SANTHIRAM ENGINEERING COLLEGE:: NANDYAL

Approved by AICTE, New Delhi: Permenantely Affiliated to JNT University, Ananthapuramu.
An ISO 9001:2015 certified college, 2(f) & 12(B) Recognition by UGC Act, 1956
NH-40, Nandyal – 518501 :: Kurnool Dist. A.P.

DEPARTMENT: ELECTRICAL & ELECTRONICS ENGINEERING

COURSE OUTCOMES **REGULATION: R-15**

Year/Sem.	S.No.	Subject Name	SUB CODE		
	1	MATHEMATICS –III	15A54301	**CO1**	Explain the concepts of matrices and its applications
				CO2	Able to solve the algaebraic and transcendental equations using numerical methods
				CO3	Able to understand inter polation and extra polation and apply the appropriate methods to solve the problems
				CO4	Construct the different types of curves by using the different numerical techniques.
				CO5	Solve the ordinary differential equations by applying the various numerical techniques
	2	ELECTRICAL CIRCUITS – II	15A02301	**CO1**	To understandand determine the transient response of R-L, R-C, R-L-C series circuits for D.C. and A.C. excitations
				CO2	To analyze of three phase balanced and unbalanced circuits and to measure active and reactive power in three phase circuits
				CO3	To apply of Fourier transforms to electrical circuits excited by non-sinusoidal sources

				CO4	Study of Network topology, Analysis of Electrical Networks, Duality and Dual Networks
				CO5	To design and analyzeDifferent types of filters and equalizers
	3	ELECTRICAL MACHINES – I	15A02302	**CO1**	Able to analyze the energy balance equation of electro magnetic systems
				CO2	Understanding and analyzing of Construction, working, effect of armature reaction and commutation process of dc generators
				CO3	Understanding the classification of generators and analyzing the characteristics and parallelling the DC generators
				CO4	Understanding, analyzing the DC motors and starters
				CO5	Able ot perform the different tests on dc motors and and determine the performance
II YEAR	4	CONTROL SYSTEMS ENGINEERING	15A02303	**CO1**	Understand & Evaluate the transfer function of physical systems, block diagrams and signal flow graphs
				CO2	Remember and Analyze the transient & Steady state responses and its specifications their characteristics
				CO3	Determine the absolute and relative stability of a system using RH and Root loci concepts.
				CO4	Analyse& Evaluate the stability of the system and design of Bode, polar, Nyquist and compensation networks

ISEM				**CO5**	Describe the state variable representation of physical system and solve the state equation
	5	ELECTRONIC DEVICES & CIRCUITS	15A04301	**CO1**	Analyze the Junction Diode Characteristics, Special Semiconductor Diodes characteristics and applications.
				CO2	To understand the concept of Rectifiers and analyze using Filters
				CO3	Design and analyze the DC bias circuitry of BJT and FET.
				CO4	To understand and analyze Transistor Biasing and Thermal Stabilization for BJT and FET.
				CO5	To understand and apply Small Signal Low Frequency Transistor Amplifier Models
	6	DATA STRUCTURES	15A05201	**CO1**	Ability to analyze algorithms and algorithm concepts
				CO2	Ability to apply basic concepts about arrays,linkedlist,stacks,queues.
				CO3	Ability to design trees and graphs.
				CO4	Ability to solve the concepts about searching and sorting techniques
				CO5	Ability to build new data structures according to given problem
	7	ELECTRICAL CIRCUITS SIMULATION LABORATORY	15A02305	**CO1**	Explain Electric Circuit Concepts By Interpreting The Simulation Results
				CO2	Design And Analyze Electrical Circuits Experimentally Using Simulation Tools.
				CO3	Apply Network Theorems To Electrical Circuits To Simplify The Circuits

		LABORATORY		**CO4**	Design Rl, Rc And Rlc Circuits For Specified Transient Response And Design Rlc Series Circuit For Specified Frequency Response
				CO5	Analyse Three Phase Balanced And Unbalanced Circuits
	8	ELECTRONIC DEVICES & CIRCUITS LABORATORY	15A04305	**CO1**	Get Knowledge About P-N Junction Diode And Germanium Diode And Also Their Cut In Voltage, Diode Resistances Based On V-I Characteristics.
				CO2	Get Knowledge About Zener Diode And Also Their Cut In Voltage, Diode Resistances Based On V-I Characteristics.
				CO3	Learn About Functioning Of Rectifiers With And Without Load And Also Calculate Their Ripple Factor And Efficiency.
				CO4	Learn About Cb,Ce Configuration With Static And Dynamic Characteristics
				CO5	Learn About Fet Configuration With Static And Dynamic Characteristics
				CO1	Understand the concepts of various voltmeter and ammeter instruments and functional concepts of Cathode Ray Oscilloscope and its applications.
				CO2	Analyse the various methods of measurement of resistance, inductance and capacitance using bridge concepts.

	1	ELECTRICAL MEASUREMENTS	15A02501	**CO3**	Understand and analyse the measurement of power, power factor and energy with functional descriptions.
				CO4	Design and analyses of instrument transformers and precise measurement of electrical parameters with potentiometers.
				CO5	Understand and analyse the magnetic parameters measurements with suitable functional instruments
	2	LINEAR & DIGITAL IC APPLICATIONS	15A04509	**CO1**	Understand the basic building blocks of linear integrated circuits and its characteristics.
				CO2	Analyze the linear, non-linear and specialized applications of operational amplifiers.
				CO3	Get the knowledge of various logic families and exposure to VHDL programming.
				CO4	Design the digital circuits using VHDL Programming.
				CO5	Design various combinational & sequential circuits using various digital integrated IC's.
	3	ELECTRICAL POWER TRANSMISSION SYSTEMS	15A02502	**CO1**	Able to determine the transmission line parameters
				CO2	Able to detemine the performance of the transmission line
				CO3	Determine the electrical and mechanical characteristics of transmission lines.
				CO4	Analyze the effect of transients due to switching with different terminations at load side in transmission lines

				CO5	Analyze the construction and characteristics of Underground cables
III YEAR I SEM	4	POWER ELECTRONICS	15A02503	**CO1**	To understand the basic Concepts of Power Semiconductor Devices
				CO2	Describe basic operation and compare performance of various power semiconductor devices
				CO3	Design and Analyze power converter circuits and learn to select suitable power electronic devices by assessing the requirements of application fields.
				CO4	Formulate and analyze a power electronic design at the system level and assess the performance.
				CO5	Identify the critical areas in application levels and execute typical alternative solutions, select suitable power converters to control Electrical Motors and other industry grade apparatus
	5	ELECTRICAL MACHINES – III	15A02504	**CO1**	ToExplain the Construction, Principle of operation of Synchronous Machines.
				CO2	To Predetermine the regulation of synchronous generators using different methods
				CO3	To Determine how several alternators running in parallel share the load on the system
				CO4	To Analyze the performance characteristics of synchronous motors.
				CO5	To Choose specific 1-phase motor and/or special motors for a given application.

6	DIGITAL CIRCUITS AND SYSTEMS	15A04510	**CO1**	Be able to manipulate numeric information in different forms, e.g. different bases, signed integers, various codes such as ASCII, Gray, and BCD.
			CO2	Be able to manipulate simple Boolean expressions using the theorems and postulates of Boolean algebra and to minimize combinational functions.
			CO3	Be able to design and analyze small combinational circuits and to use standard combinational functions/building blocks to build larger more complex circuits.
			CO4	Be able to understand classification of microprocessors and memories.
			CO5	Be able to design and analyze small sequential circuits and devices and to use standard sequential functions/building blocks to build larger more complex circuits
7	ELECTRICAL MACHINES LABORATORY – II	15A02506	**CO1**	To Acquires sufficiently good practical knowledge about the operation, testing, and characteristics of transformers, Induction Motors
			CO2	To Acquires sufficiently good practical knowledge about the operation, testing, and characteristics of Alternators and Synchronous Motors
			CO3	To Acquire the knowledge about the fixation of the rating of transformers

				CO4	To Acquire the knowledge about the fixation of the rating of induction motors and synchronous machines..
				CO5	To determine the performance the electrical machines
	8	ELECTRICAL MEASUREMENTS LABORATORY	15A02507	**CO1**	Calibrate various electrical measuring/recording instruments.
				CO2	Accurately determine the values of inductance and capacitance using a.c bridges
				CO3	Accurately determine the values of very low resistances
				CO4	Measure reactive power in 3-phase circuit using single wattmeter
				CO5	Determine ratio error and phase angle error of CT
	9	SOCIAL VALUES AND ETHICS (AUDIT COURSE)	15A99501	**CO1**	Able recall family,and human values and compare his family with others and analyse the importance of family in the society.
				CO2	Classify the fundamental Rights and fundamental duties of citizen Influence the factors affecting youth crime..
				CO3	Explain the Environmental issues and Justify the objectives of civil defense.
				CO4	Demonstrate Gender inequality, Domestic violence and Appraise the government schemes ,laws.
				CO5	Importance the games ,sports,and benefits of exercise, Recommend the yoga asanas ,mudras and pranayama
				CO1	Compute the various factors associated with power distribution

	1	ELECTRICAL DISTRIBUTION SYSTEMS	15A02701	**CO2**	Make voltage drop calculations in given distribution networks
				CO3	Learn principles of substation Layouts
				CO4	Compute power factor improvement for a given system and load
				CO5	Understand implementation of SCADA for distribution automation
	2	DIGITAL SIGNAL PROCESSING	15A04603	**CO1**	Formulate engineering problems in terms of DSP tasks.
				CO2	Apply engineering problems solving strategies to DSP problems.
				CO3	Design and test DSP algorithms.
				CO4	Analyze digital and analog signals and systems.
				CO5	Analyze and compare different signal processing strategies
	3	POWER SYSTEM OPERATION AND CONTROL	15A02702	**CO1**	To Evaluate the economic operation of power system
				CO2	To Develop the mathematical models of turbines and governors
				CO3	To Discuss the Load Frequency Control methods
				CO4	To Explain how shunt and series compensation helps in reactive power control
				CO5	To Explain the issues concerned with power system operation in competitive Environment
	4	UTILIZATION OF ELECTRICAL ENERGY	15A02703	**CO1**	Understand & Analyze the laws of illumination and their application for various lighting schemes& Lamps.
				CO2	Understand & Apply the Principles and methods of electric heating, electric welding and Electrolysis.
				CO3	Describe the Systems of electric traction and study of traction equipment.

		ENERGY		**CO4**	Analyze the mechanics of Train movement and Evaluate the speed time curves for different services.
				CO5	Ability to choose the better equipment with consideration of economic aspects and Evaluate the losses& efficiency of the electrical equipments used in various industries
IV YEAR I SEM	5	ENERGY AUDITING & DEMAND SIDE MANAGEMENT	15A02706	**CO1**	Elaborate energy auditing and evaluate energy audit results
				CO2	Determine motor energy audit
				CO3	Analyze Lighting energy instruments for audit
				CO4	Analyze demand side management concepts through case study
				CO5	Analyze economics and cost effectiveness tests of DSM Programs
	6	FLEXIBLE AC TRANSMISSION SYSTEMS	15A02708	**CO1**	Understand the need, significance and types of FACTS controllers
				CO2	Understand, analyse the level of significance and concepts of voltage source and current source converters
				CO3	Understand, analyse and evaluate the objectives and various types of shunt controllers.
				CO4	Understand, analyse and evaluate the objectives and various types of series controllers.
				CO5	Understand and analyse the power flow controllers in single and multi transmission lines.
				CO1	Find the response of a Linear time invariant discrete time system.
				CO2	Analyze the frequency spectrum of a discrete time signal

	7	DIGITAL SIGNAL PROCESSING LABORATORY	15A04608	**CO3**	Determine the spectrum of a real world signal using Fast Fourier Transform algorithm
				CO4	Design real time DSP systems and real world applications.
				CO5	Implement DSP algorithms using both fixed and floating point processors
	8	POWER SYSTEMS & SIMULATION LABORATORY	15A02710	**CO1**	To Experimental determination (in machines lab) of sequence impedance and subtrasient reactance of synchronous machine
				CO2	To Conducting experiments to analyze LG, LL, LLG, LLLG faults
				CO3	To The equivalent circuit of three winding transformer by conducting a suitable experiment
				CO4	To Developing MATLAB program for formation of Y,Z buses and gauss-seidel and fast decoupled load flow studies.
				CO5	To Developing the SIMULINK model for single area load frequency control problem.
				CO1	Able to get knowledge inbeta and gamma functionsand Techniques of Beta andGamma functions to improper integrals, Expressing complex functions in power series, Conformal mappings and bilinear transformations

	1	MATHEMATICS – IV	15A54402	**CO2**	Develop skills in Analyzing the properties exhibited by complex functions in Argand plane, Properties of real integrals through complex variable techniques, The properties of improper integrals through residue theory, Conformal transformations of complex valued functions for inferences.
				CO3	Develop skills in designing mathematical models involvingIntegrals of complex variable functions, Improper integrals using beta and gamma functions, Residue theory of complex functions
				CO4	Develop analytical skills in providing solutions for problems involving Integration of complex functions, Improper real integrals
				CO5	Use relevant Complex variable techniques for Residues and integrals of complex functions, Improper real integrals through complex functions
	2	MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS	15A52301	**CO1**	Capable of analyzing fundamentals such as Demand, Elasticity & Forecasting methods
				CO2	To apply production , pricing & Supply concepts for effective business organization
				CO3	Students can able to identify the influence of various markets , the forms of business organisation
				CO4	Analyze Accounting statements like balance sheet and to understand financial performance

				CO5	To analyze how to invest the amount of Capital in order to get maximum return from selected business activity
II YEAR II SEM	3	ELECTRICAL MACHINES – II	15A02401	**CO1**	Conduct O.C, S.C tests and predetermine the regulation and efficiency of transformer
				CO2	Compute the load shared by each transformer when several transformers operate in parallel
				CO3	Understand The concept of a three phase Induction motor
				CO4	Draw the circle diagram of a three phase Induction motor and predetermine the performance
				CO5	characteristics Determine the starting torque, maximum torque, slip at maximum torque using given data
	4	ELECTRICAL POWER GENERATING SYSTEMS	15A02402	**CO1**	Estimate the coal requirement, cost per kWh generation and number of units generated for thermal power station
				CO2	Estimate the required flow of river water, cost of generation and number of units generated in hydel power generation and Nuclear power generation
				CO3	Identify Solar and Winds energy as alternate form of energy and to know how it can be tapped
				CO4	Identify bio gas generation and its impact on environment and Understand the Geothermal &Tidal energy, its mechanism of production and its applications.

				CO5	Evaluate various factors like load factor, plant factor and the tariffs to be charged for the consumers,Plot the load curve, load duration curve and hence determine the load capacity of the plant.
	5	ANALOG ELECTRONIC CIRCUITS	15A04409	**CO1**	Analyzing the Methods of biasing transistors & Design of simple amplifier circuits.
				CO2	Understanding the Mid – band analysis of amplifier circuits using small - signal equivalent circuits to determine gain, input impedance and output impedance.
				CO3	Method of Apply & calculating cutoff frequencies and to determine bandwidth.
				CO4	Design and analyze different Oscillator circuits.
				CO5	Design and creating the circuits for linear wave shaping and Multi-vibrators
	6	ELECTROMAGNETIC FIELDS	15A02403	**CO1**	The knowledge to understand the concepts of electrostatic charges and its field's analysis.
				CO2	To analyze the behavior of conductors and dielectrics under the influence of electrostatic fields.
				CO3	Capable to understand the concepts of magnetostatic charges and its field's analysis.
				CO4	Able to analyse the and design various types of inductors and concept of magnetic potential.

				CO5	To understand the knowledge of time varying electromagnetic fields by maxwell's equations and uniform plane & wave equations
	7	ELECTRICAL MACHINES LABORATORY – I	15A02404	**CO1**	To Conduct experiments to obtain the no-load and load characteristics of D.C. Generators
				CO2	To Conduct tests on D.C. Generators for predetermination of efficiency
				CO3	To Conduct tests on D.C. motors for predetermination of efficiency
				CO4	To Control the speed of D.C. motor in a given range using appropriate method
				CO5	To Identify the reason as to why D.C. Generator is not building up voltage
	8	CONTROL SYSTEMS & SIMULATION LABORATORY	15A02405	**CO1**	Evaluate the transfer function model for physical systems and control system components
				CO2	Compute the time response of systems and steady state errors
				CO3	Determine the absolute and relative stability of a system using RH and root loci concepts.
				CO4	Analyse the stability of the system and design compensation networks
				CO5	Describe the state variable representation of physical system and solve the state equation
				CO1	To understand the concepts of management its functions, theories of Motivation, Leadership and organization Structures

	1	MANAGEMENT SCIENCE	15A52601	**CO2**	To know about plant location and layout, inventory Management,PLC, channels and ASPM strategies.
				CO3	To tell about the HRM concepts like HRP, Performance appraisal, Employee grievances, Recruitment strategies , Training and Development.
				CO4	To know about the Corporate Planning process, Environmental scanning, SWOT analysis, Program Evaluation, Review Technique and Critical Path method.
				CO5	To describe the contemporary management practices like BPR, BPO, Balance score card, six-sigma, Total Quality Management
	2	POWER SEMICONDUCTOR DRIVES	15A02601	**CO1**	To choose the suitable drive system for particular application and analyze the single phase and three phase rectifiers fed DC motors.
				CO2	To understand the multi quadrant operation of dc motor and analyze the various electrical braking schemes with suitable dual converters.
				CO3	Able to control and analyse the drive operation in single, two and multi quadrants with suitable chopper circuits.
				CO4	Understand and apply the concept of control of induction motor by various control strategies and suitable converters.

				CO5	Understand and apply the concept of control of induction motor by various control strategies and suitable converters.
	3	POWER SYSTEM PROTECTION	15A02602	**CO1**	Explain the principles of operation of various types of electromagnetic relays, Static relays as well as Microprocessor based relays
				CO2	Apply the basic relays for the protection of generators and Transformers.
				CO3	Apply various types of protective schemes used for feeders and bus bar protection.
				CO4	Solve numerical problems concerning the arc interruption and recovery in circuit breakers and Understand the principles of operation of various types of circuit breakers
				CO5	Explain the different types of over voltages appearing in the system, including existing protective schemes required for insulation co–ordination
	4	MICROPROCESSORS & MICROCONTROLLER	15A04601	**CO1**	To understand the basic Concepts and Architecture of 8086 Microprocessor .
				CO2	To understand various 8086 Instruction set,Assembler directives and able to programming with 8086.
				CO3	To understand the basic concepts of MSP 430 microcontroller and embedded systems on it.

III YEAR II SEM		S		**CO4**	To under stand the concepts of low power aspects of MSP 430 ,RTC,PWM control,ADC and comparator in MSP 430.
				CO5	To understand the concepts of serial,synchronous,Asynchronous communications and different inter facing using MSP 430.
	5	POWER SYSTEM ANALYSIS	15A02603	**CO1**	To Explain the basics and form of Zbus and Ybus of a given power system network..
				CO2	To Apply computational models for symmetrical and unsymmetrical fault conditions in Electrical power systems
				CO3	To Distinguish between different types of buses used in load flow solution.
				CO4	To Evaluate load flow studies on a given power system
				CO5	To Determine the transient stability by equal area criterion and steady state stability limit
	6	PROGRAMMABLE LOGIC CONTROLLER & ITS	15A02605	**CO1**	Program a PLC for a given application
				CO2	Implement Ladder logic for various Industrial applications
				CO3	Design control circuits for various applications
				CO4	PLC logic and arithmetic operations
				CO5	PLC Installation, Troubleshooting and Maintenance
		MICROPROCESSORS		**CO1**	Can Ensure the completely use of MASM programming environment.
				CO2	Debug assembly language programs using 8086 assembler.

7	MICROPROCESSORS & MICROCONTROLLERS LABORATORY	5A04607	**CO3**	Analyze the interfacing between external peripherals and 8086 microprocessor using development kit.
			CO4	Debug msp430 assembly language programs using CCS
			CO5	Analyze the interfacing between external peripherals and MSP 430 microcontroller using development kit.
8	POWER ELECTRONICS & SIMULATION LABORATORY	15A02607	**CO1**	The study of various power electronic devices and their commutation circuits
			CO2	The voltage and current characteristics of various converters and inverters at different
			CO3	
			CO4	firing angles
			CO5	The study of different types converters and inverters with different types of loads
			CO-4	Analyze the TPS7A4901, TPS7A8300 and TPS54160 buck regulators,
			CO-5	The PSPICE/PSIM programming for various power electronic devices
9	ADVANCED ENGLISH LANGUAGE & COMMUNICATION SKILLS	15A52602	**CO1**	Choose suitable vocabulary and use appropriately in day-to-day communication and Understand how reading enhances their communicative competency.
			CO2	Selectsuitable formats and formulate resumes, formal reports, official e-mails.
			CO3	Simplify the language and give Effective presentations and Justify the objective of presentations..

		SKILLS		**CO4**	Demonstrate their ideas effectively during GDs, Debates and maximize the chances of selection in job interviews.
				CO5	Develop all-round personalities with a mature outlook to function effectively in different circumstances.
	1	INSTRUMENTATION	15A02801	**CO1**	To Identify and explain the types of errors occurring in measurement systems.
				CO2	To Differentiate among types of data transmission and modulation techniques.
				CO3	To Explain the working principles of different signal analyzers and Digital meters
				CO4	To Apply digital techniques to measure voltage, frequency and speed
				CO5	To Choose suitable transducers for the measurement of non-electrical quantities.
	2	ENERGY RESOURCES & TECHNOLOGY	15A02805	**CO1**	Understand different types of sources of energy
				CO2	Estimate the coal requirement and number of units generated in Hydel power generation and Nuclear power generation.
				CO3	Identify Solar and Winds energy as alternate form of energy and to know how it can be tapped

IV YEAR II SEM				**CO4**	Identify bio gas generation and its impact on environment and Understand the Geothermal &Tidal energy, its mechanism of production and its applications.
				CO5	Understand energy storage and economy
	3	Technical Seminar	15A02807	**CO1**	Spell for basic concepts of science and technology
				CO2	Contrast the understanding perceptive of techniques applicable to their
				CO3	Construct the solutions upon their own knowledge
				CO4	Improve their Presentation and Communication skills
				CO5	Make up them to pursue their placements and higher studies
	4	Project Work	15A02808	**CO1**	Apply knowledge to generate, develop, and evaluate ideas and information to solve the problem in the area of Electrical and Electronics Engineering
				CO2	Identify the basic requirements for the design of application and propose
				CO3	Apply appropriate techniques, resources, modern engineering and IT tools
				CO4	Develop the skills to communicate effectively
				CO5	Construct collaborative skills through working in a team to achieve common

HEEED