



BHARAT INSTITUTE OF ENGINEERING AND TECHNOLOGY

Ibrahimpattanam - 501 510, Hyderabad

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

COURSE OUTCOMES (COs)

B.TECH – ELECTRICAL AND ELECTRONICS ENGINEERING

JNTUH: R13 REGULATIONS

Code	Course Name	Course Outcomes
I B. Tech		
A10001	English	At the end of this course, each student should be able to: CO1. Understand the value of English as an international language, as a Lingua-Franca and try to improve their knowledge regarding language skills and elements to be perfect in their usage. CO2. Usage of English Language, written and spoken. CO3. Enrichment of comprehension and fluency CO4. Gaining confidence in using language in verbal situations. CO5. Develop the ability to analyze the language used in descriptions and narrations. CO6. Augment skills related to technical English.
A10002	Mathematics – I	At the end of this course, each student should be able to: CO1. Write the matrix representation of a set of linear equations and to analyze solutions of system of equations. CO2. Understand the methods of differential calculus to optimize single and multivariable functions. CO3. Evaluate the multiple integrals and can apply the concepts to find the areas, volumes, moment of inertia etc., of regions on a plane or in space. CO4. Identify the type of differential equation and uses the right method to solve the differential equation. Apply the theory of differential equations to the real world problems. CO5. Knowledge on directional derivative and tangent planes and normal planes and integrals. CO6. Solve certain differential equations using Laplace transform. Also able to transform functions on time domain to frequency domain using Laplace transforms.

Code	Course Name	Course Outcomes
A10003	Mathematical Methods	<p>At the end of this course, each student should be able to:</p> <p>CO1. From a given discrete data, one will be able to predict the value of the data at an intermediate point and by curve fitting, can find the most appropriate formula for a guessed relation of the data variables. This method of analysis data helps engineers to understand the system for better interpretation decision making.</p> <p>CO2. After studying this unit one will be able to find a root of a given equation and will be able to find a numerical solution for a given differential equation.</p> <p>CO3. Helps in describing the system by an ODE, if possible. Also, suggests to find the solution as a first approximation.</p> <p>CO4. One will be able to find the expansion of a given function by Fourier series and Fourier transform of the function.</p> <p>CO5. Helps in phase transformation, phase change and attenuation coefficients in acoustics.</p> <p>CO6. After studying this unit, one will be able to find a corresponding partial differential equation for an unknown function with many independent variables and to find their solution.</p>
A10004	Engineering Physics	<p>At the end of this course, each student should be able to:</p> <p>CO1. Learn the fundamental concepts on behavior of crystalline solids.</p> <p>CO2. The knowledge on fundamentals of Quantum Mechanics, Statistical Mechanics enables the student to apply to various systems like Communications Solar Cells, Photo Cells and so on.</p> <p>CO3. Design, Characterization and study of properties of materials help the student to prepare new materials for various Engineering applications.</p> <p>CO4. Helps the student exposed to non-destructive testing methods.</p> <p>CO5. Develop problem solving skills and analytical skills.</p> <p>CO6. Ability to apply knowledge of engineering and interpret data.</p>
A10005	Engineering Chemistry	<p>At the end of this course, each student should be able to:</p> <p>CO1. Extrapolate the knowledge of cell, electrode, cathode, anode, electrolysis, electromotive force and reference electrode.</p> <p>CO2. Explore the engineering applications of polymeric materials.</p> <p>CO3. Develop awareness about the usage of conducting polymers as an engineering material.</p> <p>CO4. Justify the immense importance of basic constructional material, Portland cement in Civil Engineering works.</p> <p>CO5. Summarize the application of phase rule to one and two component systems.</p> <p>CO6. The knowledge of chemistry provides the requisite expertise to deal with challenges in engineering disciplines and development of new materials.</p>

Code	Course Name	Course Outcomes
A10501	Computer Programming	<p>At the end of this course, each student should be able to:</p> <p>CO1. Identify and understand the working of key components of a computer system.</p> <p>CO2. Develop algorithms and flowcharts for solving mathematical and engineering problems.</p> <p>CO3. Design programs involving decision structures, loops and functions.</p> <p>CO4. Use structured data types and the concept of arrays in simple data processing applications.</p> <p>CO5. Understand the concept of recursion and describe its implementation using a stack.</p> <p>CO6. Understand simple data structures, use of pointers, memory allocation and data handling through files in C.</p>
A10301	Engineering Drawing	<p>At the end of this course, each student should be able to:</p> <p>CO1. Identify the basic concepts of Engineering Drawing.</p> <p>CO2. Construct various conic sections, cycloids and scales.</p> <p>CO3. Apply the principles of orthographic projections to projections of points and lines.</p> <p>CO4. Sketch different sections and sectional views of solids.</p> <p>CO5. Show the orthographic projection of the isometric views.</p> <p>CO6. Design the perspective projections of various points, lines, plane figures and simple solids.</p>
A10581	Computer Programming Lab	<p>At the end of this course, each student should be able to:</p> <p>CO1. Write programs in C to solve real-world problems.</p> <p>CO2. Choose the appropriate data structure and algorithm design method for a specified application.</p> <p>CO3. Implement linear data structures such as lists, stacks, queues.</p> <p>CO4. Implement simple searching and sorting methods.</p> <p>CO5. Understand which algorithm or data structure to use in different scenarios.</p> <p>CO6. Write complex applications using structured programming methods.</p>

Code	Course Name	Course Outcomes
A10081	Engineering Physics/Engineering Chemistry Lab	<p>At the end of this course, each student should be able to:</p> <p>Physics Lab:</p> <p>CO1. Understand the concept of error and its analysis. CO2. Develop experimental skills CO3. Design new experiments in engineering. CO4. Compare the theory and correlate with experiment. CO5. Understand the applications of physics experiments in day to day life CO6. Able to meet the challenges in various emerging areas of engineering technology</p> <p>Chemistry Lab:</p> <p>CO1. Expected to learn from this laboratory course the concept of error and its analysis. CO2. Develop experimental skills to design new experiments in Engineering. Exposure to these experiments the student can compare the theory and correlate with experiment. CO3. Understand general characteristics and uses of rubbers. CO4. Determine hardness of various water samples. CO5. Estimate the number of free ions, charge & mobility of ions in the mixture of acids using conductivity meter and also gets an idea about titrations without using any indicator. CO6. Determine the presence and quantity of impurities in water and he can estimate amount of metal in metal ores.</p>
A10083	English Language Communication Skills Lab	<p>At the end of this course, each student should be able to:</p> <p>CO1. Ability to discuss role and importance of communication skills and learn to make use of various forms of communication in their respective professional fields. CO2. Ability to use communication tool to be an effective team leader or team member. CO3. Ability to use communication modes as a tool for success in career progression. CO4. Ability to present in various social and professional situations formally. CO5. Ability to analyze and share the ideas by various media of information transfer. CO6. Ability to design various behavioral aspects in relation to problem solving.</p>

Code	Course Name	Course Outcomes
A10082	IT Workshop/ Engineering Workshop	<p>At the end of this course, each student should be able to:</p> <p>Engineering Workshop CO1. Prepare various jobs with carpentry trade and fitting trade. CO2. Prepare various jobs with Black smithy trade. CO3. Produce various patterns with foundry techniques. CO4. Combine various metal pieces with the techniques of welding. CO5. Identify various power tools in construction, wood working, electrical and mechanical engineering. CO6. Recognize the methods of plumbing.</p> <p>IT Workshop CO1. Understand various aspects of information technology. CO2. Demonstrate capability to work with LaTeX. CO3. Perform upgrading and repairing of PC's. CO4. Learn actual exposure to various computer hardware components & assemblies including PC hardware. CO5. Knowing Internet, www, productivity tools including word, excel and power point. CO6. Ability to learn troubleshoot of PCs</p>
II B. Tech I Semester		
A3007	Mathematics-III	<p>At the end of this course, each student should be able to:</p> CO1. Apply the forbenius method to obtain a series solution for the given linear 2 nd ODE CO2. Identify bessel equation and legendre equation and solve them under special conditions with the help of series solutions method. CO3. Analyze the complex functions with reference to their analyticity, integration using Cauchy's integral theorem. CO4. Find the Taylor's and. Laurent series expansion of complex functions. CO5. The conformal transformations of complex functions can be dealt with ease. CO6. Understand the properties of bilinear transformations.
A30102	Fluid Mechanics and Hydraulic Machinery	<p>At the end of this course, each student should be :</p> CO1. Able to understand the schematic layout of steam power plant and concepts of improving cycle performance. CO2. Able to understand the working principles of boiler and chimney. CO3. Able to understand the classification, functions and use of different types of pumps. CO4. Able to understand the application and basic analysis of steam nozzle CO5. Able to understand the different steam and gas turbines and their performance analysis. CO6. Able to understand the basic principles of jet propulsion of air breathing and non-air breathing.

Code	Course Name	Course Outcomes
A30404	Electronic Devices and Circuits	<p>At the end of this course, each student should be able to:</p> <p>CO1. To understand the electron dynamics and CRO functioning.</p> <p>CO2. To study junction diode characteristics, Hall Effect, Fermi level LED, LCD, and photo diode.</p> <p>CO3. The analysis of half wave & Full wave rectifiers. To study filters and Regulators.</p> <p>CO4. To study and analysis of transistor FET characteristics, SCR and UJT.</p> <p>CO5. To study biasing and stabilization of BJT, Thermal run away, thermal stability.</p> <p>CO6. The analysis of small signal low frequency transistor amplifier circuits, concept of feedback amplifier and their oscillators classification and</p>
A30204	Electrical Circuits	<p>At the end of this course, each student should be able to:</p> <p>CO1. To perceive the features of AC and DC steady state analysis of simple circuits using time domain equations to analyze the transient analysis of RL, RC and RLC series circuits.</p> <p>CO2. To gain the knowledge about the solution methods of AC & Dc circuits</p> <p>CO3. To promote the applications of series and parallel resonance in real time systems</p> <p>CO4. To acquire basic knowledge of computer based analysis of electrical networks.</p> <p>CO5. Acquire proficiency in coupled circuits</p> <p>CO6. Proficiency in basic analysis of electrical networks using network theorems.</p>
A30403	Electromagnetic Fields	<p>At the end of this course, each student should be able to:</p> <p>CO1. Understand basic concepts and principles of electromagnetic fields.</p> <p>CO2. Assimilate the practical significance of theory in developing a clear perspective of engineering applications.</p> <p>CO3. Appreciate the relation between electric and magnetic fields.</p> <p>CO4. Acquire application knowledge of electromagnetic fields in practice.</p> <p>CO5. Be conversant with wave motion in Electromagnetic fields</p> <p>CO6. Understand the applications of EM waves in different Medias and to find the time average power density.</p>
A30206	Electrical Machines-I	<p>At the end of this course, each student should be able to:</p> <p>CO1. Analyze & grasp the importance of Electromagnetic Energy Conversion principles applied to computation of force and torque in magnetic field system</p> <p>CO2. Identify various features of construction and operation of DC generators</p> <p>CO3. Analyze and reproduce operational characteristics of all types of Dc generators including parallel operation</p> <p>CO4. Identify various features of construction and operation and speed control for DC motors</p> <p>CO5. Verification of theoretical performance of DC machines by testing and relate the significance of test results with theory</p> <p>CO6. Analyze the applications of different types of DC machines</p>

Code	Course Name	Course Outcomes
A30181	Fluid Mechanics and Hydraulic Machinery Lab	<p>At the end of this course, each student should be able to:</p> <p>CO1. Able to understand concepts of fluids</p> <p>CO2. Understand the classification, components, function and use of different types of pumps.</p> <p>CO3. Able to understand performance of flow machines.</p> <p>CO4. Able to understand operate turbine test rig.</p> <p>CO5. Able to understand concepts of hydraulic power station.</p> <p>CO6. Able to understand impact momentum equation</p>
A30482	Electronic devices & Circuit lab	<p>At the end of this course, each student should be able to:</p> <p>CO1. Understand the operating principles of major electronic devices, circuit models and connection to the physical operation of device.</p> <p>CO2. Able to design and conduct experiments on PN Diode, Regulation characteristics of Zener diode, Response of transistor amplifier w.r.t the frequency of input signals, etc, also analyse and interpret the results</p> <p>CO3. Design and conduct experiments, as well as to organize, analyses, and interpret data.</p> <p>CO4. Obtain the performance Characteristics of various devices.</p> <p>CO5. The average value of DC component, rms value AC component in every electrical signal can be estimated by applying the Knowledge of mathematics.</p> <p>CO6. The carrier concentration, conductivity, total currents and voltages in all the electronic devices will be identified, formulated to solve the practical problems.</p>
II B. Tech II Semester		
A40010	Managerial Economics and Financial Analysis	<p>At the end of this course, each student should be able to:</p> <p>CO1. Know the Introduction to Managerial Economics & its Concepts.</p> <p>CO2. Understand Business and New Economic Environment.</p> <p>CO3. Learn the basic economic aspects for entrepreneur requirements</p> <p>CO4. Enter and succeed in professional engineering practice or enrol and succeed in engineering graduate degree programs.</p> <p>CO5. Succeed in leadership positions in industry, academia, or non-profit organizations.</p> <p>CO6. Be committed to using engineering and technology to improve the lives of others.</p>
A40214	Power Systems-I	<p>At the end of this course, each student should be able to:</p> <p>CO1. To draw the complete thermal, nuclear & gas power stations single line diagrams and to explain the flow diagrams & operations</p> <p>CO2. To describe the various economic aspects of power generation.</p> <p>CO3. To solve problems relating to DC & AC distribution through single fed & double fed systems</p> <p>CO4. To describe the operation of different types of Substations and equipment's</p> <p>CO5. To differentiate various reactive power compensation techniques for power factor improvement</p> <p>CO6. Ability to plot the power –energy demand in the form of graph</p>

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A40413	Electronic Circuits	<p>At the end of this course, each student should be able to:</p> <p>CO1. Ascertain and determine the theoretical output of basic electronic circuits.</p> <p>CO2. Understand and apply concept and principle of security Attacks, Services and Mechanisms.</p> <p>CO3. Understand and apply Conventional encryption algorithms.</p> <p>CO4. Expertise in Message authentication, Hash function and Public key encryption.</p> <p>CO5. Applying knowledge in various real time applications.</p> <p>CO6. Analyze, Investigate and perform various security schemes</p>
A40407	Switching Theory and Logic Design	<p>At the end of this course, each student should be able to:</p> <p>CO1. Understand the basic digital logic fundamentals such as numbering systems, binary codes and Boolean algebra.</p> <p>CO2. Understand the basic building blocks of digital systems like gates ,memory elements, PLD's</p> <p>CO3. Study the basic philosophy underlying the various number systems, negative number representation, binary arithmetic, binary codes and error detecting and correcting binary codes.</p> <p>CO4. Sstudy the theory of Boolean algebra and to study representation of switching functions using Boolean expressions and their minimization techniques.</p> <p>CO5. Study the combinational logic design of various logic and switching devices and their realization.</p> <p>CO6. Study the sequential logic circuits design both in synchronous and Asynchronous modes for various complex logic and switching devices, their minimization techniques and their realizations.</p>
A40213	Network Theory	<p>At the end of this course, each student should be able to:</p> <p>CO1. Familiar with the various components of an electrical circuit</p> <p>CO2. Solve AC and DC circuits</p> <p>CO3. Understanding the concept of three phase circuits.</p> <p>CO4. Learning analysis of two port networks</p> <p>CO5. Ability to convert star to delta circuits and vice-versa.</p> <p>CO6. Gain the knowledge of transients in electrical circuit analysis.</p>
A40212	Electrical Machines- II	<p>At the end of this course, each student should be able to:</p> <p>CO1. Understand basic concepts and principles of transformers & construction</p> <p>CO2. Know the testing of transformers & calculation of efficiency and voltage regulation</p> <p>CO3. Understand parallel operation of transformers & three phase transformers</p> <p>CO4. Learn principles of induction motors & construction details</p> <p>CO5. Know the starting methods of induction motors</p> <p>CO6. Ability to construction of circle diagram & performance analysis of induction motor</p>

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A40287	Electrical Machines Lab-I	<p>At the end of this course, each student should be able to:</p> <p>CO1. Know the knowledge of various parts of electrical machines</p> <p>CO2. Verify the OC & SC characteristics of DC shunt generator and calculate critical resistance and critical speed.</p> <p>CO3. Able to obtain performance characteristics of shunt and compound generators.</p> <p>CO4. Conduct experiment on given shunt, compound and series DC motors and calculate Torque and speed characteristics</p> <p>CO5. Ability to conduct a field test on two identical series machines</p> <p>CO6. Able to separate the rotational losses of compound machines</p>
A40286	Electrical Circuits and Simulation Lab	<p>At the end of this course, each student should be able to:</p> <p>CO1. Able to verify the Ohms, KVL and KCL principles</p> <p>CO2. To learn the principles and applications various network theorems along with its simulation.</p> <p>CO3. To learn the significance of two port network parameters.</p> <p>CO4. To analyze the behavior and frequency response of various linear circuits.</p> <p>CO5. Ability to calculate RMS, AVERAGE, PEAK values of different wave forms.</p> <p>CO6. To learn the measurement of three phase active and reactive power.</p>
III B. Tech I Semester		
A50423	IC Applications	<p>At the end of this course, each student should be able to:</p> <p>CO1. Understand the terminal characteristics of Op-amps and design fundamental circuits</p> <p>CO2. Capability to analyze feedback and its effect on the performance of op--amp</p> <p>CO3. Acquire knowledge to design and analyze nonlinear circuits</p> <p>CO4. Obtain application knowledge of op--amps and IC 555</p> <p>CO5. Design simple sequential and combinational circuits</p> <p>CO6. Obtain Knowledge in digital electronics and data converters, ICs.</p>
A50014	Management Science	<p>At the end of this course, each student should be able to:</p> <p>CO1. Exercise critical thinking to propose, communicate, and implement, action plan that address opportunities and issues.</p> <p>CO2. Observe and recognize behaviors in organizational settings to aid in predicting outcomes.</p> <p>CO3. Appreciate the importance of time management, planning, and communication in completing a group project.</p> <p>CO4. Integrate knowledge of the key theories across the disciplines of public administration.</p> <p>CO5. Compare various perspectives across organizational environments and the role of manager in core management and public policy disciplines</p> <p>CO6. Ability to Work under self-direction, having acquired lifelong learning skills and personal development competencies</p>

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A50221	Power System -II	<p>At the end of this course, each student should be able to:</p> <p>CO1. Understand the electrical and mechanical design aspects of transmission lines</p> <p>CO2. Acquire knowledge of the performance of transmission lines, relevant compensating techniques and power transfer capability</p> <p>CO3. Ability to calculation of sag for different types of transmission lines</p> <p>CO4. Able to discuss construction of underground cables</p> <p>CO5. Understand the concept of power system transients</p> <p>CO6. Ability to calculation of various levels of faults</p>
A50211	Control Systems	<p>At the end of this course, each student should be able to:</p> <p>CO1. Apply the principles and applications of control systems in everyday life</p> <p>CO2. Apply the basic concept of block diagram reduction, time domain analysis solutions to time variant systems</p> <p>CO3. Solve different aspects of stability problems in time domain and frequency domain</p> <p>CO4. Able to plot Root Locus and bode plots for given control system model</p> <p>CO5. Design stable systems from unstable systems by using controllers and compensation techniques like lead, Lag and Lead-Lag compensation</p> <p>CO6. Ability to design PID controller for given control system model</p>
A50220	Power Electronics	<p>At the end of this course, each student should be able to:</p> <p>CO1. Articulate the basics of power electronic devices</p> <p>CO2. Understand the fundamental principles and applications of power electronics circuits</p> <p>CO3. Be conversant with the operating principle of semiconductor power electronic switches and turn--on and turn--off methods</p> <p>CO4. Mastery of ac phase control methods to control output power</p> <p>CO5. Awareness of various types of power converters</p> <p>CO6. Proficiency in the usage of power electronic converters to design inverters and rectifiers</p>
A50218	Electrical Machines-III	<p>At the end of this course, each student should be able to:</p> <p>CO1. Understand the construction and types of windings used in synchronous generators</p> <p>CO2. Identification, formulation and solution of engineering problems in the area of electromechanical energy conversion</p> <p>CO3. Acquire knowledge of parallel operation of synchronous generator</p> <p>CO4. Appreciate the performance of AC generators under loaded and unloaded condition</p> <p>CO5. Identify the significant applications of single phase motors</p> <p>CO6. Imbibe the techniques, skills, and application of modern engineering tools for the control of brushless alternator</p>

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A50289	Electrical Machines Lab-II	<p>At the end of this course, each student should be able to:</p> <p>CO1. To provide the students a chance to put theory into practice.</p> <p>CO2. Able to conduct open circuit/short circuit tests on single phase transformers.</p> <p>CO3. To learn about different losses of AC machines and find the characteristics.</p> <p>CO4. Ability to conduct different tests on AC machines and calculate torque and speed characteristic.</p> <p>CO5. To understand the operation and basic configuration of AC machines, including the synchronous motor and generator, and the induction machine.</p> <p>CO6. Ability to perform test on synchronous machines to find X_d and X_q</p>
A50086	Advanced Communication Skills Lab	<p>At the end of this course, each student should be able to:</p> <p>CO1. Accomplishment of sound vocabulary and its proper use contextually</p> <p>CO2. Flair in writing and felicity in written expression</p> <p>CO3. Enhanced job prospects</p> <p>CO4. Effective speaking abilities</p> <p>CO5. Enrich group discussions and interview skills</p> <p>CO6. Enhanced interpersonal skills</p>
III B. Tech II Semester		
A60223	Electrical and Electronics Instrumentation	<p>At the end of this course, each student should be able to:</p> <p>CO1. Have a understanding of units and standards for electrical measurements</p> <p>CO2. Be familiar with the essentials of measuring instruments</p> <p>CO3. Working knowledge of the effects and working principles of measuring instruments</p> <p>CO4. Be acquainted with construction and operation of measuring instruments</p> <p>CO5. To understand errors of measuring instruments and their compensating techniques</p> <p>CO6. Ability to measure strain, displacement, velocity, angular velocity, temperature, pressure, vacuum and flow</p>
A60225	Static Drives	<p>At the end of this course, each student should be able to:</p> <p>CO1. Analyze 1-Φ and 3-Φ controlled converters fed DC Motors and also used in various applications.</p> <p>CO2. Analyze 4-quadrant operation of DC Drives</p> <p>CO3. Apply Choppers for DC Motors</p> <p>CO4. Understand the control of Induction Motors with variable voltage and frequency control</p> <p>CO5. Apply the knowledge of cyclo converters for speed control of synchronous Motors.</p> <p>CO6. Apply the knowledge of VSI and CSI for speed control of synchronous Motors.</p>

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A60222	Computer Methods in Power Systems	<p>At the end of this course, each student should be able to:</p> <p>CO1. Acquire knowledge of the mathematical model of a power system and ability to design and specify the ratings of components in a power system</p> <p>CO2. Understand advanced mechanisms to address load flow problems</p> <p>CO3. Gain comprehensive understanding of the principles of load dispatching</p> <p>CO4. Ability to create computational models for analysis of both symmetrical and unsymmetrical conditions in power systems</p> <p>CO5. Ability to evaluate the key aspects of a power system and address its performance, cost effectiveness, reliability and stability</p> <p>CO6. Able to determine numerical load flow solutions for active and reactive power</p>
A60430	Microprocessors and Interfacing Devices	<p>At the end of this course, each student should be able to:</p> <p>CO1. Familiarize with the assembly level programming</p> <p>CO2. Design circuits for various applications using microcontrollers</p> <p>CO3. Able to apply in-depth knowledge of concepts on real time applications</p> <p>CO4. Appreciate the need of microprocessors, microcontrollers in the development of various projects</p> <p>CO5. Gain mastery over architecture, programming, interfacing details of 8085 microprocessor and 8051 microcontroller</p> <p>CO6. Acquire ability to execute different programs for 8085 and 8051 in Assembly Level Language</p>
A60009	Environmental Studies	<p>At the end of this course :</p> <p>CO1. Students will be able to realize the significance of Green development and Wild life protection.</p> <p>CO2. Students will be able to apply fundamentals of cleanliness and importance of natural resources.</p> <p>CO3. Students will be able to adopt, grasp and absorb knowledge across disciplines</p> <p>CO4. Students will be able ability to integrate within research areas of Environmental protection.</p> <p>CO5. Students will be able evaluate the developing technologies in the ecological systems</p> <p>CO6. Students will be able to understand the environmental policy, legislation and protection acts.</p>
A60018	Human Values and Professional Ethics	<p>At the end of this course, each student should be able to:</p> <p>CO1. To learn & apply the ethical values in modern education.</p> <p>CO2. To understand the need for strengthening of society in social aspects , importance of human values</p> <p>CO3. It ensures students sustained happiness through identifying the essentials of human values and skills.</p> <p>CO4. It facilitates a correct understanding between profession and happiness</p> <p>CO5. It helps students understand practically the importance of trust, mutually satisfying human behaviour and enriching interaction with nature.</p> <p>CO6. Ability to develop appropriate technologies and management patterns to create harmony in professional and personal life.</p>

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A60290	Control Systems and Simulation Lab	<p>At the end of this course, each student should be able to:</p> <p>CO1. Ability to apply the principles and applications of control systems in real time.</p> <p>CO2. Capable to know characteristics of open loop & closed loop practical systems characteristics.</p> <p>CO3. Able to model & analyze different types of systems.</p> <p>CO4. Able to draw the root locus and bode plots in frequency domain</p> <p>CO5. Ability to design lead, lag and lead-lag systems for stability improvement</p> <p>CO6. To design different types of controllers (P, PI, PD, & PID) for different types of systems.</p>
A60291	Power Electronics and Simulation Lab	<p>At the end of this course, each student should be able to:</p> <p>CO1. To understand and acquire knowledge about various power semiconductor devices.</p> <p>CO2. To prepare the students to analyze and design different power converter circuits.</p> <p>CO3. Ability to simulate characteristics of SCR, MOSFET, IGBT.</p> <p>CO4. Ability to simulate Gate firing circuits.</p> <p>CO5. Ability to simulate Rectifier, Chopper, Inverter and AC Voltage Controller.</p> <p>CO6. Ability to simulate Cyclo-Converter and calculate harmonics</p>
IV B. Tech I Semester		
A70231	Switch Gear and Protection	<p>At the end of this course, each student should be able to:</p> <p>CO1. Describe circuit breakers, electromagnetic and static relays</p> <p>CO2. Illustrate different protection schemes of generator and transformer</p> <p>CO3. Illustrate different protection schemes of feeder and bus--bar</p> <p>CO4. Differentiate different grounding practices</p> <p>CO5. Illustrate different protection schemes against over voltages</p> <p>CO6. Ability to identify rotor, stator faults, inter turn faults and their protection.</p>
A70232	Utilization of Electrical Energy	<p>At the end of this course, each student should be able to:</p> <p>CO1. Understand basic principles of electric heating and welding.</p> <p>CO2. Determine the lighting requirements for flood lighting, household and industrial needs.</p> <p>CO3. Calculate heat developed in induction furnace</p> <p>CO4. Evaluate speed time curves for traction and design electric traction</p> <p>CO5. Ability to discuss mechanics of train movement</p> <p>CO6. Able to specify energy consumption</p>
A70421	Digital Signal Processing	<p>At the end of this course, each student should be able to:</p> <p>CO1. Imbibe the concept of various transformation techniques and application in the field of signal processing</p> <p>CO2. Gain knowledge in discrete Fourier transforms and FFT computations</p> <p>CO3. Assimilate the concepts behind the design and realization of IIR filters</p> <p>CO4. Understand the basics of FIR filter design and its realization</p> <p>CO5. Be able to apply the concepts of digital signal processors with inherent errors in diverse signal processing applications</p> <p>CO6. Ability to demonstrate the impacts of finite word length effects in filter design.</p>

Code	Course Name	Course Outcomes
A70230	Power System Operation and Control	<p>At the end of this course, each student should be able to:</p> <p>CO1. Understand operation and control of power systems.</p> <p>CO2. Analyze various functions of Energy Management System (EMS) functions.</p> <p>CO3. Analyze whether the machine is in stable or unstable position.</p> <p>CO4. Understand power system deregulation and restructuring</p> <p>CO5. Ability to discuss single area load frequency control and two area load frequency control.</p> <p>CO6. Ability to model and design turbine and Automatic controller.</p>
A70228	High Voltage Engineering (Elective-1)	<p>At the end of this course, each student should be able to:</p> <p>CO1. Design the insulation of HV power equipment.</p> <p>CO2. Estimate electric field intensity of different electrode configurations.</p> <p>CO3. Understand the testing methods of high voltage equipment.</p> <p>CO4. Understand the Breakdown mechanism of Gas, Liquid and solid insulation</p> <p>CO5. Understand high voltage testing techniques of power apparatus and causes of over voltage in power systems</p> <p>CO6. Design the layout of gas insulated substations and to know the concepts of insulation coordination</p>
A70226	Electrical Distribution Systems (Elective-2)	<p>At the end of this course, each student should be able to:</p> <p>CO1. Characterize the electric load on a feeder or a substation</p> <p>CO2. Evaluate transformer performance in terms of voltage regulation and efficiency under various load conditions</p> <p>CO3. Design primary and secondary distribution system</p> <p>CO4. Estimate the voltage profile and losses on a feeder</p> <p>CO5. Analyze the voltage regulation problem and present remedial methods</p> <p>CO6. Evaluate voltage drop and line loss calculations and design the capacitors and voltage regulating equipment to improve the power factor and voltage profile</p>
A70498	Microprocessors and Interfacing Devices Lab	<p>At the end of this course, each student should be able to:</p> <p>CO1. Familiarize with the assembly level programming</p> <p>CO2. Design circuits for various applications using microcontrollers</p> <p>CO3. Able to apply in-depth knowledge of concepts on real time applications</p> <p>CO4. Appreciate the need of microprocessors, microcontrollers in the development of various projects</p> <p>CO5. Gain mastery over architecture, programming, interfacing details of 8085 microprocessor and 8051 microcontroller</p> <p>CO6. Acquire ability to execute different programs for 8085 and 8051 in Assembly Level Language</p>
A70293	Electrical Measurements Lab	<p>At the end of this course, each student should be able to:</p> <p>CO1. To learn testing methods of energy meter and current transformer.</p> <p>CO2. To learn measurement of low and medium resistance.</p> <p>CO3. To learn the use of ac bridges for inductance and capacitance measurement.</p> <p>CO4. To learn the measurement of power and power factor.</p> <p>CO5. To understand the basics of active and reactive power.</p> <p>CO6. To understand the basics of current transformer and to measure the errors.</p>

IV B. Tech II Semester

Code	Course Name	Course Outcomes
A80237	Fundamentals of HVDC and FACTS Devices	<p>At the end of this course, each student should be able to:</p> <p>CO1. Evaluate HVDC and EHVAC transmission</p> <p>CO2. Analyze converter configurations used in HVDC and list the performance metrics.</p> <p>CO3. Understand controllers for controlling the power flow through a dc link and compute filter parameters.</p> <p>CO4. Apply impedance, phase angle and voltage control for real and reactive power flow in ac transmission systems.</p> <p>CO5. Analyze and select a suitable FACTS controller for a given power flow condition</p> <p>CO6. Describe the principles, operation and control of UPFC and IPFC</p>
A80324	Renewable Energy Sources (Elective-3)	<p>At the end of this course, each student should be able to:</p> <p>CO1. Create awareness about renewable energy sources among students</p> <p>CO2. Understand the principles of wind power and solar photovoltaic power generation, fuel cells.</p> <p>CO3. Assess the cost of generation for conventional and renewable energy plants.</p> <p>CO4. Design suitable power controller for wind and solar applications</p> <p>CO5. Analyze the issues involved in the integration of renewable energy sources to the grid</p> <p>CO6. Enrich the knowledge of storage technology for various renewable energy sources</p>
A80235	EHV AC Transmission (Elective-4)	<p>At the end of this course, each student should be able to:</p> <p>CO1. Evaluate AC and DC transmission systems with all aspects</p> <p>CO2. Understand the necessity, merits and demerits of EHVAC transmission and mechanical aspects</p> <p>CO3. Evaluate the Inductance and capacitance of two conductor and multi conductor lines</p> <p>CO4. Analyse the effect of corona, electrostatic field of EHVAC lines</p> <p>CO5. Analyse the surface gradient on two conductor and bundle with more than 3 sub conductors</p> <p>CO6. Design SVC schemes and voltage controlling devices</p>
A80087	Industry Oriented Mini Project	<p>At the end of this course, each student should be able to</p> <p>CO1. Apply the relevant knowledge and skills, which are acquired within the technical area, to a given problem</p> <p>CO2. within given constraints, even with limited information, independently analyse and discuss complex inquiries/problems and handle larger problems on the advanced level within the technical area</p> <p>CO3. Reflect on, evaluate, and critically assess one's own and others' scientific results</p> <p>CO4. Document and present one's own work, for a given target group, with strict requirements on structure, format, and language usage.</p> <p>CO5. Identify one's need for further knowledge and continuously develop one's own competencies</p> <p>CO6. Understand how to apply technology for the real time problems</p>

Code	Course Name	Course Outcomes
A80089	Seminar	<p>At the end of this course, each student should be able to</p> <p>CO1. To assess and enhance the capability of the student to present a seminar on a technical topic</p> <p>CO2. Understand the learning and critical thinking about a technical topic</p> <p>CO3. Draw upon literature from different traditions to help the students appreciate the universal importance social trust, truth telling and mutual obligations</p> <p>CO4. Learn how to document and present a technical reports</p> <p>CO5. Acquire awareness on latest technology and current trends in the field of power systems</p> <p>CO6. Participate in discussions for enhancement of knowledge and Adapt professional ethics</p>
A80088	Project Work	<p>At the end of this course, each student should be able to</p> <p>CO1. Apply the relevant knowledge and skills, which are acquired within the technical area, to a given problem</p> <p>CO2. within given constraints, even with limited information, independently analyze and discuss complex inquiries/problems and handle larger problems on the advanced level within the technical area</p> <p>CO3. Reflect on, evaluate, and critically assess one's own and others' scientific results</p> <p>CO4. Document and present one's own work, for a given target group, with strict requirements on structure, format, and language usage.</p> <p>CO5. Identify one's need for further knowledge and continuously develop one's own competencies</p> <p>CO6. Understand how to apply technology for the real time problems</p>
A80090	Comprehensive Viva-Voce	<p>At the end of this course, each student should be able to:</p> <p>CO1. Students able to have a comprehensive understanding of techniques applicable to their own area of professional practice</p> <p>CO2. Demonstrate originality in the application of knowledge, together with a practical understanding</p> <p>CO3. Able to critically evaluate current professional practice in their discipline</p> <p>CO4. Be able to demonstrate self-direction and originality in tracking and solving problems.</p> <p>CO5. Act autonomously in planning and implementing tasks at professional or equivalent level</p> <p>CO6. Continue to advance their knowledge and understanding, to develop new skills to high level</p>