Gayatri Vidya Parishad College of Engineering for Women
Madhurawada, Visakhapatnam
(Affiliated to JNTUK, Approved by AICTE, New Delhi)

Department of Electrical and Electronics Engineering

B.Tech (EEE) Course Outcomes(R16)

1st Semester
Theory Courses

Course Code	Course Title	Course Outcomes	
C111	English – I	CO1	Develop an understanding of the service that can be rendered through the human resources to the society and acquire knowledge of familial relationships portrayed in "An Ideal Family".
		CO2	Develop awareness and importance of road safety and relate the pain and hopelessness that war brings in the lives of ordinary people.
		CO3	Evaluate and to perceive the advantages and disadvantages of technology and show that courage and determination can triumph all obstacles.
		CO4	Plan alternatives to the depleting sources and to choose suitable sources of energy for rural India and distinguish between reality and illusion, to overcome the superstious beliefs.
		CO5	Build on the fact that the animal must be preserved because animal life is precious and analyse the tragedy that unplanned development can ensue.
		CO6	Apply safety measures at home, workplace, labs, industries by following safety measures and evaluate the complex issue prevails in racism and slavery.
C112	Mathematics - I	CO1	Solve the first order, first degree differential equations and apply the techniques to engineering applications.
		CO2	Solve the higher order differential equations with constant coefficients and apply it to solve physical situations whose behaviour can be described by Linear D.E.
		CO3	Determine Laplace Transforms of various functions and apply it to solve linear ODE with initial conditions.

		CO4	Utilize multivariate differential calculus concepts to determine the extrema of multivariable functions.
		CO5	Solve the linear and non linear partial differential equations of first order.
		CO6	Classify and solve the higher order linear/non-linear partial differential equations with constant coefficients.
C113	Applied Chemistry	CO1	Understand the preparation, properties, advantages and limitations of plastic materials and relate the ideas to engineering applications
		CO2	Compare and relate the advantages, limitations of different fuels with the computational air requirements for combustion.
		CO3	Make use of electrochemical reactions in understanding the construction and working of batteries and further gain knowledge of corrosion control
		CO4	Utilize fundamentals of applied chemistry to acquire knowledge of advanced materials and their applications
		CO5	Apply the basics of solid state chemistry in understanding the structure and properties of crystalline solids
		CO6	Gain knowledge regarding non-conventional energy sources and compare their advantages and limitations
C114	Engineering Mechanics	CO1	Understand the concepts of moment, friction and its applications
		CO2	Analyze the given physical problem for finding the unknown reaction forces by using equilibrium equations & graphical method
		CO3	Determine the centroid and centre of gravity of the given plane area and solid body
		CO4	Estimate area and mass moment of inertia of a plane area and solid body
		CO5	Evaluate the displacement, velocity and acceleration of a particle subjected to rectilinear and curvilinear motion & methods of representing plane motion
		CO6	Apply work energy principle, impulse momentum principle for connected systems
C115	Computer Programming	CO1	Outline the basic terminology of computer programming and illustrate to write, compile & debug a C-program.
		CO2	Make use of basic C- programming language constructs to build C-programs.
		CO3	Develop C-programs by utilizing various control

			structures.
		CO4	Classify modular programming techniques to implement C-programs.
		CO5	Build C-programs by using data structures like arrays, strings.
		CO6	Make use of pointers and different derived data structures to solve problems in C.
C116	Environmental Studies	CO1	Outline global environmental challenges, initiatives towards sustainable development, understand the concept of the ecosystem and its importance
		CO2	Demonstrate an understanding about natural resources and recognize the need to conserve them
		CO3	Explain biodiversity, identify threats to biodiversity and the conservation methods
		CO4	Categorize and explain different types pollution, their causes, impacts, control measures and waste management practices
		CO5	Identify social issues pertaining to environment and gain knowledge about various environmental legislations
		CO6	Examine and understand the concept of environmental impact assessment, environmental audit and its importance

Laboratory Courses

Course Code	***Course Title***	***Experiment No***	***CO. No.***	***Course Outcomes***
C117	Applied / Engineering Chemistry Laboratory	2&3	CO1	Make use of experimental skills for volumetric titrations and perform acid - base titrations using indicators
		4, & 16	CO2	Demonstrate an understanding of redox titrations like permanganometry and estimation of vitamin c in different samples
		7,8 &15	CO3	Apply the principles of complexometric titrations to determine hardness of water, amount of Zinc and Copper using EDTA in the given samples
		9,10,11, 12,13,& 14	CO4	Perform Experiments with instruments such as conductometer, pH meter to acquire skills of conductometric titrations and chemical analysis

		5 &6	CO5	Estimate the amount of Ferrous Iron in the sample using Potassium Dichromate using the principles of oxidation - reduction titration
C118	English-Communication Skills Laboratory - I	1,2	CO1	Apply the skill of making inquiries on the phone, thanking and responding to thanks.
		3,4	CO2	Develop responding to requests, requesting, asking for permission, giving and refusing permission, asking for and giving directions.
		5,6	CO3	Make use of language skills for inviting, accepting, declining invitations, congratulating, making and responding to complaints.
		7,8	CO4	Identify the relationship between letters and sounds.
		9,10	CO5	Develop pronunciation, stress and intonation.
C119	C Programming Laboratory	1,2	CO1	Make use of basic C-programming language constructs and practice logical ability to solve problems in Linux Environment.
		3,4,5,6,7	CO2	Solve problems by using control structures and modularity.
		8,9,12	CO3	Build programs using basic data structures include arrays, structures.
		10,11	CO4	Apply pointers and dynamic memory allocation for dealing real world problems.
		13,14,15,16	CO5	Utilize files and Strings for developing C-programs.

2nd Semester

Theory Courses

Course Code	Course Title	Course Outcomes	
C121	English – II	CO1	Make use of the greatest resource, education and follow Dr.A.P.J's simple life and service to the nation. Develop the skill of writing official letters.
		CO2	Develop peaceful co existence and universal harmony and have deep insight on the achievements of Sir C.V.Raman. apply e-correspondence in professional field.
		CO3	Analyse the symptoms of cultural shock and aftermath

			consequences due to globalization and assimilate the contributions of H.J.Bhabha. Plan speech writing.
		CO4	Assess the theme which the society needs to re-examine its traditions when they are outdated and acquire the knowledge of discoveries and inventions made by J.CBose. Understand the structure of the text.
		CO5	Categorize several health disorders due to climatic change and recommend protective environment for the sustainability of the future generations and develop insight into the contributions of P.C.Ray. Make use of technical writing for the media.
		CO6	Relate eminent personalities, who toiled for the present day advancement in software field and perceive Ramanujan innate talent. Develop report writing skills.
C122	Mathematics – II (Mathematical Methods)	CO1	Solve algebraic, transcendental and simultaneous equations using numerical methods like Bisection, False-Position, Iterative and Newton Raphson method.
		CO2	Construct an interpolating polynomial for the given data and estimate the value of an unkown function at a given point using Newton forward, backward, Gauss forward, backward and Lagrange interpolation formulae.
		CO3	Evaluate definite integrals using Quadrature formula, and solve the ordinary differential equations numerically using Taylor, Picard, Euler's and RK methods.
		CO4	Find Fourier Series of an arbitrary function over a given range.
		CO5	Utilize the method of separation of variables to One dimensional wave, heat and two dimensional Laplace equations.
		CO6	Determine the Fourier Transform, sine, cosine transforms and their Inverse transforms of given function and evaluate integrals using Fourier integral theorem.
C123	Mathematics – III	CO1	Determine the rank of a matrix and Solve linear system of equations using Rank and iterative methods
		CO2	Determine Eigen values and Eigen vectors of a matrix and apply the concept to examine the nature of quadratic forms
		CO3	Explain the concepts of curve tracing, double and triple integrals and apply them to determine areas and volumes.
		CO4	Examine the properties of Beta and Gamma functions and

			apply them to solve improper integrals.
		CO5	Apply vector differential operator on scalar and vector point functions and determine directional derivative, angle between two surfaces.
		CO6	Determine the work done using Line Integrals and evaluate line, surface and volume integrals using Green's Theorem, Stoke's Theorem and Gauss Divergence theorem.
C124	Applied Physics	CO1	Utilize the concepts of interference of light in understanding the optical systems and apply the principle in observing the formation of interference pattern in thin films.
		CO2	Distinguish the different types and understand the resolving power of optical instruments through various slit pattern effects of diffraction.
		CO3	Understand the concepts of polarization types and conversion by studying wave plates and polarimeter and further understand working principle of lasers.
		CO4	Understand the basic principles of electromagnetic fields that predict the possibility of electromagnetic waves.
		CO5	Explain and apply the fundamentals of quantum mechanics to a particle in one dimensional potential box and to study the conductivity of free electrons in solids.
		CO6	Infer the mechanism of electrical conduction in solids, especially the semiconductors which are the basic materials for electronic devices.
C125	Electrical Circuit Analysis - I	CO1	Outline and apply the basic concepts, laws for analyzing DC electric circuits
		CO2	Explain the Concept of duality and graph theory approach to solve the electrical networks.
		CO3	Develop electrical equivalent for magnetic circuits and solve the magnetic circuit using Dot convention.
		CO4	Summarize the basic concepts of AC electric circuits
		CO5	Outline the performance of AC circuits under resonance conditions
		CO6	Make use of network theorems for analyzing the electrical circuits

C126	Engineering Drawing	CO1	Make use of graphic representation as per standards and to construct polygons, ellipse and scales.
		CO2	Identify and draw the orthographic projection of points & straight lines placed in various quadrants
		CO3	Identify and draw the projection of straight lines inclined to both the planes
		CO4	Identify and draw the projection of planes inclined to both the planes.
		CO5	Plan and draw the projection of solids in different positions & inclined to one of the planes.
		CO6	Interpret orthographic and isometric views of objects.

Laboratory Courses

Course Code	*Course Title*	*Experiment No*	*CO. No.*	*Course Outcomes*
C127	English-Communication Skills Laboratory - II	1,2	CO1	Build the basics of debating, presenting their views, arguing and counter arguing.
		3,4	CO2	Plan and prepare for a Group Discussion
		5,6	CO3	Organise and structure the content of a presentation.
		7,8	CO4	Make use of C.V for interviews, face interviews confidently and develop official emails.
		9,10	CO5	Apply idiomatic expressions in usage and avoid common errors in English.
C128	Applied / Engineering Physics Laboratory	4,5	CO1	Determine the elastic modulus of given material and Moments of inertia of various types of pendulums
		1,2,3	CO2	Operate optical instruments (Spectrometer and travelling microscope) to understand principles of interference and diffraction of light
		6	CO3	understand the modes of mechanical vibrations and determine their frequency.
		13	CO4	Apply tangent law to study the variation of magnetic fields due to current carrying conductors
		10,11,12, 14	CO5	Estimate the Energy band gap , thermal coefficients of resistance for semiconductors and understand the volt - ampere characteristics of diodes
C129	Engg.Workshop	5,6,7	CO1	Select tools required for getting required shape and size

	& IT Workshop	,8		of the object for black smithy operations and Compare process of least wastage of material and economy in process.
		1,2,3 ,4	CO2	Prepare various joints with the available work materials i.e with wood, M.S flats.
		9,10, 11	CO3	Understand and connects different circuits in house wiring. Further, Identify parts/peripherals of CPU and experiment with system assembling and disassembling, OS installation and Make use of MS office tools to prepare different types of documents.
		1,2,3 ,4,5, 6	CO4	Experiment with Network configuration, Soft ware installation, Internet, Trouble shooting
		7,8	CO5	Model various graph plots using MATLAB and understand basic commands, subroutines of MATLAB and Utilize LATEX to do basic formatting, handling equations and images.

3rd Semester

Theory Courses

Course Code	Course Title	Course Outcomes	
C211	Electrical Circuit Analysis-II	CO1	Analyze three phase circuits under balanced condition.
		CO2	Analyze three phase circuits under unbalanced condition.
		CO3	Evaluate the transient response of electrical networks for different types of excitations.
		CO4	Determine the parameters of two port networks.
		CO5	Assess electrical equivalent network for a given network transfer function.
		CO6	Estimate different harmonic components from the response of an electrical networks.
C212	Electrical Machines-I	CO1	Understand the fundamental principles and control practices associated with DC Machines.
		CO2	Analyze performance and operational problems of the D.C.Machines and suggest the remedial measures to solve them.
		CO3	Test, Measure and provide valid conclusions on the performance of DC Machines using the tools or equipment.
		CO4	Analyze the performance of single phase transformers.

		CO5	Solve regulation, losses and efficiency of single phase transformers.
		CO6	Understand the concepts of voltage control with tap changing methods and achieve three-phase to two-phase transformation.
C213	Basic Electronics And Devices	CO1	Understand the basic concepts of semiconductor physics, which are useful to understand the operation of diodes and transistors.
		CO2	Explain the operation and characteristics of PN junction diode and special diodes.
		CO3	Understand operation and design aspects of rectifiers and regulators.
		CO4	Understand the characteristics of various transistor configurations. Familiarize with different biasing, stabilization and compensation techniques used in transistor circuits.
		CO5	Understand the basic operation and characteristics of FET, Thyristors, Power IGBTs and Power MOSFETs.
		CO6	Understand the merits and demerits of positive and negative feedback and the role of feedback in oscillators and amplifiers.
C214	Electro Magnetic Fields	CO1	Summarize the laws of Electrostatics and apply them in electrostatic field.
		CO2	Model the capacitance for different configurations and understand the properties of dielectrics.
		CO3	Summarize the laws of Magneto statics and apply them in static magnetic field.
		CO4	Analyze the force experienced by charged bodies in magnetic field.
		CO5	Determine the self and mutual inductances and energy stored in magnetic fields.
		CO6	Analyze the time varying field and understand Faradays Laws of Electromagnetic Induction.
C215	Thermal and Hydro Prime movers	CO1	Classify internal combustion engine and Evaluate the performance of IC engines.
		CO2	Identify the basic components of steam turbines and determine the performance of steam turbine using velocity diagrams.
		CO3	Analyze the different methods for improving the efficiency of gas turbines.

		CO4	Apply the concepts of momentum equation for finding the forces acting on the vanes of the turbines, centrifugal pump.
		CO5	Understand working of various types of hydraulic turbines and determine the performance of hydraulic turbines.
		CO6	Understand the working of hydro electric power plant and estimate the different loads in hydro electric power plant.
C216	Managerial Economics And Financial Analysis	CO1	Learn the concepts of Managerial Economics and utilize the demand forecasting methods to predict demand of a product.
		CO2	Make use of Production function & economies of scale and assess the BEP of their own business.
		CO3	Understand the concepts of competitive market situations.
		CO4	Classify the types of business organizations and identify the stages of business cycles to improve the organizations.
		CO5	Analyze accounting concepts to prevent loss for the organization.
		CO6	Identify the sources of raising capital for business undertaking.

Laboratory Courses

Course Code	Course Title	Experiment No	Course Outcomes	
C217	Thermal and Hydro Lab	1,5	CO1	Understand the working of two stroke engine, four stroke engine and boiler
		2,3,4	CO2	Evaluate the performance parameter of two stroke petrol engine, four stroke diesel engines
		6	CO3	Apply the concepts of Impulse momentum equation for finding the forces acting on the vanes and compare theoretical and actual force values
		10,11	CO4	Determine the coefficient of discharge for Venturimeter, Orifice meter
		7,8,9	CO5	Analyze the performance characteristic curves of different turbines and centrifugal pump
C218	Electrical Circuits Lab	1,2,3,4	CO1	Analyze the different Network Theorems
		5	CO2	Test for Series and Parallel Resonance
		6	CO3	Determine the self inductance, mutual inductance and coefficient of coupling of a given transformer.

		7,8	CO4	Determine the different two port network parameters
		9,10	CO5	Measure the powers in three phase circuits and parameters of choke coil.

4th Semester

Theory Courses

Course Code	Course Title	Course Outcomes	
C221	Electrical Measurements	CO1	Select suitable instrument for measurement of voltage and current for AC and DC applications.
		CO2	Summarize the instruments for measurement of power and energy.
		CO3	Outline the working principle and calibration of DC and AC potentiometers.
		CO4	Analyze the various types of bridges for measurement of resistance,inductance,capacitance and frequency.
		CO5	Demonstrate the operation of ballistic galvanometer and flux meter for magnetic measurements.
		CO6	Summarize the operation of CRO and digital instruments.
C222	Electrical Machines-II	CO1	Outline the principle of operation and performance of three phase induction motor.
		CO2	Interpret the torque-speed relation and explain speed control, starting and testing methods of induction motor.
		CO3	Summarize the torque producing mechanism of a single phase induction motor.
		CO4	Summarize the performance characteristics of synchronous generators.
		CO5	Outline the parallel operation of synchronous generators when connected to an infinite bus.
		CO6	Summarize the operation, performance and starting methods of synchronous motors.
C223	Switching Theory and Logic Design	CO1	Represent signed binary numbers using different number systems and binary codes.
		CO2	Apply Boolean algebra, K-maps and Tabular method to minimize logic functions
		CO3	Make use of combinational circuits to implement combinational logic functions
		CO4	Develop combinational circuits using PLD's.

		CO5	Develop different types of counters and registers using flip-flops.
		CO6	Model minimized Finite State Machines.
C224	Control Systems	CO1	Develope the transfer function using block diagram algebra and signal flow graph methods.
		CO2	Evaluate the time response specifications of second order systems and its error constants.
		CO3	Analyze the stability of LTI systems using Routh's stability criterion and the Root locus method.
		CO4	Analyze the stability of LTI systems using frequency response methods.
		CO5	Design Lag, Lead, Lag-Lead compensators to improve system performance from Bode diagrams.
		CO6	Develop the state models to solve time invariant state equations and outline the concepts of controllability and observability of control systems.
C225	Power Systems-I	CO1	Summarize the operation of thermal power plant.
		CO2	Outline the operation and safety measures of nuclear power plant.
		CO3	Compare DC & AC distribution systems and determine voltage drops in distribution systems.
		CO4	Classify and summarize the construction details of a substation.
		CO5	List the types and outline the construction details of cables.
		CO6	Outline various economic aspects and tariff methods of power generation.
C226	Management Science	CO1	Appraise the practices of management concepts in the business environment and evaluate various types of organization structures.
		CO2	Identify the production management practices and distinguish the different stock levels of an organization.
		CO3	Prepare an appropriate marketing mix and determine the recruitment process in global competitive environment.
		CO4	Evaluate the project process on the basis of costs and time.
		CO5	Recognize and analyze the strategies of the firm and can re discover the SWOT of themselves.
		CO6	Understand and develop the contemporary management practices such as MIS, MRP, TQM,ERP, BPO and assess the changing business environment.

Laboratory Courses

Course Code	Course Title	Experiment No	Course Outcomes	
C227	Electrical Machines - I Lab	2,3,4	CO1	Determine the performance of DC machines and transformer by Direct and Indirect test methods.
		1	CO2	Identify different conditions required to be satisfied for self – excited DC Generators.
		5	CO3	Examine the different methods of speed control of a DC machine.
		9	CO4	Examine the load sharing between two parallel connected transformers.
		6,7,8, 10	CO5	Determine the losses in a DC machine and Transformer by different test methods.
C228	Electronic Devices & Circuits Lab	1,2,3	CO1	Analyze the characteristics of P-N junction diode and Zenerdiode. Build the rectifier circuits and regulator circuits using diode.
		4,5	CO2	Analyze the operation and characteristics of BJT and FET in different configurations, which can be used in the design of amplifiers.
		7	CO3	Understand the operation of unipolar junction transistor by examining UJT for its characteristics.
		8	CO4	Design the biasing circuits for transistor.
		9,10,11	CO5	Design amplifier circuits using BJT and FET. Find the frequency response of amplifier to determine its bandwidth.

5th Semester

Theory Courses

Course Code	Course Title	Course Outcomes	
C311	Power Systems-II	CO1	Evaluate the transmission line parameters for various types of transmission line configuration.
		CO2	Classify transmission lines and determine the performance of short and medium transmission lines.
		CO3	Summarize the performance of long transmission lines.

		CO4	Infer about surge behavior of transmission lines for different types of line termination.
		CO5	Outline the various factors governing the performance of transmission lines.
		CO6	Summarize the concepts of mechanical design and selection of suitable insulators for transmission lines.
C312	Renewable Energy Sources	CO1	Analyze solar radiation data for extraterrestrial radiation and radiation on earth surface.
		CO2	Classify and compare Solar thermal collectors.
		CO3	Make use of MPPT methods to model solar photo voltaic systems.
		CO4	Determine Betz coefficient, tip speed ratio and MPPT methods for Wind Energy Systems.
		CO5	Understand the basic principle and working of various types of hydro, tidal , wave and OTEC systems.
		CO6	Understand the basic principle and working of types of Biomass, Geothermal systems and fuel cells.
C313	Signals & Systems	CO1	Characterize the signals and systems and build the analogy between vectors & signals to develop the Fourier series concept.
		CO2	Make use of the Fourier concept to analyze the spectral characteristics for different classes of signals.
		CO3	Explain the process of sampling and reconstruction of signal.
		CO4	Outline the concepts of convolution & Correlation to examine the response of LTI systems.
		CO5	Apply the Laplace transform to analyze continuous LTI systems.
		CO6	Apply the Z- transform to analyze DT LTI systems .
C314	Pulse & Digital Circuits	CO1	Explain the response of linear wave shaping circuits to various non sinusoidal inputs.
		CO2	Extend the applications of diodes and transistors to non-linear wave shaping case.
		CO3	Construct the Collector and Emitter Coupled Bistable Multivibrators for the given specifications.
		CO4	Make use of basic electronic components to design monostable and astable multivibrators.
		CO5	Explain the operation of different time base generators.
		CO6	Compare the working mechanism of logic gates in different

			logic families.
C315	Power Electronics	CO1	Summarize the characteristics of power semiconductor devices and designof firing circuits for SCR.
		CO2	Analyze the performance of single phase controlled converters for R , RL and RLE loads.
		CO3	Analyze the performance of three phase controlled converters.
		CO4	Summarize the operation DC-DC converters.
		CO5	List the advantages of the inverters and summarize its operation.
		CO6	Summarize the operation AC-AC converters.
C319	IPR & Patents	CO1	Outline concept of Intellectual property rights, IPR tool kit and its importance in the global scenario.
		CO2	Demonstrate an understanding about copyright protection, the registration process and legal remedies available in case of infringement.
		CO3	Explain and gain knowledge on patents, steps for registration and recent developments in patent system.
		CO4	Utilize the concept of Trademark, their registration, infringement and related laws.
		CO5	Make use of principles of trade secrets and laws of unfair competition.
		CO6	Apply the information gained on cyber laws and cyber - crimes in the domain of e-commerce and data security.

Laboratory Courses

Course Code	Course Title	Experiment No	Course Outcomes	
C316	Electrical Machines-II Lab	1,2	CO1	Determine and predetermine the performance of three phase Induction motor.
		3,4	CO2	Predetermine the regulation of three–phase alternator by various methods.
		8	CO3	Start and speed control of the three phase Induction motor.
		5,6,9	CO4	Analyze the performance of three phase synchronous machine.
		7,10	CO5	Assess and improve the performance of single phase

				induction motor.
C317	Control Systems Lab	2,8,9, 10	CO1	Analyze the performance and working of Magnetic amplifier, Synchro, D.C. servo motor and A.C. Servo motor.
		1	CO2	Determine the transient response of Second order system.
		4,5,7	CO3	Examine the Effect of P, PD, PI, PID Controllers and compensators on second order systems.
		3	CO4	Analyze the performance of D.C servo motor with the effect of feedback.
		6	CO5	Determine the transfer function of D.C. Motor.
C318	Electrical Measurements Lab	1,8	CO1	Test for calibration of energy meter and wattmeter using Direct loading.
		4,5,6	CO2	Measure Resistance, inductance and Capacitance using different bridges.
		3	CO3	Test for calibration of voltmeter and ammeter using DC Potentiometer.
		7,9,10	CO4	Measure the Active Power & reactive power using Direct loading.
		2	CO5	Calibration of dynamometer wattmeter using indirect loading.

6th Semester

Theory Courses

Course Code	Course Title	Course Outcomes	
C321	Power Electronic Controllers & Drives	CO1	Summarize the concept of load torque, dynamics of electric drive, four quadrant operation and braking methods.
		CO2	Analyze speed control and their characteristics of converter fed drives.
		CO3	Analyze speed torque characteristics of chopper fed dc drives under motoring & braking conditions.
		CO4	Summarize the performance of power converter fed induction motor from stator side.
		CO5	Assess the performance of induction motor using slip power recovery schemes.
		CO6	Summarize the operation of power converter fed synchronous motor drives.
C322	Power System	CO1	Develop the Impedance Diagram in (p.u) and Construct the Ybus matrix for a Power System by singular transformation and direct inspection method.

	Analysis	CO2	Summarize the load flow solutions for Power System using various types of Power Flow Methods.
		CO3	Develop the Zbus matrix for a Power System by element by element method.
		CO4	Determine the fault current for 3 phase short circuit conditions of a power system and to provide data for the design of protective devices.
		CO5	Analyze the sequence components of currents for unbalanced power system network.
		CO6	Analyze the steady state, transient and dynamic stability concepts of a Power System.
C323	Microprocessors & Microcontrollers	CO1	Comprehend the architecture of 8086 microprocessor and explore the evaluation of Intel family microprocessors.
		CO2	Understand the operating modes, instruction set and process time details of 8086 microprocessor.
		CO3	Summarize the interfacing methodologies of various peripherals with 8086 microprocessor.
		CO4	Identify the features of microcontroller; understand the instruction set and onboard peripherals of 8051 microcontroller.
		CO5	Outline the features of PIC18 microcontroller architecture.
		CO6	Apply C language programming skills to perform logical and Input/Output operations with PIC18.
C324	Data Structures	CO1	Relate the concept of Abstract Data type with Arrays and Strings
		CO2	Apply data structures like stacks and queues to Solve various real time computing problems
		CO3	Develop algorithms using linear data structures to Solve real world problems.
		CO4	Utilize non-linear data structure such as trees to Solve various computing problems.
		CO5	Apply various non-linear data structures such as graphs on various computing problems.
		CO6	Make use of searching and sorting techniques to Solve computing Problems.
C325	Energy Audit and Conservation& Management(op	CO1	Summarize the schemes of energy conservation ,concept of energy audit and management.
		CO2	Outline the types of energy efficient lighting systems.
		CO3	Determine the factors to increase the efficiency of electrical equipment.

	en elective)	CO4	Summarize the energy conservation methods of HVAC systems.
		CO5	Apply suitable methods to estimate the economic benefits of conservation, management and auditing of energy.
		CO6	Summarize the concepts of simple payback period and life cycle cost analysis.
C329	Professional Ethics & Human Values	CO1	Apply the moral template inculcatingthe core human values for transformation into an ethical human being.
		CO2	Utilize the principles of harmony, value education and human virtues for professional competency.
		CO3	Explain and understand the role of engineering ethics and code of conduct for development of professionalism.
		CO4	Evaluate the responsibility and accountability of a professional engineer towardsdesign, operation, safety, by adopting risk benefit analysis.
		CO5	Judge issues pertaining to individual rights, collegiality, moral dilemmas and conflicts while discharging their professional duties.
		CO6	Analyse cross cultural issues in different ethical domains by acquiring knowledge on intellectual property rights in the context of globalization.

Laboratory Courses

Course Code	Course Title	Experiment No	Course Outcomes	
C326	Power Electronics Lab	1,2,3	CO1	Summarize the characteristics of power semiconductor devices and design of firing circuits for SCR.
		4,5	CO2	Analyze the performance of single phase controlled converters for R and RL loads.
		6	CO3	Summarize the operation of AC-AC converters.
		8	CO4	Analyze the performance of three phase controlled converters.
		7,9,10	CO5	Summarize the operation of AC-DC Converters and DC-DC converters.
C327	Microprocessors & Microcontrollers Lab	1,2	CO1	Develop basic assembly language programs based on arithmetic, logical, and shift operations using 8086 microprocessor.
		3	CO2	Develop assembly language programs based on string operations using 8086 microprocessor.
		4,5,6,7	CO3	Develop standalone applications by Interfacing I/O peripheral

				devices with 8086 microprocessor.
		8,9,10	CO4	Develop parallel and serial communication using 8051 and PIC microcontrollers.
C328	Data Structures Lab	3,4	CO1	Develop programs on Stack ADT and Queue ADT.
		1,2	CO2	Construct C programs on Linear Data Structures like Single Linked List and Double Linked List Operations.
		5,6,7	CO3	Build C programs on nonlinear Data Structures like Heaps, Hash, Binary Search Trees.
		8,9,10,11,12	CO4	Make use of Graphs to Develop C programs to like Graphs Traversal Algorithms, Minimum Spanning tree Algorithm.
		13,14,15	CO5	Develop C programs for several recursive non recursive Sorting and searching Techniques.

7th Semester

Theory Courses

Course Code	Course Title	Course Outcomes	
C411	Utilization of Electrical Energy	CO1	Select a suitable motor for electric drives and industrial applications.
		CO2	Identify the most appropriate heating or welding technique for suitable applications.
		CO3	Interpret various levels of illumination produced by different illuminating sources.
		CO4	Estimate the illumination levels produced by various sources and recommend the most efficient illuminating sources.
		CO5	Determine the speed-time characteristics of different types of Electric traction services.
		CO6	Evaluate energy consumption levels at various modes of operation.
C412	Linear IC Applications	CO1	Outline the basic operation and performance parameters of differential amplifiers.
		CO2	Demonstrate the measuring techniques for performance parameters of OP-AMP.
		CO3	Construct different linear and non-linear circuits using OP-

			AMPs.
		CO4	Analyze and design amplifiers and active filters using OP-AMPs.
		CO5	Develop applications by making use of different analog ICs.
		CO6	Construct different types of DAC's and ADC's using OP-AMP.
C413	Power System Operation & Control	CO1	Determine the optimal scheduling of Generators.
		CO2	Outline the Hydrothermal scheduling.
		CO3	Solve the Unit commitment problems subjected to constraints.
		CO4	Model the Isolated power system for single area and two area system and obtain it's load frequency control.
		CO5	Make use of PID controllers in single area and two area system to find the steady state response.
		CO6	Understand the Importance of Reactive power control and line power compensation.
C414	Switch Gear and Protection	CO1	Make use of the principles of arc interruption to perceive the operation of circuit breakers.
		CO2	Classify and compare different types of electromagnetic protective relays.
		CO3	Illustrate various protection schemes used for transformers and alternator.
		CO4	Examine various types of protection schemes for transmission line and busbar.
		CO5	Distinguish different types of static relays and use the concept for an application to the system.
		CO6	Outline various methods of over voltage protection in power systems.
C415	Instrumentation (Elective I)	CO1	Understand different characteristics and errors of measuring systems , classify the types of signals and modulation schemes.
		CO2	Distinguish active transducers from passive transducers.
		CO3	Develop the ability to use instruments for measurement of physical parameters.
		CO4	Understand the working principle of various types of digital voltmeter.
		CO5	Utilize the design and functioning of Oscilloscopes to measure the phase and frequency.
		CO6	Make use of Signal generators to analyze a signal.
C416		CO1	Outline the operation and analyze performance of switched

	Special Electrical Machines (Elective II)		reluctance motor
		CO2	Explain the performance and control of stepper motors, and their applications
		CO3	Outline the operation and characteristics of permanent magnet dc motor
		CO4	Distinguish between brush dc motor and brush less dc motor
		CO5	Summarize the concepts of travelling magnetic field and their applications
		CO6	Outline the significance of electrical motors for traction drives

Laboratory Courses

Course Code	Course Title	Experiment No	Course Outcomes	
C417	Electrical Simulation Lab	1,4	CO1	Analyze the response of series RLC circuit for different inputs & the stability of systems using Bode plot,Root locus and Nyquist plot.
		2,6	CO2	Simulate transmission line,D.C separately excited motor.
		7	CO3	Determine the equivalent circuit parameters of single phase Transformer and simulate.
		5,9	CO4	Simulate Integrator & differentiator circuit, Buck-Boost converters.
		3,8,10	CO5	Simulate the AC Voltage Controller, full converter and PWM inverter.
C418	Power systems & Simulation lab	1,2,3	CO1	Analyze the performance of Alternator and Transformer under different fault conditions.
		4	CO2	Determine equivalent circuit parameters of the transmission line.
		7,12	CO3	Analyze the steady state and Transient behaviour of the power system.
		10,11	CO4	Determine the economic scheduling of generators with and without transmission losses.
		8,9	CO5	Design the controller to improve frequency stability of power system.

8th Semester

Theory Courses

Course Code	Course Title	Course Outcomes	
C421	Digital Control Systems	CO1	Summarize the concepts of digital control systems and assemble various components associated with it.
		CO2	Apply Z- transforms in the analysis of Digital Control Systems.
		CO3	Evaluate the response for the given discrete time systems. Understanding the concepts of controllability and observability.
		CO4	Outline the stability of the system using various methods.
		CO5	Design discrete- time control systems using conventional methods
		CO6	Estimate the design of state feedback control by "the pole placement method.
C422	HVDC Transmission	CO1	List the types of HVDC levels and basic concepts.
		CO2	Analyze the performance of HVDC Converters.
		CO3	Analyze the power control of HVDC transmission.
		CO4	Develop the control concepts for reactive power control and AC/DC power flow.
		CO5	Summarize the converter faults, protection and harmonic effects.
		CO6	Outline the low pass and high pass filter requirements in HVDC systems.
C423	Electrical Distribution Systems	CO1	Understand the various factors of distribution system.
		CO2	Understand the design considerations of substations and distribution feeders.
		CO3	Determine the voltage drop and power loss in a distribution system.
		CO4	Apply various protective devices and its coordination techniques to distribution system.
		CO5	Understand the effect of compensation on power factor improvement.
		CO6	Make use of the concepts of voltage drop compensation to Identify methods for voltage control.
C424	FACTS: Flexible Alternating Current Transmission	CO1	Summarize the concept of power flow control in transmission lines using FACTS controllers.
		CO2	Outline the differences between VSC and CSC.
		CO3	Apply the shunt compensation methods to improve the stability in the transmission lines.

	Systems (Elective-III)	CO4	Summarize the Shunt compensation methods.
		CO5	Outline the importance of series capacitive compensation.
		CO6	Explain the operating principle and list applications of UPFC and IPfC.
C425	Seminar	CO1	Outline the important concepts to gain factual knowledge.
		CO2	Organise the presentation and disseminate ideas effectively with good communication skills.
		CO3	Develop self learning & time management skills to engage in continuous learning.
		CO4	Synthesize and reflect on to show the depth of knowledge in a compelling, well structured and professional behaviour.
		CO5	Develop writing skills with clarity of thought and expression.
C426	Project	CO1	Demonstrate the technical knowledge to identify problems in the field of Electrical &Electronics Engineering and its allied areas.
		CO2	Analyze and formulate technical projects with a comprehensive and systematic approach.
		CO3	Identify the modern tools to implement technical projects.
		CO4	Design engineering solutions for solving complex engineering problems.
		CO5	Develop effective communication skills, professional behaviour and team work.