G PULLAIAH COLLEGE OF ENGINEERING & TECHNOLOGY
(Autonomous)
(Approved by AICTE | NAAC Accreditation with 'A' Grade |
Accredited by NBA (CIV, CSE, ECE & EEE) | Affiliated to JNTUA)
Nandikotkur Road, Venkayapalli (V), Kurnool - 518452, Andhra Pradesh

Course Name: FUNCTIONAL ENGLISH - A1001

A1001.1	Have improved communication in listening, speaking, reading and writing skills in general.
A1001.2	Have developed their oral communication and fluency in group discussions and interviews.
A1001.3	Have improved awareness of English in science and technologycontext.
A1001.4	Have achieved familiarity with a variety of technicalreports.

Course Name: MATHEMATICS – I – A1002

A1002.1	The students become familiar with the application of differential and integral calculus, ordinary differential equations and vector calculus to engineeringproblems
A1002.2	The students attain the abilities to use mathematical knowledge to analyze, formulate and solve problems in engineeringapplications.

Course Name: COMPUTER PROGRAMMING - A1501

A1501.1	Apply problem solving techniques in designing the solutions for a wide-range of problems
A1501.2	Choose appropriate control structure depending on the problem to besolved
A1501.3	Modularize the problem and alsosolution

Course Name: ENGINEERING PHYSICS-A1003

A1003.1	The different realms of physics and their applications in both scientific and technological systems are achieved through the study of physical optics, lasers and fibre optics.

A1003.2	The important properties of crystals like the presence of long-range order and periodicity, structure determination using X-ray diffraction are focused along with defects in crystals and ultrasonic non-destructivetechniques.
A1003.3	The discrepancies between the classical estimates and laboratory observations of physical properties exhibited by materials would be lifted through the understanding of quantum picture of subatomicworld.
A1003.4	The electronic and magnetic properties of materials were successfully explained by free electron theory and the bases for the band theory arefocused.
A1003.5	The properties and device applications of semiconducting and magnetic materials are illustrated.
A1003.6	The importance of superconducting materials and nanomaterials along with their engineering applications are well elucidated.

Course Name : ENGINEERING DRAWING - A1301

A1301.1	Drawing 2D and 3D diagrams of variousobjects.
A1301.2	Learning conventions of Drawing, which is an Universal Language ofEngineers
A1301.3	Drafting projections of points, planes andsolids

Course Name: ENGLISH LANGUAGE COMMUNICATION SKILLS (ELCS) - A1006

A1006.1	Become active participants in the learning process and acquire proficiency in spokenEnglish.
A1006.2	Speak with clarity and confidence thereby enhance employabilityskills

Course Name: ENGINEERING PHYSICS LABORATORY - A1007

A1007.1	Would recognize the important of optical phenomenon like Interference and diffraction.
A1007.2	Would have acquired the practical application knowledge of optical fiber, semiconductor,dieclectricandmagneticmaterials,crystalstructureandlasersbythe study of their relative parameters.
A1007.3	Would recognize the significant importance of nano materials in various engineering fields.

Course Name: COMPUTER PROGRAMMING LAB - A1502

A1502.1	Apply problem solving techniques to find solutions toproblems
A1502.2	Able to use C language features effectively and implement solutions using C language
A1502.3	Improve logicalskills.

Course Name: MATHEMATICS – II- A1009

A1009.1	The student gains the knowledge to tackle the engineering problems using the concepts of Fourier series, various transforms and partial differential equations

Course Name: ENGLISH FOR PROFESSIONAL COMMUNICATION- A1008

A1008.1	Have acquired ability to participate effectively in groupdiscussions.
A1008.2	Have developed ability in writing in variouscontexts.
A1008.3	Have acquired a proper level of competence foremployability

Course Name: ENGINEERING CHEMISTRY- A1004

A1004.1	Differentiate between hard and soft water. Understand the disadvantages of using hard water domestically and industrially. Select and apply suitable treatments domestically andindustrially.
A1004.2	Understand the electrochemical sources ofenergy
A1004.3	Understand industrially based polymers, various engineeringmaterials

Course Name: ENVIRONMENTAL STUDIES   - A1005

A1005.1	Students will get the sufficient information that will clarify modern environmental concepts like equitable use of natural resources, more sustainable life stylesetc.
A1005.2	Students will realize the need to change their approach so as to perceive our own environmental issues correctly, using practical approach based on observation andself learning.
A1005.3	Students become conversant with the fact that there is a need to create a concern for our environment that will trigger pro-environmental action; including simple activities we can do in our daily life to protectit.

A1005.4	By studying environmental sciences, students is exposed to the environment that enables one to find out solution of various environmental problems encountered on andoften.

Course Name: ELECTRICAL CIRCUITS - I - A1203

A1203.1	Given a network, find the equivalent impedance by using network reduction techniques
A1203.2	Given a circuit and the excitation, determine the real power, reactive power, power factoretc,.
A1203.3	Determine the current through any element and voltage across anyelement
A1203.4	Apply the network theoremssuitably

Course Name: ENGINEERING CHEMISTRY LAB - A1010

A1010.1	Would be confident in handling energy storage systems and would be able combat chemicalcorrosion
A1010.2	Would have acquired the practical skill to handle the analytical methods with confidence.
A1010.3	Would feel comfortable to think of design materials with the requisiteproperties
A1010.4	Would be in a position to technically address the water relatedproblems.

Course Name: ELECTRICAL CIRCUITS LAB -A1204

A1204.1	Apply suitable theorems for circuit analysis and verify the resultstheoretically
A1204.2	Experimental determination of two port network parameters and theoretical verification
A1204.3	Measure active and reactive power experimentally and verify the theoreticalvalues
A1204.4	Experimentally determine self inductance, mutual inductance and coefficient

| A1204.5 | Practically determine band width, Q-factor and verify with theoreticalvalues. |

	of coupling
A1204.5	Practically determine band width, Q-factor and verify with theoreticalvalues.

Course Name: ENGINEERING & I.T. WORKSHOP- A1302

A1302.1	Disassemble and Assemble a Personal Computer and prepare the computer ready to use.
A1302.2	Prepare the Documents using Wordprocessors
A1302.3	Prepare Slide presentations using the presentation tool
A1302.4	Interconnect two or more computers for informationsharing
A1302.5	Access the Internet and Browse it to obtain the requiredinformation

Course Name: Linear Algebra and Complex Variables -A1014

A1014.1	Demonstrate knowledge of matrix calculation as an elegant and powerful mathematical language in connection with rank of a matrix, linear system of equations, linear dependence and independence
A1014.2	Interpret the Eigen values and Eigen vectors of matrix in terms of the transformation it represents in to a matrix Eigen value problem.
A1014.3	Define a quadratic form and determine its nature using Eigen values.Apply Beta and Gamma functions to evaluate many integrals which cannot be expressed in terms of elementary functions.
A1014.4	Analyze the functions of complex variable which include continuity, differentiability and analyticity along with evaluation of Cauchy-Riemann equations in Cartesian and polar coordinates.
A1014.5	Employ the Cauchy‟s integral theorem along with integral formula along with expansion in Taylor‟s series, Maclaurin‟s series and Laurent series.
A1014.6	Evaluate the residual formula through Laurent series and residue theorem along with evaluation of improper real integrals.

Course Name: ELECTRICAL MACHINES-I- A1205

| A1015.1 | Calculate the e.m.f. generated on open circuit, terminal voltage on load and |

	load shared by each generator.
A1015.2	Determine the gross torque and useful torque developed by DC motor and Identify suitable methods to control speed f DC motors.
A1015.3	Calculate the losses and efficiency of DC generators and motors.
A1015.4	Conduct O.C, S.C tests and predetermine the regulation, efficiency and draw the equivalent circuit of transformer.
A1015.5	Compute the load shared by each transformer when several transformers operate in parallel.
A1015.6	Construct and operating characteristics of three phase induction motors, and various tests are conducted to construct the circle diagram to determine the performance of induction motors.

Course Name: ELECTRO MAGNETIC FIELDS-A1206

A1206.1	Understand the behavior of static magnetic fields in standard configurations by applying vector calculus.
A1206.2	Apply vector calculus to generalize the behavior of static electric fields in standardconfigurations.
A1206.3	Analyze the inductance and capacitance for different structures.
A1206.4	Apply basic laws of electric, magnetic and electromagnetic fields to find force.
A1206.5	Analyze the effect of time varying fields involving both electric and magnetic field on a wave propagating through a medium along analysis of with modified Maxwell"sequations for time varying fields.
A1206.6	Use of modern tool MATLAB to simulate electromagnetic fields of transmission lines.

Course Name: ELECTRICAL CIRCUITS – II –A1207

A1207.1	Analyze three phase balanced and unbalanced circuits and determine line voltages, line currents, phase voltages and phase currents
A1207.2	Measure active and reactive power consumed by a given three phase circuit
A1207.3	Determine the transient response of R-L, R-C, R-L-C circuits for D.C and A.CExcitations
A1207.4	Apply Fourier transforms to electrical circuits excited by non-sinusoidal sources
A1207.5	Design different types of filters.

Course Name: ELECTRONIC DEVICES AND CIRCUITS –A1401

A1401.1	Understand the operation and characteristics of PN diode with diode's applications in electronic circuits.
A1401.2	Formulate the electrical models for special semiconductor diodes like Tunnel diode,LED and Photodiode.
A1401.3	Analyze various rectifiers and filter circuits used in regulated power supplies.
A1401.4	Compare and contrast the construction, working principles, characteristics andapplications of major electronic devices like BJT, FET and MOSFET.
A1401.5	Design and analyze the DC bias circuitry of BJT.
A1401.6	Design and analyze the small signal models of BJT & FET Amplifiers at low frequencies.

Course Name: ELECTRICAL MACHINES-I LAB –A1208

A1208.1	Understand the concept of OP-AMP such as differential amplifier modes analysis using r parameters, ideal OP-AMP parameter fundamentals and various stages in the OP-AMP.
A1208.2	Depict the internal block diagram of operational amplifiers along with listing out some typical applications of operational amplifiers in linear and non linear modes of operation
A1208.3	Analyze various applications of Op-Amp and also to design and construct waveform generation circuits.
A1208.4	Study the block diagram of 555 timer and 565 phase locked loops ICs and employ them to construct various applications along with listing out different cmos logic families.
A1208.5	Differentiate between CMOS and TTL logic families; realize various logic functions using VHDL code for CMOS logic.
A1208.6	Interpret various combinational and sequential logic circuits and simulate it by using VHDL code.

Course Name: ELECTRICAL CIRCUITS AND SIMULATION LAB- A1209

A1209.1	Explain electric circuit concepts by interpreting the simulation results
A1209.2	Design RLC series circuit for specified frequency response
A1209.3	Analyze three phase balanced and unbalanced circuits
A1209.4	Design RL, RC and RLC circuits for specified transient response
A1209.5	Design and Frequency Response of Low Pass and High Pass

Course Name: ELECTRONIC DEVICES AND CIRCUITS LABORATORY-A1405

A1405.1	Analyze the description of CRO and Function generator panels.

A1405.2	Find the cut-in voltage, static and dynamic resistances from V-I characteristics of PNjunction diode.
A1405.3	Find the breakdown voltage and Regulation characteristics of Zener diode.
A1405.4	Compute the ripple content present in half wave and full wave rectifiers with andwithout filters.
A1405.5	Plot the characteristics of BJT and FET.
A1405.6	Draw the frequency response of single stage amplifiers at low, mid and high frequencies.

Course Name: ELECTRICAL MACHINES-II –A1210

A1210.1	Identify the three phase transformers employed in distribution and transmission systembased on their connections.
A1210.2	Understand the construction and principle of operation of round rotor and salient polemachines along with E.M.F Equation.
A1210.3	Determine experimentally the characteristics of synchronous generator along with phasor diagram and also evaluate the regulation by synchronous impedance method, M.M.Fmethod and Z.P.F method
A1210.4	Interpret the parallel operation of synchronous generators and determination of sub-transient, transient and steady state reactance‟s
A1210.5	Explain the principle of operation of synchronous motor along with V and Inverted V curves and also describe the concept of hunting and methods of starting in synchronousinduction motor
A1210.6	Infer the constructional features of single phase motor along with double revolving field theory and elementary idea of cross-field theory. Carry out a detailed analysis on specialmotors which include A.C series motor, universal motor and stepper motor.

Course Name : CONTROL SYSTEMS –A1211

A1211.1	Differentiate the open loop and closed loop control system along with understandingof fundamental concepts like signal flow graph and Masons gain formula and also representing the transfer function of AC and DC servomotor.
A1211.2	Analyze the time response of both first order and second order systems along with thedesigning of various controllers
A1211.3	Apply the concepts of stability through Root locus technique, R-H Criterion in s-Domain
A1211.4	Plot the phase and magnitude of various systems employing Bode plot, Nyquist plotand polar plot
A1211.5	Design compensation techniques which involve lag, lead and lead-lag type.
A1211.6	Derive the State models from schematic models along with diagnolization andformulation of state transition matrix

Course Name: POWER SYSTEMS – I –A1212

A1212.1	Recognize the importance of power generation and difference between renewableand non-renewable energy sources, recall the process of nuclear fission and chain reaction.
A1212.2	Analyze the construction, working and operating principle, and essential componentsof various power generating stations with their relative merits and demerits.
A1212.3	Design the layout and select the optimal location for different power plants alongwith its relevant features.
A1212.4	Analyze the different methods and characteristics of solar, wind, biogas, geothermal and ocean power generating systems along with their economic and environmentalaspects.
A1212.5	Carry out a detailed analysis on the economic aspects of power generation involvingvarious tariff methods and costs of generation.

Course Name:LINEAR AND DIGITAL INTEGRATED CIRCUIT APPLICATIONS-A1414

A1414.1	Understand the internal operation of Op-Amp and its specifications.
A1414.2	Operate 555 timer in different modes like monostable and astable operations and studytheir applications and discuss about various DAC and ADC techniques
A1414.3	Analyze and design applications like filters using Op-Amp and discuss about oscillators.
A1414.4	Apply basic switching concepts for realizing logic circuits.
A1414.5	Analyze and design combinational and sequential circuits.
A1414.6	Write VHDL code for any type of logic circuit.

Course Name: CONTROL SYSTEMS AND SIMULATION LAB –A1213

A1213.1	Design the controllers/compensators to achieve desired specifications.
A1213.2	Understand the effect of location of poles and zeros on transient and steady statebehavior of systems.
A1213.3	Assess the performance, in terms of time domain specifications, of first and secondorder systems.
A1213.4	Understand the concepts of PLC and develop the PLC programs
A1213.5	Use MATLAB/SIMULINK software for control system analysis and design.

Course Name: ELECTRICAL MACHINES-II LAB –A1214

A1214.1	Conduct suitable tests on single phase transformer and pre determine the efficiency and regulation at different loading conditions.

A1214.2	Perform the regulation of alternator by EMF and MMF methods in order to evaluate voltage regulation at different power factors.
A1214.3	Carry out No load and blocked rotor tests on three phase induction motor to determine efficiency and also to draw the performance characteristics.
A1214.4	Analyze the equivalent circuit diagrams of single phase induction motor by conducting various tests.
A1214.5	Conduct the brake test on 3 phase induction motors and evaluate the performanceCharacteristics
A1214.6	Convert 3 phase to 2 phase connection in 3 phase transformer through Scott Connection

Course Name: LINEAR AND DIGITAL INTEGRATED CIRCUIT APPLICATIONS LAB-A1415

A1415.1	Study the closed-loop Op-amp configurations.
A1415.2	Generate sinusoidal, triangular & square waveform using op-amp.
A1415.3	Design and verify the frequency response of the filters using TL082 Op Amp.
A1415.4	Design and draw the internal structure of various logic gates.
A1415.5	Implement Combinational circuits using VHDL source code.
A1415.6	Develop VHDL source code and perform simulation.

Course Name: POWER SYSTEMS-II -- A1218

A1218.1	Apply the knowledge of electromagnetic fields to calculate the parameters of transmission lines and underground cables.
A1218.2	Analyze the performance of various transmission lines, underground cables and overhead insulators.
A1218.3	Design mechanical transmission lines using corona phenomenon, Sag and Tension.
A1218.4	Analyze the distribution system, types of faults and protective devices

Course Name: POWER ELECTRONICS – A1219

A1219.1	Illustrate the fundamental concepts and techniques used in power electronic circuits.
A1219.2	Analyze the performance and protection techniques of power electronic devices.
A1219.3	Analyze the operation and performance of AC-DC, DC-DC, DC-AC and AC-

	AC converters.
A1219.4	Design a suitable power electronic converter circuit for given applications.
A1219.5	Apply PWM techniques to improve the performance of DC-DC and DC-AC converters.

Course Name: ELECTRICAL MEASUREMENTS AND INSTRUMENTATION - A1220

A1220.1	Categorize various electrical instruments used for measuring electrical parameters.
A1220.2	Analyze the errors and compensations in various electrical measuring instruments
A1220.3	Measure current, voltage, power and energy in 1-phase and 3-phase circuits.
A1220.4	Estimate the unknown quantities of resistance, inductance and capacitance using bridges
A1220.5	Apply transducers, digital meters and CRO for measuring electrical parameters

Course Name: DIGITAL ELECTRONICS - A1424

A1424.1	Perform arithmetic operations on different number systems and to apply the principles of Boolean algebra to minimize logic expressions.
A1424.2	Make use of k map and tabulation methods to minimize boolean functions and to implement with logic gates.
A1424.3	Analyze basic components used in digital systems such as adder and subtractor, decoder, encoder, multiplexer, flip-flops, registers and counters
A1424.4	Distinguish combinational and sequential logic in terms of their functions.
A1424.5	Design various PLDs such as ROMs, PALs, PLAs and PROMs.

Course Name: POWER ELECTRONICS LABORATORY - A1221

A1221.1	Analyze the performance characteristics of SCR firing and commutation circuits.
A1221.2	Plot the performance characteristics of AC-DC, DC-AC, DC-DC and AC-AC converters with R and RL Loads.
A1221.3	Apply the knowledge of MATLAB to plot the characteristics of full converter, inverter and forced commutation circuits

Course Name: ELECTRICAL MEASUREMENTS AND INSTRUMENTATION LABORATORY - A1222

A1222.1	Estimate resistance, inductance and capacitance of electrical circuits using bridges and dielectric strength of transformer oil
A1222.2	Calculate the percentage error of various measuring instruments, LVDT, and resistance strain gauge
A1222.3	Evaluate 3-Φ active power and reactive power of different loads.
A1222.4	Calibrate single phase energy meter and DC Crompton potentiometer.

Course Name: ADVANCED ENGLISH LANGUAGE COMMUNICATION SKILLS- A1016

A1016.1	Build inferences and predictions based on the information provided in the context.
A1016.2	Choose academic vocabulary appropriately both in speaking and in writing.
A1016.3	Develop effective technical writing skills.
A1016.4	Construct necessary skills to deliver presentation confidently for improving in respective domains
A1016.5	Apply language structures to construct good relations.

Course Name: POWER SEMICONDUCTOR DRIVES - A1223

A1223.1	Identify a suitable electric drive system for desired application.
A1223.2	Apply 1-phase & 3- phase controlled converters for speed control operation of DC drives.
A1223.3	Apply the knowledge of DC-DC Converter and dual converter for speed and torque control of DC Drives.
A1223.4	Apply the knowledge of AC voltage controller and cyclo-converter to control the speed of an induction motor and synchronous motor.

Course Name: POWER SYSTEM ANALYSIS - A1224

A1224.1	Apply computational methods to determine transmission line parameters.

A1224.2	Apply load flow methods to examine the load flow studies.
A1224.3	Analyze symmetrical and unsymmetrical power system faults.
A1224.4	Apply the methods to improve the steady state and transient stability of power systems.

Course Name: MICROPROCESSORS AND MICROCONTROLLERS - A1427

A1427.1	Analyze 8086 microprocessor and MSP430 microcontroller architectures
A1427.2	Develop programs using 8086 microprocessor and MSP430 microcontroller
A1427.3	Make use of peripherals of MSP430 to interface I/O devices
A1427.4	Apply serial communication protocols for interfacing serial devices.
A1427.5	Design embedded applications using MSP430 microcontroller

Course Name: POWER SYSTEMS SIMULATION LABORATORY - A1230

A1230.1	Develop a program to simulate Ferranti effect
A1230.2	Develop a program to model transmission lines
A1230.3	Develop a program for formation Y-Bus and Z-Bus
A1230.4	Develop a program for load flow solution
A1230.5	Develop a program for short circuit analysis
A1230.6	Develop a Simulink model for evaluating transient stability

Course Name: MICROPROCESSORS AND MICROCONTROLLERS LABORATORY– A1429

A1429.1	Develop assembly language programs using EMU8086 emulator.
A1429.2	Execute 8086 ALPs for arithmetic, logical, string, call operations.
A1429.3	Build programs of MSP430 using embedded C.
A1429.4	Interface LEDs push buttons, potentiometer to MSP430.
A1429.5	Test and debug 8086 ALPs and MSP430 embedded C programs

Course Name: PYTHON PROGRAMMING LABORATORY – A1529

A1529.1	Apply fundamental programming concepts of python for solving general purpose problems

A1529.2	Implement sequences to solve complex problems
A1529.3	Build functions to increase code reusability
A1529.4	Implement modular programming for organized software development
A1529.5	Make use of exception handling for robust programming.

Course Name: HUMAN VALUES &PROFESSIONAL ETHICS - A1015

A1015.1	Apply human values and ethics in professional life.
A1015.2	Develop the moral ideals to maintain good relationships with people.
A1015.3	Solve environmental related problems by keeping health of human being into consideration.
A1015.4	Make use of the fundamental rights and human rights in life for individual dignity.
A1015.5	Build the sound health system both physically and mentally by practicing yoga, karate, sports etc

Course Name: SPECIAL ELECTRICAL MACHINES - A1251

A1251.1	Analyze the performance of switched reluctance motors, stepper motors, permanent magnet dc motors linear motors and servo motors
A1251.2	Deduce the emf and torque equations of stepper motor, servo motor, reluctance motor and BLDC motor.
A1251.3	Apply speed control techniques for switched reluctance motors, stepper motors, Permanent magnet dc motors linear motors and servo motors.
A1251.4	Plot the characteristics of switched reluctance motors, stepper motors, Permanent magnet dc motors linear motors and servo motors.

Course Name: UTILISATION OF ELECTRICAL ENERGY - A1252

A1252.1	Analyze various illumination systems, heating and welding techniques.
A1252.2	Analyze the torque- speed characteristics, speed-time characteristics and specific energy consumption of electric locomotive
A1252.3	Apply suitable braking technique to control the speed locomotive.
A1252.4	Apply the power factor improvement and load factor improvement techniques

	for effective usage of electrical energy.

Course Name:ADVANCED CONTROL THEORY - A1253

A1253.1	Develop the mathematical model of linear/non-linear systems in state space.
A1253.2	Investigate the controllability/observability of a given system.
A1253.3	Analyze stability of linear / Non-linear systems using various methods.
A1253.4	Design state feedback controller and optimal controller for a given system.
A1253.5	Evaluate the stability of the given system by Lyapunov criterion.
A1253.1	Develop the mathematical model of linear/non-linear systems in state space.

Course Name: SOLAR ENERGY AND ITS APPLICATIONS - A1254

A1254.1	Demonstrate the usage of solar energy for different electrical equipment's.
A1254.2	Apply the principles of solar radiation to generate electrical energy.
A1254.3	Analyze the thermal properties of solar energy collectors.
A1254.4	Classify the methods to measure solar radiation and store solar energy.
A1254.5	Analyze the economic aspects and environmental issues related to solar system.

Course Name :ELECTRICAL AND HYBRID VEHICLES - A1255

A1255.1	Analyze the topologies used for design of hybrid electric vehicles.
A1255.2	Apply the concepts of power electronics & drives to control hybrid electric vehicles
A1255.3	Analyze power flow control and various energy storage components used for hybrid electric vehicles
A1255.4	Demonstrate different configurations, techniques and sizing of components used in hybrid electric vehicles
A1255.5	Apply the Various energy management strategies in hybrid electric vehicles.

Course Name: ELECTRICAL DISTRIBUTION AND AUTOMATION - A1256

A1256.1	Categorize the different types of distribution system, feeders and loads.
A1256.2	Compare the voltage drop and power loss for various distribution systems.
A1256.3	Design a substation layout with optimal location.
A1256.4	Analyze the methods for power factor correction.
A1256.5	Apply the knowledge of Distribution automation and SCADA in Energy management systems operations.

Course Name:FUNDAMENTALS OF SIGNALS AND SYSTEMS - A1257

A1257.1	Distinguish between different signals and systems.
A1257.2	Make use of Fourier series for the representation of signals.
A1257.3	Analyze different signals by using an appropriate transform.
A1257.4	Select an appropriate transform to find the transfer function of the system.
A1257.5	Analyze the system stability in different domains.

Course Name:WIND ENERGY AND ITS APPLICATIONS - A1258

A1258.1	Apply various measurement techniques to determine the atmospheric and design boundaries of wind turbines.
A1258.2	Apply a suitable turbine model to generate electrical energy from wind energy.
A1258.3	Analyze the parameters of aerodynamics, DRC/PMG Generator and AC drive connected wind turbines.
A1258.4	Apply suitable control and monitoring mechanism for wind energy systems.

Course Name:MACHINE MODELING AND ANALYSIS - A1259

A1259.1	Apply the principles of electrical machines in their design and modelling.
A1259.2	Evaluate the Voltage and Torque Equation of DC and AC Machines.
A1259.3	Differentiate the performance of machines using reference frame theory.
A1259.4	Analyze the dynamic modelling and steady state behavior of various electrical Machines.

Course Name:HIGH VOLTAGE ENGINEERING - A1260

A1260.1	Analyze the breakdown mechanisms of solids liquids and gases.
A1260.2	Design the insulation for power system components.
A1260.3	Analyze and calculate the circuit parameters involved in generation of high voltages.
A1260.4	Measure the alternating signals, impulse high voltage signals, dielectric loss and partial discharge.

Course Name:DIGITAL CONTROL SYSTEMS - A1261

A1261.1	Apply the Sampling and reconstruction theory in A/ D & D/A Conversion.
A1261.2	Solve the given differential equations using Z- transforms.
A1261.3	Analyze the given discrete time system in frequency domain and Z domain.
A1261.4	Design a given discrete time system in Z – Plane and state space representation.
A1261.5	Investigate the Stability of the closed loop systems using Z- transforms.

Course Name:SMART GRIDTECHNOLOGY-A1262

A1262.1	Demonstrate the need of converting conventional grid to Smart Grid.
A1262.2	Assess the role of automation in Transmission and Distribution.
A1262.3	Apply Evolutionary Algorithms for the Smart Grid.
A1262.4	Analyze various Methods used for information security on smart grid
A1262.5	Analyze Voltage and Frequency control techniques in Micro Grids.

Course Name:FUNDAMENTALS OF ELECTRICAL ENGINEERING - A1281

A1281.1	Apply network reduction techniques and knowledge of alternating quantities to calculate current, voltage and power for complex circuits.
A1281.2	Analyze the electrical circuits using nodal analysis, mesh analysis and network theorems.
A1281.3	Demonstrate the working principle and operation of DC machines, AC machines and single-phase transformers.
A1281.4	Test the Performance of DC machines, AC machines and single-phase transformers.

Course Name:RENEWABLE ENERGY SOURCES - A1282

A1282.1	Apply the principles of Renewable energy sources for the construction of Power generating station.
A1282.2	Analyze the various energy conversion systems and their limitations.
A1282.3	Analyze Renewable energy sources for various environmental conditions
A1282.4	Analyze the generation principles and operation of variety of sources of energy

Course Name:ELECTRICAL MEASURING INSTRUMENTS - A1283

A1283.1	Categorize various electrical instruments used for measuring electrical parameters.
A1283.2	Design appropriate arrangement for extension of range in measuring instruments.
A1283.3	Analyze the errors and compensations in various electrical measuring instruments
A1283.4	Measure current, voltage, power and energy in 1-phase and 3-phase circuits.
A1283.5	Estimate the unknown quantities of resistance, inductance and capacitance using bridges

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Nandikotkur Road, Venkayapalli (V), Kurnool - 518452, Andhra Pradesh

Course Name: Mathematics-I :A2002

A2002.1	Develop the use of matrix algebra techniques that is needed by engineers for practical applications
A2002.2	Interpret the Eigen values and Eigen vectors of matrix in terms of the transformation it represents in to a matrix Eigen value problem
A2002.3	Utilize mean value theorems to real life problems
A2002.4	Familiarize with functions of several variables which is useful in optimization
A2002.5	Students will also learn important tools of calculus in higher dimensions. Students will become familiar with 2- dimensional coordinate systems
A2002.6	Students will become familiar with 3- dimensional coordinate systems and also learn the utilization of special functions

Course Name: CHEMISTRY: A2005

A2005.1	To illustrate the molecular orbital energy levels for different molecular species and apply Schrödinger wave equation and particle in a box.
A2005.2	To differentiate between pH metryPotentiometry and conductometric titrations.
A2005.3	Explain the preparation properties and applications of polymers and describe the mechanism of conduction in conducting polymers.
A2005.4	Understand the principles of different analytical instruments and explain their applications.
A2005.5	Explain the concept of nano clusters nano wires and characterize the applications of SEM & TEM.
A2005.6	Explain of different types of colloids ,their preparations , properties and applications

Course Name: COMPUTER PROGRAMMING: A2501

A2501.1	Comprehend the fundamental concepts of computer hardware and problem solving abilities
A2501.2	Knowledge on the basic concepts of algorithms, flow charts and python programming
A2501.3	Ability to analyze the procedure for providing input and acquire output from the program along with implementation of control statements
A2501.4	Interpret the importance of functions in programming
A2501.5	Analyze and Modularize the problem and its solution by using functions.
A2501.6	Ability to relate the concepts of strings, files and preprocessors to the real world applications

Course Name: ENGINEERING GRAPHICS AND COMPUTER AIDED DRAFTING   :A2301

A2301.1	Learning conventions of Drawing, which is an Universal Language Of Engineers. Also Interpret and Sketch the various curves which Including ellipse, parabola, hyperbola
A2301.2	Analyze and draft the orthographic projections of points and lines
A2301.3	Analyze and sketch the orthographic projections of planes and solids
A2301.4	Revise and Improve their visualization skills in the development of new products
A2301.5	Construct the isometric projection of an object employing orthographic projections
A2301.6	Drawing 2D and 3D diagrams of various objects

Course Name: CHEMISTRY LAB   :A2009

A2009.1	Determine the cell constant and conductance of solutions
A2009.2	Prepare advanced polymer materials
A2009.3	Measure the strength of an acid present in secondary batteries
A2009.4	pH metric titrations
A2009.5	Verify Lambert-Beer's law
A2009.6	Potentiometry - determination of redox potentials and emfs

Course Name: COMPUTER PROGRAMMING LAB: A2502

A2502.1	Design solutions to mathematical problems & Organize the data for solving the problem
A2502.2	Understand and implement modular approach using python
A2502.3	Learn and implement various data structures provided by python library including string, list, dictionary and its operations etc
A2502.4	Understands about files and its applications.
A2502.5	Develop real-world applications, files and exception handling provided by python
A2502.6	Select appropriate programming construct for solving the problem

CO-ENGINEERING LABORATORY : A2302

A2302.1	To acquire the knowledge about the characteristics and working principles of semiconductor diodes, Bipolar Junction Transistor

A2302.2	Analysis of Single Phase AC Circuits, the representation of alternating quantities and determining the power in these circuits
A2302.3	Able to Measure the amplitude and frequency utilizing oscilloscope and analyze the fabrication processes of printed circuit boards
A2302.4	Apply wood working skills in real world applications. Build different parts with metal sheets in real world applications
A2302.5	Apply fitting operations in various applications
A2302.6	Apply different types of basic electric circuit connections

Course Name: Mathematics-II :A2010

A2010.1	Apply the mathematical principles to solve second and higher order differential equations
A2010.2	Analyze the non- homogeneous linear differential equations along with method of variation of parameters
A2010.3	Apply the concept of higher order differential equations to the various streams like Mass spring system and L-C-R Circuit problems
A2010.4	Apply a range of techniques to find solutions of standard PDEs and basic properties of standard PDEs
A2010.5	Analyze the vector calculus involving divergence, curl and their properties along with vector identities
A2010.6	Apply Green's, Stokes and Divergence theorem in evaluation of double and triple integrals.

Course Name: APPLIED PHYSICS : A2004

A2004.1	Interpret the properties of light waves and its interaction of energy with the matter
A2004.2	Explain the principles of physics in dielectrics and magnetic materials
A2004.3	Apply electromagnetic wave propagation in different guided media
A2004.4	Calculate conductivity of semiconductors
A2004.5	Interpret the difference between normal conductor and super conductor
A2004.6	Demonstratethe application of nanomaterials

Course Name: DATA STRUCTURES :A2503

A2503.1	Learn to choose appropriate data structure as applied to specified problem definition.
A2503.2	Design and analyze linear and non-linear data structures.
A2503.3	Design algorithms for manipulating linked lists, stacks, queues, trees and graphs in python
A2503.4	Demonstrate advantages and disadvantages of specific algorithms and data

	structures
A2503.5	Develop a base for advanced computer science study.
A2503.6	Evaluate algorithms and data structures in terms of time and memory complexity of basic operations.

Course Name: ELECTRICAL CIRCUITS-I   :A2202

A2202.1	Solve Electrical circuits with minimum complexity and the concepts of magnetic circuits will be used to understand the static induced E.M.F principle of Transformers.
A2202.2	Differentiate the Active power and the role of reactive power in a electrical system for single phase and three phase systems which is the basis to analyze a complex Power system.
A2202.3	Analyze series and parallel resonance circuits and current locus diagrams.
A2202.4	Solve an Electrical circuit with minimum complexity by using various theorems and their applications.
A2202.5	Determine various network parameters for different two port networks.

Course Name: COMMUNICATIVE ENGLISH :A2001

A2001.1	Understand the context, topic, and pieces of specific information from social or transactional dialogues spoken by native speakers of English
A2001.2	Apply grammatical structures to formulate sentences and correct word forms
A2001.3	Analyze discourse markers to speak clearly on a specific topic in informal discussions
A2001.4	Evaluate reading/listening texts and to write summaries based on global comprehension of these texts.
A2001.5	Create a coherent paragraph interpreting a figure/graph/chart/table
A2001.6	Understand the context, topic, and pieces of specific information from social or transactional dialogues spoken by native speakers of English

Course Name: COMMUNICATIVE ENGLISH LAB   :A2006

A2006.1	Remember and understand the different aspects of the English language proficiency with emphasis on LSRW skills
A2006.2	Apply communication skills through various language learning activities
A2006.3	Analyze the English speech sounds, stress, rhythm, intonation and syllable division for better listening and speaking comprehension.
A2006.4	Evaluate and exhibit acceptable etiquette essential in social and professional settings
A2006.5	Create awareness on mother tongue influence and neutralize it in order to improve fluency in spoken English.
A2006.6	Improve upon speaking skills over telephone, role plays and public speaking

Course Name: APPLIED PHYSICS LAB   :A2008

A2008.1	Operate optical instruments like microscope and spectrometer and understand the concepts of interference by finding thickness of paper, radius of curvature of Newton's rings
A2008.2	interpret the concept of diffraction by the determination of wavelength of different colours of white light and dispersive power of grating
A2008.3	demonstrate the importance of dielectric material in storage of electric field energy in the capacitors
A2008.4	plot the intensity of the magnetic field of circular coil carrying current with varying distance and B-H curve
A2008.5	evaluate the acceptance angle of an optical fiber and numerical aperture
A2008.6	determine the resistivity of the given semiconductor using four probe method, the band gap of a semiconductor and identify the type of semiconductor using Hall effect

Course Name: DATA STRUCTURES LABORATORY   :A2504

A2504.1	Practice the various DOS and LINUX Commands along with study of editors and also execute sample C programs
A2504.2	Write a program to calculate roots of quadratic equation, factorial, Fibonacci series and also reverse the digits of a number
A2504.3	Generate a program to check palindrome, Pascals Triangle, read and evaluate matrices and also perform addition, subtraction, division of complex numbers
A2504.4	Design a program to implement numerical methods, sorting of strings in alphabetical order and perform various operations on strings
A2504.5	Write a program to compute the salary statement, perform various arithmetic calculations along with maintaining students data
A2504.6	Generate a program to evaluate the telephone bill along with calculating the execution time of a program

Course Name: ELECTRICAL CIRCUITS-I LAB: A2205

A2205.1	Verification of theorems like Norton's Theorem, Thevenin's theorem, super position theorem, maximum power transfer theorem experimentally and theoretically.
A2205.2	Evaluate the frequency responses at which series and parallel resonance occurs in a given circuit
A2205.3	Calculate the impedance and admittance parameters along with transmission parameter for a given circuit.
A2205.4	Measure the active and reactive power for star and delta connected balanced loads
A2205.5	Assess the value of 3 phase power for unbalanced loads employing two wattmeter method

Course Name: TRANSFORM TECHNIQUES AND COMPLEX VARIABLES   : A2015

A2015.1	Apply Laplace transforms to solve ordinary differential equations
A2015.2	Build Fourier series and Fourier transforms of a given function.
A2015.3	Test for analyticity of complex functions in the given domain
A2015.4	Apply Cauchy's integral formula and Cauchy's integral theorem to evaluate improper integrals along contours
A2015.5	Evaluate improper integrals of complex functions using Residue theorem.

Course Name: A2207– ELECTRICAL MACHINES – I

A2207.1	Apply the principles of AC and DC machines to identify a suitable electrical machine for a given application.
A2207.2	Deduce the emf / Voltage equations of DC Machines and single phase transformers.
A2207.3	Analyze the various characteristics of DC Machines, single phase and three phase transformers.
A2207.4	Test the performance of DC Machines and Single phase transformers.
A2207.5	Apply suitable test to control the speed of DC motor.

Course Name: A2208– ELECTROMAGNETIC FIELDS

A2208.1	Apply orthogonal coordinate systems for Electric and magnetic fields over the distribution of charge.
A2208.2	Analyse the charge configurations of Electric and Magnetic fields using Coulombs law, Gauss's law, Biot-Savart's Law, Ampere's circuital Law and Poynting theorem.
A2208.3	Evaluate the capacitance, Inductance and Magnetic forces for various conductors in Electromagnetic fields.
A2208.4	Investigate the behavior of Electric and Magnetic Fields in Static and Time Varying Fields by Maxwell's equations.
A2208.5	Analyze the plane wave equation in free space, dielectrics and conductors.

Course Name :A2209 –ELECTRICAL CIRCUITS – II

A2209.1	Analyze three phase circuits to determine line voltages, line currents, phase voltages and phase currents.
A2209.2	Apply differential equation and Laplace transform techniques fortransientresponse of series and parallel RLC circuits.
A2209.3	Design a low pass filter, high pass filter, band pass filter and attenuators for given circuit parameters.
A2209.4	Develop a dual circuit, cutest and tie set matrices for a given circuit.

Course Name: A2408 – ELECTRONIC CIRCUITS-I

A2408.1	Analyze the operation and characteristics of diodes and transistors.
A2408.2	Analyze various applications of diodes and transistors.
A2408.3	Make use of Boolean algebra postulates to minimize Boolean functions.
A2408.4	Construct and analyze various combinational and sequential circuits used in digital systems.

Course Name: A2210– ELECTRICAL MACHINES-I LABORATORY

A2210.1	Determine the critical field resistance and critical speed of a DC Shunt generator.
A2210.2	Plot the characteristics of DC shunt, Series and Compound generators using load test.
A2210.3	Test the performance of a given DC motor using suitable technique.
A2210.4	Apply suitable test to calculate the losses for a given DC machine.

Course Name:A2211 –ELECTRICAL CIRCUITS AND SIMULATION LABORATORY

A2211.1	Analyze RL and RC series circuits, 3 phase balanced and unbalanced system and power system network using PSPICE programming.
A2211.2	Test the transient response of DC & AC series RLC circuits using PSPICE programming.
A2211.3	Design the dual network, low pass and high pass filter using PSPICE programming.

A2211.4	Simulate a given DC circuit using PSPICE programming.

Course Name:A2409 – ELECTRONIC CIRCUITS - I LABORATORY

A2409.1	Analyze the description of CRO and Function generator panels.
A2409.2	Determine cut-in, break-down voltages, static and dynamic resistances from V-I characteristics of electronic devices.
A2409.3	Measure the ripple content present in rectifiers using with and without filters.
A2409.4	Make use of small signal analysis to plot the characteristics of BJT and FET.
A2409.5	Make use of Lab VIEW software to construct combinational and sequential circuits.
A2409.6	Test and Debug the combinational and sequential circuits using LabVIEW Software.

Course Name:A2017 –QUANTITATIVE APTITUDE AND REASONING – I

A2017.1	Identify the problems by applying mathematical fundamentals
A2017.2	Apply the suitable logical methods to solve the problems
A2017.3.	Solve the various problems by using quantitative mathematical fundamentals
A2017.4	Analyse the comprehensive data with logical ability

Course Name:A2032 – HUMAN VALUES AND PROFESSIONAL ETHICS

A2032.1	Apply human values and ethics in professional life.
A2032.2	Develop the moral ideals to maintain good relationships with people.
A2032.3	Solve environmental related problems by keeping health of human being into consideration.
A2032.4	Make use of the fundamental rights and human rights in life for individual dignity
A2032.5	Build the sound health system both physically and mentally by practicing yoga, karate, sports etc.

Course Name:A2019 – MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS

A2019.1	Analyze the concepts of managerial economics and financial accounting to make better decisions in the organization
A2019.2	Analyze the demand, production, cost and break even to know interrelationship among variables and their impact

A2019.3	Classify the market structure to decide the fixation of suitable price
A2019.4	Apply capital budgeting techniques to select best investment opportunity
A2019.5	Analyze and prepare financial statements to assess financial health of business

Course Name:A2212 – ELECTRICAL MACHINES – II

A2212.1	Apply the principles of AC machines to identify a suitable electrical machine for a given application.
A2212.2	Deduce the power and torque equations of Induction motors and synchronous machines.
A2212.3	Analyze the various characteristics of induction motors and synchronous machines.
A2212.4	Test the performance of induction motors and synchronous machines.
A2212.5	Apply a suitable test to control speed of Induction motors.

Course Name:A2213 – CONTROL SYSTEMS

A2213.1	Determine the transfer function of a given system using different techniques.
A2213.2	Analyze the response of a given system in time and frequency domains.
A2213.3	Test the stability, observability and controllability of a given system.
A2213.4	Apply suitable technique for calculating the gain margin and phase margin of a given system.

Course Name:Analog Electronic Circuits : C211
Year of Study: 2012-13/2013-14/2014-15/2015-16/2016-17

C211.1	Analyze the multi stage amplifiers which include BJT and FET RC Coupled amplifiers in terms of frequency response and bandwidth
C211.2	Describe the effect of negative feedback on amplifier characteristics along with analysis of voltage series, current series, voltage and current shunt feedback amplifiers
C211.3	Interpret the condition for oscillations along with the analysis of Hartley, Colpitts, Clapp and Tuned Collector oscillators
C211.4	Estimate the frequency and amplitude stability of oscillators which include crystal oscillators, RC oscillators and Weinbridge oscillators
C211.5	Identify Large Signal Amplifiers Along With Efficiency And Carry Out Analysis On Power Disssipation, Thermal Runaway, Push-Pull Amplifier.
C211.6	Discuss the response characteristics of high pass and low pass circuits for various excitations and also analyze the working and design of bistable, monostable and Astable multi vibrators

Course Name:A2214 - ELECTRICAL POWER GENERATION

A2214.1	Apply the knowledge of conversion of energy for different energy sources to generate electrical power.
A2214.2	Draw the layouts of different electrical power generating systems.
A2214.3	Select the optimal location for the establishment of different electrical power plants.
A2214.4	Analyze the base load and peak load conditions to select suitable generating stations.
A2214.5	Compare different types of tariffs suitable for different loads.

Course Name:A2419 – ELECTRONIC CIRCUITS-II

A2419.1	Analyze the characteristics and applications of operational amplifier.
A2419.2	Construct different active filters and oscillator circuits using op-amp and make use of IC 555 and PLL effectively in communication systems.
A2419.3	Analyze the concepts of combinational and sequential logic circuits and use them in the design of latches, counters using digital IC's.
A2419.4	Distinguish between different signals and systems.
A2419.5	Analyze different signals by using an appropriate transform

Course Name:A2215 - CONTROL SYSTEMS LABORATORY

A2215.1	Plot the characteristics of AC servo motor, DC servo motor, synchros and magnetic amplifier.
A2215.2	Determine the transfer function of DC machine and time domain specifications of second order system.
A2215.3	Analyze the different logic gates using Programmable Logic Controller
A2215.4	Analyze the stability of given system in time domain and frequency domain using MATLAB software.
A2215.5	Test the effect of P, PD, PI, PID controller on a second order system.

Course Name:A2216–ELECTRICAL MACHINES-II LABORATORY

A2216.1	Test the performance of 1 phase Transformer, 3 phase induction motor and synchronous motor by conducting suitable test.
A2216.2	Determine circuit parameters of a 1 phase Transformer, 3 phase induction motor and synchronous motor by conducting suitable test.
A2216.3	Apply Scott connection for the conversion of a 3 phase to 2 phase systems.

C407.3	Employ 8086 processor for Dos/BIOS programming involving display of characters and strings

A2216.4	Determine the regulation of a 3 phase alternator and 1 phase transformer by conducting suitable test.
A2216.5	Test the parallel operation and polarity test of a single phase transformer.

Course Name:A2420 – ELECTRONIC CIRCUITS-II LABORATORY

A2420.1	Implement different configurations of operational amplifiers.
A2420.2	Construct and analyze various active filters using op-amp.
A2420.3	Design and draw the internal structure of various logic gates.
A2420.4	Analyze the generation ofoperations of various signals and sequences using MATLAB.

Course Name:A2018 –QUANTITATIVE APTITUDE AND REASONING – II

A2018.1	Identify the problems by applying mathematical fundamentals.
A2018.2	Apply the suitable logical method to solve the problems.
A2018.3.	Solve the various problems by using quantitative mathematical fundamentals.
A2018.4	Analyse the comprehensive data with logical ability.

Course Name:A2031-ENVIRONMENTAL SCIENCE

A2031.1	Solve environmental problems through higher level of personal involvement and interest.
A2031.2	Apply ecological morals to keep up amicable connection among nature and human beings.
A2031.3	Recognize the interconnectedness of human dependence on the earth's ecosystems.
A2031.4	Apply environmental laws for the protection of environment and wildlife.
A2031.5	Influence society in proper utilization of goods and services.

C407.4	Realize the string operation and instruction prefix involving move block, reverse string, sorting, inserting using 8086 processor
C407.5	Carry out the process of interfacing using 8259, 8279 and 8251

Course Name: **Electrical circuits -I**

	Course Outcomes
CO1	Analyze the concept of electrical circuits and magnetic circuits and study different techniques to calculate voltage and current.
CO2	Determining the response of circuits to single phase A.C excitation and evaluate the RMS value and Average Values
CO3	Depict the locus diagrams of various combinations of circuits along with the analysis of concept of resonance
CO4	Understand the concept of bandwidth and Q factor in various series and parallel circuits.
CO5	Interpret the technique of solving circuits employing theorems which involve Norton's, Thevenin's, Maximum Power transfer theorem etc.
CO6	Analyze the concept of two port parameters with respect to impedance, admittance, Transmission and Hybrid parameters

Course Name: **MATHEMATICS-I (R15 & R18)**

	Course Outcomes
CO1	Apply the mathematical principles to solve first and second order differential equations
CO2	Analyze the non homogeneous linear differential equations of second and higher order along with Euler – Cauchy's equations and Legendre's linear equation
CO3	Apply the differential equations of second and higher order in various streams ---like Electrical Circuits,Simple Harmonic motion,Deflection of beams
CO4	Estimate the Taylors and Maclaurin series involving Maxima and minima of functions consisting of 2 variables along with radius of curvature
CO5	Evaluate the multiple integrals involving double and triple integrals along with change of order of integration and apply the multiple integrals to areas and volumes in polar and Cartesian coordinates.
CO6	Analyze the concept of vector calculus involving divergence, curl, green's theorm, Stoke's and Gauss theorms

Course Name: **MATHEMATICS-II (R15 & R18)**

	Course Outcomes
CO1	Analyze the concept of Laplace transform of standard functions along with inverse transform, dirac's delta function and convolution theorem
CO2	Apply the Laplace transforms to ordinary differential equations of first order and second order
CO3	Carry out the determination of Fourier coefficients in terms of Fourier series involving Half range Fourier sine and cosine expansions
CO4	Interpret the Fourier integral theorem along with Fourier sine and cosine transformation and also the concept of inverse transformation
CO5	Formulate the partial differential equations through elimination of arbitrary constants and also understand the technique of separation of variables
CO6	Analyze the technique of Z-transformation for various conditions along with analysis of Fourier transforms

Course Name: **NETWORK ANALYSIS LAB**

	Course Outcomes
CO1	Solve the electrical network using mesh and nodal analysis by applying network theorems
CO2	Estimate the impedance for maximum power transfer and will be in a position to design the systems for maximum power transformation.
CO3	Analyze the transient response of series and parallel A.C. circuits and to solve problems in time domain using Laplace Transform.
CO4	Communicate clearly and use the appropriate medium, including written, oral, and electronic methods.
CO5	Analyze and design a filter to meet its specifications using PSPICE Software
CO6	Engage in independent and lifelong learning in the context of technological changes.

Course Name: **NETWORK ANALYSIS**

	Course Outcomes
CO1	Analyze the concept of electrical circuits and magnetic circuits and study different techniques to calculate voltage and current and also Interpret the technique of solving circuits employing various theorems
CO2	Perform the D.C and A.C transient analysis on combination of circuits along with source transformation
CO3	understand and analyze the fundamental concept of single phase circuits and also determine different powers for a given circuit

CO4	Depict the locus diagrams of various combinations of circuits along with the analysis of concept of resonance
CO5	understand and analyze the concept of two port parameters and apply it for different two port networks
CO6	Understand the concept of filters and able to design different filters

Course Name: **CONTROL SYSTEM ENGINEERING**

CO1	Understand the concepts of feedback control systems, analogies between electrical and mechanical systems.
CO2	Find the transfer function, time domain specifications and steady state errors.
CO3	Apply R-H criterion and root locus concepts to determine the stability of the given system.
CO4	Find the frequency domain specifications of second order systems and determine the stability of the systems using Bode plot and Nyquist plot techniques.
CO5	Determine the transfer function and gain & phase margins from the Bode plot & Nyquist plot.
CO6	Develop state model of a given system, solve the state equations and test the observability and controllability of the given system.

Course Name: **CONTROL SYSTEMS AND SIMULATION LAB**

	Course Outcomes
CO1	Determine experimentally the time domain reposes of a given second order system
CO2	Analyze the effect of P,PI,PID controller on the step response of a feedback control system
CO3	Design & conduct experiment on Lead, Lag & Lag & Lead Compensators for the given specifications.
CO4	Draw the characteristics of AC servo motor, DC servo motor and Magnetic amplifier
CO5	Apply the control systems concepts to synchro transmitter and synchro receiver pair
CO6	Design state space based controllers, compensators and systems using MATLAB software.

Course Name: **ELECTRCAL CIRCUITS – II**

	Course Outcomes
CO1	Carry out the transient analysis of RL,RC,RLC series circuits for DC & AC Excitations
CO2	Analyze three phase balanced and unbalanced circuits and determine line voltages,line currents, phase voltages and phase currents
CO3	Measure active and reactive power in three phase circuit

CO4	To understand the concept of graph Theory, nodal and mesh analysis
CO5	Apply Fourier transforms to various electrical circuits.
CO6	Design various types of filters.

Course Name: **ELECTRICAL CIRCUITS AND SIMULATION LAB**

	Course Outcomes
CO1	Explain electric circuit concepts by interpreting the simulation results.
CO2	Design RLC series circuit for specified frequency response.
CO3	Analyze three phase balanced and unbalanced circuits.
CO4	Design RL, RC and RLC circuits for specified transient response.
CO5	Design and Frequency Response of Low Pass and High Pass.
CO6	Explain electric circuit concepts by interpreting the simulation results.

Course Name: **ELECTRICAL MACHINES-I Lab**

	Course Outcomes
CO1	Evaluate the open circuit characteristics in order to find the critical resistance, speed and also list out the external and internal characteristics of dc shunt machines.
CO2	Perform the load test and brake test on DC shunt generator and motor in order to determine the performance characteristics.
CO3	Determine the efficiency of DC shunt and series machines through fields test and Hopkinson's test respectively.
CO4	Predetermine the efficiency of DC shunt motor by conducting Swinburne's test and also control the speed of dc motor by different method.
CO5	Draw the characteristics of DC series generator by conducting load test and also carry out the separation of losses in DC shunt motor
CO6	Analyze the performance curves of DC compound motor by conducting brake test on the motor

Course Name: **ELECTRICAL MACHINES-I**

	Course Outcomes
C206.1	Analyze the formulation of electromechanical energy conversion in single and multi excited systems.
C206.2	Describe the principle of Operation of Motor,Generator and classify the DC Machines into separately excited and self-excited
C206.3	Perform tests like swinburnes test and brake test in order to determine the losses and efficiency of DC Machines
C206.4	Understand the methods to control the speed of DC motor by various methods like armature control,field control and ward leonard method

C206.5	Interpret the construction and working of three point starter and four point starter in dc motor for limiting the starting current
C206.6	Interpret the concept of armature reaction and commutation in dc machine along with its corresponding improvement

Course Name: **ELECTRICAL MACHINES-II**

	Course Outcomes
CO1	Enumerate the working and construction of single phase transformer, along with determination of various tests in order to determine the performance and efficiency.
CO2	Identify the three phase transformers employed in distribution and transmission system based on their connections.
CO3	Investigate the operation and working principles of various types of induction motors and depict the torque speed characteristics
CO4	Perform various tests on three phase induction motor like Brake test, No-Load and Blocked Rotor tests in order to determine the performance and efficiency.
CO5	Conduct various tests like O.C, S.C and sumpners test on single phase transformer to determine the performance , losses and efficiency
CO6	Analyze the various starting methods of induction motors and also control methods for speed control of induction motor.

Course Name: **ELECTRICAL POWER GENERATING SYSTEMS**

	Course Outcomes
CO1	Recognize the importance and economic aspects of power generation and difference between renewable and non-renewable energy sources, recall the process of nuclear fission and chain reaction.
CO2	Analyze the construction, working and operating principle, and essential components of various power generating stations with their relative merits and demerits.
CO3	Design the layout and select the optimal location for different power plants along with its relevant features.
CO4	Analyze the different methods and characteristics of solar, wind, biogas, geothermal and ocean power generating systems along with their economic and environmental aspects.
CO5	Carry out a detailed analysis on the economic aspects of power generation involving various tariff methods and costs of generation.
CO6	Function effectively as a member or leader in a team in the development of Power System applications.

Course Name: **Electromagnetic Fields**

	Course Outcomes
CO1	Apply vector calculus to generalize the behavior of static electric fields in standard configurations.
CO2	Understand the behavior of static magnetic fields in standard configurations by applying vector calculus.
CO3	Analyze the inductance and capacitance for different structures.
CO4	Apply the force in electric field and magnetic field and both.
CO5	Examine the effect of time varying fields involving both electric and magnetic field on a wave propagating through a medium along analysis of with modified Maxwell's equations for time varying fields.
CO6	Use of modern tool MATLAB to simulate electromagnetic fields of transmission lines.

Course Name: **Managerial Economics and Financial Analysis**

	Course Outcomes
CO1	Understand, Concepts of economics, managerial economics, demand determinants, law of demand and its exceptions, types and measurement of elasticity of demand,demand forecasting.
CO2	Understand production function, isoquants and isocosts, MRTS, least cost combinationof inputs, Cobb-Douglas production function and law of return to scale. Types of cost,BEA, BEP..
CO3	Understand market structure, types of markets, price-output determination underperfect competition, monopoly, monopolistic competition and pricing methods,types of business organizations and LPG.
CO4	Understanding the concepts of accounting principles and apply them to know the financial position of a company.
CO5	Evaluate the financial position of the company by using Ratio Analysis.
CO6	Understand capital, types, sources, estimation of capital requirements, capital budgeting and techniques of capital budgeting.

Course Name: **MATHEMATICS-III (R15)**

	Course Outcomes
CO1	Demonstrate knowledge of matrix calculation as an elegant and powerful mathematical language in connection with rank of a matrix, linear system of equations, linear dependence and independence.

CO2	Interpret the Eigen values and Eigen vectors of matrix in terms of the transformation it represents in to a matrix Eigen value problem. Define a quadratic form and determine its nature using Eigen values.
CO3	Perform the solutions of algebraic and transcendental equation employing bisection method, false position method and Newton-Raphson method
CO4	Understand the technique of interpolation along with Lagrange's formula and Newton's interpolation formulae.
CO5	Understand and apply the concepts of curve fitting, numerical differentiation and integration.
CO6	Interpret the numerical solutions of ordinary differential equations employing Taylor series, Euler's, Picard's and Runga-kutta methods.

Course Name: **MATHEMATICS-IV (R15)**

	Course Outcomes
CO1	Apply Beta and Gamma functions to evaluate many integrals which cannot be expressed in terms of elementary functions.
CO2	Demonstrate the usage of Bessel functions and Legendre polynomials in solving various engineering problems.
CO3	Analyze the functions of complex variable which include continuity, differentiability and analyticity along with evaluation of Cauchy-Riemann equations in Cartesian and polar coordinates
CO4	Perform the Conformal mapping which includes bilinear transformation, translation, rotation, magnification and inversion.
CO5	Employ the Cauchy's integral theorem along with integral formula along with expansion in Taylor's series, Maclaurin's series and Laurent series along with radius of convergence.
CO6	Evaluate the residual formula through Laurent series and residue theorem along with evaluation of improper real integrals.

Course Name: **ELECTRICAL MACHINES-II Lab**

	Course Outcomes
CO1	Conduct suitable tests on single phase transformer and pre determine the efficiency and regulation at different loading conditions.
CO2	Perform the regulation of alternator by EMF and MMF methods in order to evaluate voltage regulation at different power factors and also determine the Xd and Xq values.
CO3	Carry out No load and blocked rotor tests on three phase induction motor to determine efficiency and also to draw the performance characteristics.
CO4	Analyze the equivalent circuit diagrams of single phase induction motor by conducting various tests.

CO5	Conduct the brake test on 3 phase induction motors and evaluate the performance characteristics
CO6	Convert 3 phase to 2 phase connection in 3 phase transformer through scott connection

Course Name: **ELECTRICAL MACHINES-III**

	Course Outcomes
C304.1	Understand the construction and principle of operation of round rotor and salient pole machines along with E.M.F Equation, different types of windings, alternator on load.
C304.2	Determine experimentally the characteristics of synchronous generator along with phasor diagram and also evaluate the regulation by synchronous impedance method, M.M.F method and Z.P.F method.
C304.3	Interpret the parallel operation of synchronous generators and determination of sub-transient, transient and steady state reactance's.
C304.4	Explain the principle of operation of synchronous motor along with V and Inverted V curves and also describe the concept of hunting and methods of starting in synchronous induction motor.
C304.5	Infer the constructional features of single phase motor along with double revolving field theory and elementary idea of cross-field theory.
C304.6	Carry out a detailed analysis on special motors which include A.C series motor, universal motor and reluctance motor.

Course Name: **ELECTRICAL MEASUREMENTS LABORATORY**

	Course Outcomes
CO1	Perform the calibration and testing of single-phase energy meter and dynamometer power factor meter.
CO2	Determine and formulate the parameters like resistance, inductance and capacitance using DC and AC bridges.
CO3	Calculate the three-phase reactive power in the given circuit through single phase wattmeter
CO4	Evaluate the three-phase real and reactive power in the given circuit through two single phase wattmeter.
CO5	Measure parameters of choke coil using three ammeters and three voltmeters method.
CO6	Analyze the calibration of LVDT, Strain gauge and DC Crompton Potentiometer and also depict their characteristics.

Course Name: **ELECTRICAL MEASUREMENTS**

	Course Outcomes
CO1	Calculate the various errors along with understanding the principle and operation of basic instruments employed for measuring purpose.
CO2	Interpret the working and operating principle of current transformer and Potential transformer along with the 1 phase and 3 phase power factor meters.
CO3	Categorizing the instruments employed for measurement of power and energy along with the analysis of A.C and D.C Potentiometers.
CO4	Determine the measurement of passive parameters (R,L,C) through various bridges along with their phasor representation
CO5	Explain the constructional details of ballistic galvanometer along with the B-H loop method of reversal.
CO6	Carry out detailed analysis on the working and application of cathode ray oscilloscope along with the analysis on the working of digital meters

Course Name: **ELECTRICAL POWER TRANSMISSION SYSTEMS**

	Course Outcomes
C302.1	Analyze the passive parameters (R,L,C) of a transmission line and to calculate the same for different configurations of transmission lines.
C302.2	Evaluate the performance of short, medium and long transmission lines along with surge impedance and surge impedance loading
C302.3	Investigate the effect of Corona on the transmission lines and various reduction techniques along with types of Insulators and methods to provide equipotential distribution across them to protect from high dielectric stress
C302.4	Estimate the mechanical design of transmission line involving Sag and tension calculations along with considering the effect of wind and ice.
C302.5	Carry out detailed study about the various transients in power systems along with Bewley's Lattice diagrams
C302.6	Interpret the insulation resistance , stress and capacitance of single core and three- core cable

Course Name: **POWER ELECTRONICS AND SIMULATION LABORATORY**

	Course Outcomes
CO1	Plot the output waveforms for the different gate firing circuits for SCR.
CO2	Analyze the output waveforms for different firing angles by conducting experiments on single phase AC voltage controller and Cycle converter with R and RL loads.
CO3	Analyze the output waveforms for different firing angles by conducting experiments on DC Jones Chopper andSingle Phase Dual Converter with R and RL loads.

CO4	Understand the operation of single phase series and parallel inverters with R and RL loads.
CO5	Design Illumination control / Fan control using TRIAC
CO6	Construct the output waveforms for Buck-Boost converter,Half bridge and Full bridge inverter circuit using MATLAB.

Course Name: **POWER SYSTEM ANALYSIS**

	Course Outcomes
CO1	Analyze the representation of various power system elements and formation of Y bus
CO2	Design the formation of Z bus in power system in various addition / removal of buses
CO3	Investigate power flow studies through the implementation of Gauss-siedel methods and Newton Raphson's method in rectangular and polar forms
CO4	Carry out the short circuit analysis involving symmetrical fault analysis and analyze the concept of symmetrical components involving positive, negative and zero sequence components
CO5	Investigate the steady state analysis in power systems under various operating conditions and also depict the power angle curve
CO6	Interpret the transient state analysis in power systems by Equal area criterion and also calculate the solution of swing equation through runga-kutta method

Course Name: **POWER SYSTEM PROTECTION**

	Course Outcomes
C404.1	Realize the basic requirements of relays as primary and backup protection along with their constructional details
C404.2	Analyze the static and microprocessor based relays along with their specifications, advantages and disadvantages
C404.3	Interpret the various techniques involves in the generator and transformer protection against faults in the system
C404.4	Explain the techniques involves in the protection of feeders and transmission lines
C404.5	Understand the fundamental principles of circuit breakers along with their ratings and specifications
C404.6	Describe the causes for over-voltages in power system and also explain the various protective schemes for the protection from over-voltages

Course Name: **PROGRAMMABLE LOGIC CONTROLLER AND ITS APPLICATIONS**

	Course Outcomes
CO1	Explain the basic concepts of Programmable Logic Controller, architecture and its connecting devices

CO2	Solve the given Logic gate diagram into PLC ladder diagram and vice versa
CO3	Design and Programme a PLC ladder structures for Industrial Applications.
CO4	Analyze the control circuits for various applications using Timers and Counters
CO5	Understand the concept of different data handling functions used in PLC
CO6	Apply the PLC simulation software on wide range of PLC applications

Course Name: **DIGITAL SIGNAL PROCESSING LAB**

	Course Outcomes
CO1	Compute the energy, power and convolution of discrete time sequences using MATLAB.
CO2	Compute the DTFT, N-Point DFT using FFT algorithm.
CO3	Design FIR filters using windowing techniques.
CO4	Design IIR filter and verify its frequency response.
CO5	Compare frequency response of FIR and IIR filters.
CO6	Find the frequency response of analog filters.

Course Name: **DIGITAL SIGNAL PROCESSING**

	Course Outcomes
CO1	Analyze various discrete time signals and systems.
CO2	Analyze the response of the discrete time systems in time and frequency domain.
CO3	Compute and analyze DFT using various algorithms.
CO4	Analyze various realization forms of FIR and IIR Filters.
CO5	Design digital FIR and IIR filters and analyze their performances.
CO6	Understand the basic concepts of sampling rate conversion and implement them.

Course Name: **ELECTRCAL DISTRIBUTION SYSTEMS(R13&R15)**

	Course Outcomes
C401.1	Identify and categorize the concept includes load distribution, load modeling related to distribution system.
C401.2	Building up analyzing, designing of primary and secondary distribution feeders.
C401.3	Evaluate the solutions of voltage drop and power loss calculations and manual methods of radial network.
C401.4	Able to explain the substations layout showing the location of all

	substations equipment
C401.5	Determines the best capacitor location, Power factor correction, capacitor allocation to enhance the power factor and voltage profile.
C401.6	Involve in lifelong learning to implement modern methods in distribution system in order to meet the demand growth in future.

Course Name: **ENERGY AUDIT AND DEMAND SIDE MANAGEMENT**

	Course Outcomes
CO1	Acquire knowledge about energy auditing and energy requirements and also about global energy scenario.
CO2	Understand about motor energy audit and power factor improvement methods.
CO3	Assess the need and type of instruments for energy audit and energy management and their applications
CO4	Acquire an in-depth knowledge about the energy management.
CO5	Acquire Knowledge about importance of evaluation, measurement and verification of demand side management programs
CO6	Understand various Cost effectiveness test for demand side management programs

Course Name: **HVDC TRANSMISSION(R15&R13)**

	Course Outcomes
C415.1	Understand the concept of HVDC Transmission system over the existing AC transmission and Basic principle and operation of different HVDC converters.
C415.2	Analyze and Apply the different power Converters and control methods to control the transmission system and distribution system
C415.3	Understand the design of filters to eliminate the harmonics to improve the power quality.
C415.4	Analyze different faults in HVDC system.
C415.5	Use modern tools including MATLAB, PSPICE tools to simulate the High transmission system.
C415.6	Engage in independent and lifelong learning in the context of HVDC technological changes

Course Name: **INSTRUMENTATION**

	Course Outcomes
CO1	Understand the various concepts in characteristics of signals and errors in measurements along with signals and their representation for electronic instruments.
CO2	Carry out the analysis of data transmission and telemetry system which is intermediate stage in instrumentation.
CO3	Understand the data acquisition system components and record the data in analog and digital format.
CO4	Analyze the signals employing signal analyzers and learn the measurement of non- electrical quantities like flow and pressure.
CO5	Realize the different types of transducers along with their advantages and disadvantages which are primary sensing element in instrumentation.
CO6	Implement the Measurement of non- electrical quantities employing various instruments.

Course Name: **POWER QUALITY**

	Course Outcomes
CO1	Understand the importance of Power Quality and obtain a brief idea of all power quality issues
CO2	Comprehend the categories and characteristics of electromagnetic phenomenon on power systems, transients, short duration and long duration variations
CO3	Understand the principles and devices for voltage regulation
CO4	Study the nature of harmonics and evaluate certain methods to control harmonics distortions by applying various principles
CO5	Learn about bench marking process, monitoring considerations, assessment of power quality measurement data and operation of monitoring equipment
CO6	Understand the principles of operation of custom power devices which include SSCL, SSB, SSTS, DVR and UPQC.

Course Name: **POWER SYSTEM AND SIMULATION LABORATORY**

	Course Outcomes
CO1	Determine the positive, negative and zero sequence impedances of cylindrical rotor synchronous machine
CO2	Carry out the fault analysis for various types of faults involving LG, LL, LLG and LLLG Faults
CO3	Determine Sub transientreactance of salient pole synchronous machine and Equivalent circuit of three winding transformer.
CO4	Carry out the analysis of formation of Y bus and Z bus applying MATLAB

CO5	Carry out the analysis of load flows involving Newton Raphson Method and Fast Decoupled Method applying MATLAB
CO6	Develop a Simulink model for the problem of load frequency control involving single area and multi area systems

Course Name: **POWER SYSTEM OPERATION AND CONTROL**

	Course Outcomes
CO1	Analyze optimal operation of generators in thermal power plants without and with transmission losses.
CO2	Interpret the importance of hydro thermal scheduling for long term and short term scheduling problems.
CO3	Model the turbine, governor and generator load model mathematically and design the block diagram for load frequency control.
CO4	Analyze the steady state response, dynamic response, load frequency control and economic dispatch control for two or more interconnected systems.
CO5	Investigate the various methods of reactive power compensation in transmission system.
CO6	Recognize the necessity for power system rescheduling and various key issues in deregulation

Course Name: **UTILISATION OF ELECTRICAL ENERGY**

	Course Outcomes
CO1	Explain the basic principles of light control and Different sources of Light
CO2	Understand the various electric heating methods, equipment required for welding and also the difference between AC and DC welding .
CO3	Interpret about the movement of a train and corresponding arrangements and also the features of a Traction Motor.
CO4	Analyze the methods of controlling the trains electrically, terms related to electric traction and calculations of various parameters related to it
CO5	Carry out a detailed review of existing Electric Traction Systems in India and analysis of Energy consumption in Electric Traction
CO6	Engage in lifelong learning to develop modern methods in the prospect of optimum utilization of electrical energy for real world usage.