protection of various equipment in electrical power system. 4. Describe the principle of operation, and able to calculate the ratings of circuit breakers. 5. Familiarize with different protection methods against over-voltages.

			6. Identify various elements of numerical relays, their functions and different techniques used in their design.
7.	18EEC26	Electrical Drives	1. Analyze 1-Φ & 3-Φ converters fed DC motors as well as chopper fed DC motors. 2. Understand the operational variance between single and multi-quadrant operation of various Electric Drives. 3. Comprehend the speed control of an AC-AC & DC-AC converter fed induction motor on stator and rotor side. 4. Illustrate the principles of speed control of synchronous motor with VSI, CSI and cyclo-converter. 5. Differentiate the features of closed loop operation of DC and AC electric drive and their controllers.
8.	18EEC27	Signals & Systems	1. Understand the basics of signals and systems and classify them 2. Analyse systems in complex frequency domain. 3. Understand sampling theorem and its implications. 4. Explore the applications of Laplace transforms to continuous time systems 5. Apply the Z-transform techniques to discrete time systems.
9.	18EEE20	High Voltage Engineering	1. Define Townsend's first and second ionization coefficients 2. Illustrate various breakdown mechanisms in gas, liquid and solid insulating materials. 3. Analyze the generation of dc, ac and impulse voltage and currents. 4. Discuss the various measurement methods of dc, ac and impulse voltages and currents. 5. Explain the testing of high voltage equipment, HV laboratories and safety precautions in HV labs.
10.	18MEO04	Entrepreneurship	1. Understand the concept and essence of entrepreneurship. 2. Identify business opportunities and nature of enterprise. 3. Analyze the feasibility of new business plan. 4. Apply project management techniques like PERT and CPM for effective planning and execution of projects. 5. Use behavioural, leadership and time management aspects in entrepreneurial journey.
11.	18EGO01	Technical Writing Skills	1. Communicate effectively, without barriers and understand aspects of technical communication. 2. Differentiate between general writing and technical writing and write error free sentences using technology specific words. 3. Apply techniques of writing in business correspondence and in writing articles. 4. Draft technical reports and technical proposals. 5. Prepare agenda and minutes of a meeting and demonstrate effective technical presentation skills.
12.	18EEC28	POWER SYSTEMS-II LAB	1. Apply the load flow studies for any given power system. 2. Analyze the fault in the real time power system. 3. Estimate the consequences of transient stability, economic power scheduling and load frequency control. 4. Examine function of different types of relays for different power system applications. 5. Illustrate the functionality of each component in the substation.
13.	18EEC29	ELECTRICAL DRIVES LAB	1. Analyse the control strategies to modify the output parameters of dc and ac drives. 2. Develop, testing and experimental procedures by applying basic knowledge in electrical and electronics. 3. Demonstrate the principle of energy efficient motors by load

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			matching. 4. Interpret the performance of a given drive by suitable experimentation. 5. Investigate the performance of a given drive by using suitable simulation software.
14.	18EEC30	PROJECT: PART-1	1. List the various approaches to the selected problem. 2. Interpret the advantages and disadvantages of various approaches. 3. Apply the selected approach for simulating / modelling / designing the problem. 4. Analyse and write a report on the results of the simulation / modelling of the problem selected. 5. Justify and present the results of the simulation / model / design before the departmental committee.
15.	20EEC18	Power System Protection	1. Understand basic terminology of relays and types of over current protection of power system. 2. Distinguish the type of distance protection with principle & their application to three phase transmission lines. 3. Choose suitable differential scheme for the protection of various equipment in electrical power system. 4. Describe the principle of operation, and able to calculate the ratings of circuit breakers. 5. Familiarize with different protection methods against over-voltages. 6. Identify various elements of numerical relays, their functions and different techniques used in their design.
16.	20EEC25	Power System Operation and Control	1. Demonstrate the Economic operation of power system without and with Losses 2. Illustrate the concept of Unit Commitment. 3. Analyze the Load Frequency Control for single and two area systems. 4. Examine the rotor angle stability of a power system under any disturbance. 5. Identify and Explain the Voltage Stability problems.
17.	20EEC26	Electrical Drives	1. Acquire the knowledge about classification, choice, dynamics and stability of Electric Drives. 2. Analyse 1-Φ & 3-Φ converters fed DC motors. 3. Understand the operational variance between single and multi-quadrant operation of various Electric Drives. 4. Analyse chopper fed DC motors. 5. Comprehend the speed control of a converter fed induction motor drives and synchronous motor drives. 6. Differentiate the features of closed loop operation of DC and AC electric drive and their controllers.
18.	20EEC27	IoT for Electrical Engineering	1. Understand the basic principles and terminologies of computer networking, network security, WSN, M2M, CPS, sensors and actuators. 2. Describe various data types in IoT applications, connectivity protocols in IoT, communication protocols in IoT. 3. Understand basic concepts of Arduino UNO and Design smart system applications using Arduino UNO. 4. Apply Python programming for Problem solving and application development. 5. Understand the working of Raspberry Pi and develop IoT applications.
19.	20EGM01	Indian Constitution& Fundamental Principles	1. Understand the making ofthe Indian Constitution and its features. 2. Identify the difference among Right To equality, Right To freedom and Right to Liberty. 3. Analyze the structuring of the Indian Union and differentiate the powers between Union and States.

			4. Distinguish between the functioning of Lok Sabha and Rajya Sabha while appreciating the importance of Judiciary.
			5. Differentiate between the functions underlying Municipalities, Panchayats and Co-operative Societies.
20.	20EEC33	Utilization of Electrical Energy	1. Acquire knowledge about electric heating concepts for a given application.
			2. Understand principles of welding concepts for a given application
			3. Familiar with principles of illumination concepts.
			4. Identify the necessity of illumination and luminaries for specified requirement.
			5. Select proper traction system and its corresponding drive for industrial applications.
			6. Able to estimate energy consumption levels at various modes of operation.
21.	20EEC34	Power Quality Engineering	1. Illustrate the basic concepts of power quality issues and power quality monitoring, standards and measuring instruments.
			2. Determine the voltage sag magnitude in radial, Non-radial and Meshed systems.
			3. Analyze voltage sags effect on three-phase AC- Adjustable speed drive (ASD), DC- Adjustable speed drive (ASD) for industrial applications.
			4. Identify the sources of harmonics and its mitigation techniques in industrial systems.
			5. Discuss the protection devices for transient over voltages and solutions for Wiring and Grounding problems.
22.	20EEC28	Power Systems Lab	1. Calculate ABCD constants of transmission lines and evaluate regulation and efficiency.
			2. Examine relay setting and compensation techniques for safe operating of power system.
			3. Identity sequence parameters of transformer and alternator and discuss its importance.
			4. Calculate the time constant, perform Fault Analysis of an Alternator and Identify Fault location of an Underground Cable.
			5. Determine the dielectric strength of transformer oil and calculate the efficiency of string insulators of a transmission line.
23.	20EEC29	Electrical Simulation Lab	1. Analyze the DC and AC circuits.
			2. Demonstrate the time and frequency response of the system
			3. Perform Load flow studies and economic load dispatch.
			4. Conduct Load frequency control and transient stability studies.
			5. Realize the Electrical operations using ANNs and Heuristic Techniques.
24.	20EEC30	ElectricalDrives Lab	1. Analyze the control strategies to modify the output parameters of dc and ac drives.
			2. Develop, testing and experimental procedures by applying basic knowledge in electrical and electronics.
			3. Demonstrate the principle of energy efficient motors by load matching.
			4. Interpret the performance of a given drive by suitable experimentation.
			5. Investigate the performance of a given drive by using suitable simulation software.
25.	20EEC31	IoT Lab	1. Understand use of Arduino / Raspberry Pi board circuit.
			2. Implement interfacing of various sensors with Arduino /Raspberry Pi.
			3. Demonstrate the ability to transmit data wirelessly between different devices.
			4. Show an ability to upload/download sensor data on cloud and server.
			5. Analyze basic protocols in wireless sensor network.

26.	20EEC17	Electrical Machines-II	1. Acquire the knowledge of Constructional and operational features of ac machines. 2. Understand the various starting methods and speed control of ac machines. 3. Explain the concepts of ac machines. 4. Describe the applications of ac machines. 5. Analyze the performance characteristics of ac machines.
27.	20EEC18	Power Systems-II	1. Analyse the performance of different types of transmission lines and evaluate the corona effect on transmission lines. 2. Understand the application of per unit quantities in power systems. 3. Classify different types of faults and apply symmetrical components to solve the power system problem when subjected to different fault conditions. 4. Describe the causes of over voltages and analyse reflection and refraction coefficients of overhead lines and cables. 5. Apply Gauss Seidel method and Newton-Raphson method to find power flows and voltages of the given power system.
28.	20EEC19	Microcontrollers and Applications	1. Understand the internal architecture of 8051 Microcontroller 2. Do Assembly Language Programming using 8051 Microcontroller. 3. Interface Application devices to 8051 Microcontroller and Communication Protocols. 4. Understand the internal architecture of ARM controller. 5. Programming using ARM controller LPC 2148.
29.	20EEC20	Control Systems	1. Understand different mathematical models for any electromechanical LTI systems. 2. Determine the Transfer function of an LTI system using block diagram & signal flow graph approach. 3. Analyze the given first and second order systems based on their performance parameters &PID controllers. 4. Analyze absolute and relative stability of an LTI system using time and frequency domain techniques. 5. To understand the concepts of compensators and be able to draw its frequency response 6. Develop various state space models for LTI systems and to determine its Controllability and Observability.
30.	20EEC11	Electrical Distribution Systems	1. Solve the problems on load factor, loss factor, coincidence factor and discuss the characteristic so floads along with load growth. 2. Illustrate the substation bus schemes and determine the rating, voltage drop of substations. 3. Describe types and characteristics of primary and secondary distribution system and find voltage drop and power losses. 4. Find voltage drop and power loss of three-phase & non-three phase lines and analyze the distribution costs and voltage control methods in the distribution system. 5. Calculate their active power requirements of the distribution system and summarize the functions and communications used in distribution automation.
31.	20EEC13	Simulation Techniques in Electrical Engineering	1. Understand the basics of MATLAB programming. 2. Apply matrix mathematics and functions for solution of linear and nonlinear equations. 3. Understand the use of plots for visualization of the numerical solution. Develop and run them-files 4. Analyse the basic electrical and networks applications in MATLAB environment. 5. Analyse the computational Intelligence Techniques in MATLAB environment.

32.	20EEC21	High Voltage Engineering	1. Understand various breakdown processes in solid, liquid and gaseous insulating materials. 2. Acquire the knowledge about generation of DC, AC and impulse voltage and currents. 3. Know the measurement of DC, AC and impulse voltage & currents. 4. Gain knowledge about testing of HV equipment. 5. Explain about HV laboratories and safety precautions in HV labs.
33.	20EEC24	Renewable Energy Technologies	1. Know the benefits of different renewable energy sources. 2. Understand the generation of Wind Power. 3. Model the generator, turbine and converter suitable for a specific wind-generation topology. 4. Understand the Solar PV generation and grid interconnection technologies. 5. Understand and apply the remedies for network integration issues.
34.	20EEC26	Basic VLSI Design	1. To design logic circuits using pMOS and nMOS technologies. 2. To design cMOS logic circuits. 3. To simulate logical circuits using HDL programming. 4. To understand different modelling strategies. 5. To understand FPGA design strategies.
35.	20ITO01	Object Oriented Programming using JAVA	1. To understand fundamentals of object-oriented programming paradigm. 2. To apply knowledge of string handling, interfaces, packages and inner classes. 3. To implement Exception handling mechanisms and Multithreading. 4. To demonstrate knowledge on collection framework, stream classes. 5. To develop web applications using Servlets and JSP.
36.	20MEO04	Principles of Entrepreneurship	1. Understand the concept and essence of entrepreneurship. 2. Identify business opportunities and nature of enterprise. 3. Analyze the feasibility of new business plan. 4. Apply project management techniques like PERT and CPM for effective planning and execution of projects. 5. Use behavioural, leadership and time management aspects in entrepreneurial journey.
37.	20EEC21	Control Systems Lab	1. Demonstrate the characteristics of DC, AC Servo motors and Synchro Pair. 2. Analyze the performance parameters of a given second order plant in time domain. 3. Analyze the performance of different compensators through its frequency response. 4. Design P, PI, PID and ON/OFF controller of a given system and to distinguish the merits and demerits of these controllers. 5. Analyze the characteristics of magnetic amplifier for series and parallel connections. 6. Demonstrate the effect of damping on the plant using D.C position control system.
38.	20EEC22	Electrical Machines- II Lab	1. Make the connections for any given AC machine based on applications. 2. Design the meter ratings for various applications of induction and synchronous machines. 3. Control the speed of the induction motor by different methods. 4. Determine the efficiency and regulation of the given alternator using various methods. 5. Test the induction motor for their no-load and load characteristics.

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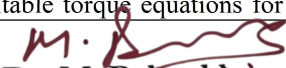| 39.	20EEC23	Microcontrollers and Applications Lab	1. Develop the programs of 8051 and ARM using their respective instruction set. 2. Understand the usage of various debugging tools available to program different microcontrollers. 3. Build code for 8051 and ARM7 to interface various input/output modules. 4. Analyze the hardware and software interaction and integration. 5. Design and develop the 8051 and ARM 7 based embedded systems for various applications.
40.	20EGCO3	Employability Skills	1. Become effective communicators, participate in group discussions with confidence and be able to make presentations in a professional context. 2. Write resumes, prepare and face interviews confidently. 3. Be assertive and set short term and long term goals, learn to manage time effectively and deal with stress. 4. Make the transition smoothly from campus to work, use media with etiquette and understand the academic ethics. 5. Enrich their vocabulary, frame accurate sentences and comprehend passages confidently.
41.	20 EE C09	Digital Electronics	1. Understand the fundamental concepts and techniques used in logical operations. 2. Analyze and design various combinational circuits using k Maps and Q-M method. 3. Design and implement Sequential logic circuits like counters shift register sand sequence generators. 4. Understand the process of Analog to Digital conversion and Digital to Analog conversion. 5. Implement PLD's to solve the given logical problems.
42.	20 EE C10	Electrical Machines-1	1. Identify the various parts of electrical machines and distinguish the nomenclature of electric and magnetic circuits. 2. Elucidate the principle of operation and characteristics of electrical machines. 3. Analyze the starting methods and speed control of DC machine. 4. Determine the performance parameters of a machine for a given data. 5. Explain the parallel operation of DC generators and single-phase transformers. 6. Choose a suitable DC machine and auto transformer for a specific application.
43.	20 EE C11	Electromagnetic Fields	1. Understand the basic concepts of vector calculus, various coordinate systems and apply them appropriately for solving electromagnetic field problems. 2. Obtain the physical quantities like field intensity, flux density and potential due to various types of charge distributions in electric and magnetic fields using fundamental laws. 3. Differentiate between conduction & convections currents, and describe the behaviour of static electric & magnetic fields in different media, boundary conditions and acquire the knowledge about energy storing elements. 4. Illustrate Maxwell's equations and their application to time-harmonic fields, wave propagation in different media and Poynting's power-balance theorem. 5. Recognize what is EMI & EMC, sources & effects of Electromagnetic Interferences in inter and intra systems and various methods to control EM.

44.	20 EE C12	Power Electronics	1. Understand the construction, operation and characteristics of various power semiconducting devices and to identify their selection in appropriate application. 2. Comprehend the driver/trigger circuits for various devices & also protection circuit, different turn –OFF methods, series & parallel operation of SCRs. 3. Illustrate the principle of working of AC-DC, AC-AC, DC-DC & DC-AC converters. 4. Analyse the performance for various power converters with different loads and modes of working. 5. Describe various voltage control techniques in power electronic converters with their applications.
45.	20 EE C13	Power systems I	1. Discuss the construction and operation of conventional and non-conventional sources of energy along with financial management. 2. Determine the line parameters such as inductance and capacitance for different configurations of transmission line. 3. Calculate the sag and tension of given transmission line under different weather conditions. 4. Discuss the operation of underground cables, insulators and calculate the capacitance of cables and string efficiency of insulators. 5. Discuss the different tariff structures, types of costs and general aspects of distribution systems.
46.	20EGM02	Indian Traditional Knowledge	1. Understand philosophy of Indian culture. 2. Distinguish the Indian languages and literature. 3. Learn the philosophy of ancient, medieval and modern India. 4. Acquire the information about the fine arts in India. 5. Know the contribution of scientists of different eras.
47.	20EGM03	Universal Human Values-II: Understanding Harmony	1. Students are expected to become more aware of themselves, and their surroundings (family, society, nature). 2. They would become more responsible in life, and in handling problems with sustainable solutions, while keeping human relationships and human nature in mind. 3. They would have better critical ability. 4. They would also become sensitive to their commitment towards what they have understood (human values, human relationship and human society). 5. It is hoped that they would be able to apply what they have learnt to their own.
48.	20 EE C14	Digital Electronics Lab	1. Demonstrate the truth table of various expressions and combinational circuits using logic gates. 2. Design, test and implement various combinational circuits such as adders, subtractors, comparators. 3. Apply knowledge of logic gates to design complex logic circuits like multiplexers and demultiplexers. 4. Design, test and implement various sequential circuits using flip-flops 5. Design various logic circuits using shift registers
49.	20 EE C15	Electrical Machines-1 Lab	1. Make the connections for DC machines and single-phase transformer for their applications. 2. Choose the meter ratings for various applications of DC machines and single-phase transformer. 3. Control the speed of the DC motor by different methods. 4. Obtain the characteristics of the given DC generator. 5. Determine the performance of DC machines and single-phase transformer.

50.	20 EE C16	Power Electronics Lab	1. Plot the characteristics of various controlled switches and identifies effect of variation of control signal on the regions of switching operation. 2. Demonstrate the effect of delay angle and nature of load on the performance of various power converters and able to plot the output voltage and current waveforms. 3. Simulate various types of power converters and discriminate between simulation models and practical models of various power converters. 4. Understand various voltage control techniques in different power converters. 5. Select proper equipment, precautions, implement connections keeping technical, safety and economic issues.
51.	20MTC07	Applied Mathematics	1. Find Laplace, Inverse Laplace and solution of engineering problems. 2. Find the solution of Difference Equation. 3. Understand the methodsto find solution of linear and non-linear PDE and solution of wave equation. 4. Solve Non-Linear algebraic and transcendental equations and first order differential equations. 5. Understand the methods for analyzing the random fluctuations using probability distribution and also identifythe importance of Principles of Least Squares approximations for predictions.
52.	20 CS C06	Basic Data Structures	1. Find Laplace, Inverse Laplace and solution of engineering problems. 2. Find the solution of Difference Equation 3. Understand the methodsto find solution of linear and non-linear PDE and solution of wave equation. 4. Solve Non-Linear algebraic and transcendental equations and first order differential equations. 5. Understand the methods for analyzing the random fluctuations using probability distribution and also Identify the importance of Principles of Least Squares approximations for predictions.
53.	20 EE C03	Electrical Circuit Analysis	1. Apply various network analysis techniques to find the responses in the circuits with dependent and independent sources. 2. Determine time constant, steady state and transient responses of RL, RC, RLC networks with initial conditions of network elements. 3. Evaluate the response of electrical circuits with Laplace transformation using initial & final value theorems and to obtain the pole-zero diagrams using network functions. 4. Calculate the response of RLC networks with sinusoidal input at steady state & resonance conditions and to analyze three-phase circuits with different loads 5. Find the impedance, admittance, ABCD, h and g- parameters of given two-port network and interconnected two-port networks.
54.	20 EE C04	Analog Electronic Circuits	1. Comprehend the V-I characteristics of Diode and its applications. 2. Understand the V-I characteristics of BJT & MOSFET and to analyze the significance of operating point in the biasing techniques of BJT & MOSFET. 3. Apply the knowledge of differential amplifiers to understand the basic characteristics of Operational Amplifiers (Op-Amps) and their significance. 4. Design and Analyze linear application circuits of Op-Amp like amplifiers, Integrator, differentiator, filters and regulators . 5. Design and Analyze non-linear application circuits of Op-Amps and to design a stable and mono Stable modes of 555 timer circuit.
55.	20 EE C05	Electrical Measurements	1. Identify a suitable instrument to measure a given electrical parameter. 2. Analyze the working principle by using suitable torque equations for

		and Instrumentation	DC and AC Instruments. 3. Design Bridge Circuits for measuring passive electrical parameters. 4. Distinguish between electrical and magnetic measurements and their instruments. 5. Select an Electrical transducer for a given physical quantity measurement.
56.	20 EE C06	Signals &System	1. Understand the basics of signals and systems, their classification and properties. 2. Determine the DTFT, DFT of given discrete signals. 3. Analyze the continuous time systems by using Laplace transform. 4. Apply the Z-transform techniques to discrete time systems 5. Analyze the effect of aliasing and reconstruction of signal using sampling theorem.
57.	20 CE M01	Environmental Science	1. Identify the natural resources and realize the importance of water, food, forest, mineral, energy, land resources and effects of over utilization. 2. Understand the concept of ecosystems and realize the importance of interlinking of food chains. 3. Contribute for the conservation of bio-diversity. 4. Suggest suitable remedial measure for the problems of environmental pollution and contribute for the framing of legislation for protection of environment. 5. Follow the environmental ethics and contribute to the mitigation and management of environmental disasters.
58.	20 EE C07	Analog Electronic Circuits Lab	1. Demonstrate the working principle of PN junction diode, transistor and MOSFET from their V-I characteristics. 2. Realize Half wave and Full wave rectifiers for C &π section filter combinations. 3. Analyze the significance of choosing a DC operating point for a transistor/MOSFET and to analyze the frequency response of CE amplifier. 4. Design of linear and non-applications of Op-Amps. 5. Design a 555 Timer in A stable mode to produce pulses for Pulse Width Modulation (PWM) Schemes.
59.	20 EE C08	Electrical Circuits and Measurements Lab	1. Obtain and plot the frequency response, locus diagrams of RLC circuits. 2. Verify various circuit theorems. 3. Determine various two-port network parameters. 4. Design and validate DC and AC bridges for measuring unknown electrical parameters. 5. Demonstrate the principles of magnetic measurements. 6. Demonstrate the measurement of non-electrical quantity with an appropriate transducer.
60.	20 CS C07	Basic Data Structures Lab	1. Implement the abstract data type. 2. Demonstrate the operations on stacks, queues using arrays and linked lists. 3. Apply the suitable data structures including stacks, queues to solve problems. 4. Analyze various searching and sorting techniques. 5. Choose proper data structures, sorting and searching techniques to solve real world problems.
61.	20 EE I01	MOOCs/Train ing/ Internship	1. Understand Engineer's responsibilities and ethics. 2. Use various materials, processes, products and quality control. 3. Provide innovative solutions to solve real world problems. 4. Acquire knowledge in technical reports writing and presentation. 5. Apply technical knowledge to real world industrial situations.

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