ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES – TIRUPATI
AUTONOMOUS
DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING
AK20 Course Outcomes

COURSE NAME	COURSE OUTCOMES	
Algebra and Calculus 20ABS9901	CO1	Develop the use of matrix algebra techniques that is needed by engineers for practical applications.
	CO2	Utilize mean value theorems to real life problems.
	CO3	Familiarize with functions of several variables which is useful in optimization.
	CO4	Students will also learn important tools of calculus in higher dimensions. Students will become familiar with 2- dimensional coordinate systems
	CO5	Students will become familiar with 3- dimensional coordinate systems and also learn the utilization of special functions
Applied Physics 20ABS9902	CO1	Analyzethe wave properties of light and the interaction of energy with the matter.
	CO2	Apply electromagnetic wave propagation in different guided media.
	CO3	Asses the electromagnetic wave propagation and its power in different media
	CO4	Analyze the conductivity of semiconductors.
	CO5	Interpret the difference between normal conductor and superconductor and apply the nanomaterials for engineering applications.
Communicative English 20AHS9901	CO1	Identify the context, topic, and pieces of specific information from social or transactional dialogues spoken by native speakers of English
	CO2	Formulate sentences using proper grammatical structures and correct word forms
	CO3	Speak clearly on a specific topic using suitable discourse markers in informal discussions
	CO4	Write summaries based on global comprehension of reading/listening texts
	CO5	Produce a coherent paragraph interpreting a figure/graph/chart/table
	CO6	Take notes while listening to a talk/lecture to answer questions
Problem Solving and Programming 20AES0501	CO1	Construct his own computer using parts.
	CO2	Recognize the importance of programming language independent constructs
	CO3	Solve computational problems
	CO4	Select the features of C language appropriate for solving a problem.
	CO5	Design computer programs for real world problems.
	CO6	Organize the data which is more appropriated for solving a problem.
Communicative English Lab 20AHS9902	CO1	Remember and understand the different aspects of the English language proficiency with emphasis on LSRW skills
	CO2	Apply communication skills through various language learning activities

	CO3	Analyze the English speech sounds, stress, rhythm, intonation and syllable division for better listening and speaking comprehension.
	CO4	Evaluate and exhibit acceptable etiquette essential in social and professional settings.
	CO5	Create awareness on mother tongue influence and neutralize it in order to improve fluency in spoken English.
Applied Physics Lab 20ABS9907	CO1	Analyzethe wave properties of light and the interaction of energy with the matter.
	CO2	Apply electromagnetic wave propagation in different guided media.
	CO3	Asses the electromagnetic wave propagation and its power in different media
	CO4	Analyze the conductivity of semiconductors.
	CO5	Interpret the difference between normal conductor and superconductor and apply the nanomaterials for engineering applications.
Problem Solving and Programming Lab 20AES0503	CO1	Construct a Computer given its parts
	CO2	Select the right control structure for solving the problem
	CO3	Analyze different sorting algorithms
	CO4	Design solutions for computational problems
	CO5	Develop C programs which utilize the memory efficiently using programming constructs like pointers.
Differential Equations and Vector Calculus 20ABS9906	CO1	Apply the mathematical concepts of ordinary differential equations of higher order.
	CO2	Solve the differential equations related to various engineering fields.
	CO3	Identify solution methods for partial differential equations that model physical processes.
	CO4	Interpret the physical meaning of different operators such as gradient, curl and divergence.
	CO5	Estimate the work done against a field, circulation and flux using vector calculus.
Chemistry 20ABS9904	CO1	Understand the behavior of interactions between mater and energy at both the atomic and molecular levels
	CO2	Compare the materials of construction for battery and electrochemical sensors
	CO3	Understand the preparation, properties, and applications of thermoplastics &thermos settings, elastomers & conducting polymers.
	CO4	HPLC and GC methods used for separation of gaseous and liquid mixtures.
	CO5	Understand the disadvantages of using hard water and select suitable treatments domestically and industrially.
Basics of Civil & Mechanical Engineering 20AES0101	CO1	Understand principles of Stress and Strain.
	CO2	Understand basic principles of Strain Measurement and apply the concepts of Strain Rosettes for strain measurement.
	CO3	Understand common building materials used in construction and analyze characteristics of common building materials
	CO4	Apply velocity ratio concepts in power transmission

	CO5	Understand the principles of CAD, CAM & CIM
Internet of Things (IoT) 20AES0505	CO1	Interpret the vision of IoT from a global context.
	CO2	Determine the Market perspective of IoT.
	CO3	Compare and Contrast the use of Devices, Gateways and Data Management in IoT.
	CO4	Implement state of the art architecture in IoT.
	CO5	Implement state of the art architecture in IoT.
Engineering Graphics 20AES0301	CO1	Draw various curves applied in engineering.
	CO2	Show projections of solids and sections graphically.
	CO3	Draw the development of surfaces of solids
	CO4	Use computers as a drafting tool.
	CO5	Draw isometric and orthographic.
Basics of Civil & Mechanical Engineering Lab 20AES0102	CO1	Impart basic principles of bending test on simply supported beam
	CO2	Understand principles of strain measurement using electrical strain gauges
	CO3	Impart concepts of compression and torsion
	CO4	Apply velocity ratio concepts in power transmission
	CO5	Understand the principles of CAD, CAM & CIM
Chemistry Lab 20ABS9909	CO1	To familiarize the students with the basic concepts of chemistry of materials
	CO2	Prepare advanced polymer materials
	CO3	Measure the strength of an acid present in secondary batteries
	CO4	To familiarize with digital and instrumental methods of analysis
Internet of Things Lab (IoT Lab) 20AES0506	CO1	Choose the sensors and actuators for an IoT application.
	CO2	Select protocols for a specific IoT application.
	CO3	Utilize the cloud platform and APIs for IoT application.
	CO4	Experiment with embedded boards for creating IoT prototypes.
	CO5	Design a solution for a given IoT application.
	CO1	Discuss the growth of the demand for civil rights in India for the bulk of Indians before the arrival of Gandhi in Indian politics.
	CO2	Discuss the intellectual origins of the framework of argument that informed the conceptualization of social reforms leading to revolution in India.

Constitution of India 20AMC9902	CO3	Discuss the circumstances surrounding the foundation of the Congress Socialist Party [CSP] under the leadership of Jawaharlal Nehru and the eventual failure of the proposal of direct elections through adult suffrage in the Indian Constitution.
	CO4	Discuss the Powers and functions of Governor, President, and Judiciary.
	CO5	Discuss the functions of local administration bodies.
Transform Techniques and Complex Variables 20ABS9912	CO1	Find the differentiation and integration of complex functions used in engineering problems
	CO2	Apply the Laplace transform for solving differential equations (continuous systems)
	CO3	Find the Fourier series of periodic signals
	CO4	Know and be able to apply integral expressions for the forwards and inverse Fourier transform to a range of non-periodic waveforms
	CO5	Develop Z transform techniques for discrete time systems
ELECTRICAL CIRCUITS – I 20APC0201	CO1	Given a network, find the equivalent impedance by using network reduction techniques and determine thecurrentthroughanyelementandvoltageacrossandpowerthroughanyelement.
	CO2	Given a circuit and the excitation, determine the real power, reactive power ,power factor etc.
	CO3	Apply the network theorems suitably.
	CO4	Determine the Dual of the Network, develop the Cut Set and Tie-set Matrices for a given Circuit. Also understand various basic definitions and concepts.
ELECTRONIC DEVICES & CIRCUITS 20APC0401	CO1	Understand the operation of diodes and special electronic devices.
	CO2	Know operation of different rectifiers without and filters.
	CO3	Understand construction, operation of BJT, FET in different configurations
	CO4	Know the need of biasing and design of DC biasing circuits.
	CO5	Design of amplifiers with BJTs and FETs by using small signal model
Power Systems – I 20APC0202	CO1	Acquire knowledge on thermal, gas and nuclear power plants operation.
	CO2	Understand the operation of AC and DC distribution systems.
	CO3	Understand the operation of Air Insulated & Gas Insulated (GIS) Substations.
	CO4	Familiarize with voltage control and power factor improvement techniques.
	CO5	Analyze economic aspects of power generation and different types of tariff methods.
Electrical Machines-I 20APC0203	CO1	Apply the concepts of magnetic circuits to compute induced EMF and force in Electro-magnetic systems.
	CO2	Analyze the operation, conditions required of self excitation of DC Generators and parallel operation of DC Generators.
	CO3	Distinguish the operation of various dc motors and determine the performance of DC machine using the results of tests.
	CO4	Explain the principle, constructional features and evaluate the performance characteristics of single-phase transformers by conducting various tests.

	CO5	Analyze the operations of Auto Transformer, Three Phase Transformer and parallel operation of Transformers.
ELECTRICAL CIRCUITS-I LAB 20APC0204	CO1	Remember, understand and apply various theorems and verify practically.
	CO2	Understand and analyze active, reactive power measurements in three phase balanced & un balanced circuits.
ELECTRONIC DEVICES & CIRCUITSLAB 20APC0404	CO1	Test and operate diodes and special electronic devices.
	CO2	Construct and operate rectifiers without and with filters.
	CO3	Construct and operate BJT, FET in different configurations.
	CO4	Design DC biasing circuits for Transistors.
	CO5	Design amplifiers using BJTs and FETs.
Electrical Machines-I Lab 20APC0205	CO1	Conduct and analyze load test on DC shunt generator.
	CO2	Understand and analyze magnetization characteristics of DC shunt generator.
	CO3	Understand and analyze speed control techniques and efficiency of DC machines.
	CO4	Understand to predetermine efficiency and regulation of single-phase Transformers.
Principles of Effective Public Speaking 20AHE9902	CO1	Apply knowledge of principles, concepts and skills learned in speech preparation.
	CO2	Develop skills in effective listening.
	CO3	Evaluate the delivery of speeches.
	CO4	Develop skills in speech composition.
	CO5	Use supporting materials and presentation aids in speech preparation.
Environmental Studies 20AMC9903	CO1	Students get sufficient information that clarifies modern environmental concepts like equitable use of natural resources, more sustainable life styles etc.
	CO2	Students realize the need to change their approach, so as to perceive our own environmental issues correctly, using practical approach based on observation and self learning.
	CO3	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 protect it.
	CO4	Interpretation of different types of environmental pollution problems and designing of new solid waste management techniques usage
	CO5	To get knowledge on various environmental acts and to engage all the students life - long learning of rain water harvesting
BASICS OF PYTHON PROGRAMMING 20AES0509	CO1	Apply the features of Python language in various real applications. • Select appropriate data structure of Python for solving a problem. • Design object oriented programs using Python for solving real-world problems.
	CO2	Apply modularity to programs.
	CO1	Analyze two port networks
	CO2	Determine the transient response of R-L, R-C, R-L-C circuits for D.C and A.C excitations

ELECTRICAL CIRCUITS-II20APC0206	CO3	Apply Fourier transforms to electrical circuits excited by non-sinusoidal sources
	CO4	Design different types of filters
Electrical Machines-II 20APC0207	CO1	Analyze the phasor diagrams of induction and synchronous machine, parallel operation of alternators, synchronization and load division of synchronous generators
	CO2	Apply the concepts to determine V and inverted V curves and power circles of synchronous motor.
	CO3	Understand construction, principle of working, equivalent circuit and analyze the testing of induction machine.
	CO4	Analyze the various methods of starting and speed control of 3-phase induction motor.
	CO5	Analyze the principle operations of single phase induction motors and special motors.
ENGINEERING ELECTROMAGNETICS 20APC0208	CO1	Analyze the different aspects related to Static Electric Fields equations.
	CO2	Understand the concept of Conductors, Dipole, Dielectric & Capacitance.
	CO3	Learns the fundamental laws related to Magneto statics.
	CO4	Understand the concepts of Magnetic forces and Magnetic potential.
	CO5	Learns the fundamentals of Time Varying Fields.
MANAGERIALECONOMICSANDFINANCIALANALYSIS 20AHSMB01	CO1	Understand the fundamentals of Economics and Managerial economics viz., Demand, Production, cost, revenue and markets.
	CO2	Apply the Concept of Production cost and revenues for effective Business decision
	CO3	Analyze how to invest their capital and maximize returns.
	CO4	Evaluate the capital budgeting techniques.
	CO5	Define the concepts related to financial accounting and management and able to develop the Accounting statements and evaluate the financial performance of business entity.
Universal Human Values 20AHS9905	CO1	Development of a holistic perspective based on self-exploration about themselves (human being), family, society and nature/existence.
	CO2	Understanding (or developing clarity) of the harmony in the human being, family, society and Nature /existence
	CO3	Strengthening of self-reflection.
	CO4	Development of commitment and courage to act.
Basics of Python Programming Lab 20AES0510	CO1	Write, Test and Debug Python Programs
	CO2	Implement Conditionals and Loops for Python Programs
	CO3	Use functions and represent Compound data using Lists, Tuples and Dictionaries
	CO4	Read and write data from & to files in Python and develop Application using Pygame
	CO1	Able to understand simulation programs for DC circuit analysis using PSPICE.
	CO2	Understand and compare basic electric circuit theorems with actual working circuits.

ELECTRICAL CIRCUITS-II LAB 20APC0209	CO3	Design and understand RLC series and parallel circuits and its resonance condition.
	CO4	Able to measure power in three phase circuits in day to day life.
	CO5	Characterize and model the network in terms of all network parameters.
Electrical Machines-II Lab 20APC0210	CO1	Analyze and apply load test, no-load and blocked-rotor tests for construction of circle diagram and equivalent circuit determination in a single-phase induction motor.
	CO2	Predetermine regulation of a three-phase alternator by synchronous impedance & m.m.f methods.
	CO3	Predetermine the regulation of Alternator by Zero Power Factor method Xd and Xq determination of salient pole synchronous machine.
	CO4	Evaluate and analyze V and inverted V curves of 3 phase synchronous motor.
SIMULATION OF CIRCUITS USING PSPICE 20ASC0201	CO1	Able to understand features and programming basics of PSPICE.
	CO2	Understand the procedures for simulation of AC and DC circuits using PSPICE.
	CO3	Design and understand nodal and frequency response analysis of circuits.
ELECTRICAL MACHINES – III 20APC0211	CO1	Acquire knowledge on construction and operation of brushless D.C motor.
	CO2	Understand construction and operation of PMSM.
	CO3	Understand construction and operation of PMSM.
	CO4	Acquire knowledge of other modern special machines.
POWER ELECTRONICS 20APC0212	CO1	Understand the basic operating principles of power semiconductor switching devices.
	CO2	Analyze the operation of AC-DC and DC to DC converters and their control.
	CO3	Analyze the operation of DC-AC and AC to AC converters and their control.
	CO4	Understand the operation of cycloconverters.
CONTROL SYSTEMS 20APC0213	CO1	Formulate mathematical model and transfer function of the physical systems.
	CO2	Determine the stability of linear systems in time domain.
	CO3	Perform frequency domain analysis using bode and polar plot.
	CO4	Formulate and design state-space analysis.
ANALOG AND DIGITAL IC APPLICATIONS 20APC0425	CO1	Understand the basic building blocks of linear integrated circuits and its characteristics.
	CO2	Design the Multivibrator circuits using IC555 and determine the frequency of oscillation and time delay, and understand the concept of A/D and D/A Converters.
	CO3	Understand the concept of active filters and oscillators.
	CO4	Design of CMOS logic circuits and analysis of performance characteristics.

	CO5	Implementation of digital logic circuits with the estimation of power and speed.
POWER SYSTEMS – II 20APE0201	CO1	Understand the classification and parameters of conductors, transmission lines.
	CO2	Analyze power system transients and the effect on power systems.
	CO3	Understand the factors governing the performance of transmission lines.
	CO4	Analyze the properties of overhead lines and their types.
	CO5	Understand the types and construction of underground cables.
Control Systems Lab 20APC0214	CO1	Acquire knowledge of feedback control and transfer function of DC servo motor.
	CO2	Familiarize mathematical modelling of systems and design controllers and compensators.
	CO3	Get the knowledge on transient and steady state behaviour of second order systems.
	CO4	Determine the performance and time domain specifications of first and second order systems.
	CO5	Implement MATLAB analysis to real life systems.
Power Electronics Lab 20APC0215	CO1	Understand and analyze various characteristics of power electronic devices with gate firing circuits and forced commutation techniques.
	CO2	Analyze the operation of single-phase half & fully-controlled converters and inverters with different types of loads.
	CO3	Analyze the operation of DC-DC converters, single-phase AC Voltage controllers, cyclo- converters with different loads.
	CO4	Create and analyze various power electronic converters using MATLAB software.
INTRODUCTION TO PROGRAMMING WITH MATLAB 20ASC0202	CO1	Learn fundamental computer programming concepts such as variables, control structures, functions and many others.
	CO2	Learn about various data types and how to handle them in MATLAB.
	CO3	Learn the powerful support MATLAB provides for working with matrices.
	CO4	Learn about file input/output.
BIOLOGY FOR ENGINEERS 20AMC9901	CO1	Explain about cells and their structure and function. Different types of cells and basics for classification of living Organisms.
	CO2	Explain about biomolecules, their structure, function and their role in the living organisms. How biomolecules are useful in Industry.
	CO3	Brief about human physiology.
	CO4	Explain about genetic material, DNA, genes and RNA how they replicate, pass and preserve vital information in living Organisms.
	CO5	Know about application of biological principles in different technologies for the production of medicines and pharmaceutical molecules through transgenic microbes, plants and animals.
ELECTRICAL MEASUREMENTS AND INSTRUMENTATION 20APC0216	CO1	Understand different types of measuring instruments, their construction, operation and characteristics.
	CO2	Identify the instruments suitable for typical measurements.
	CO3	Apply the knowledge about transducers and instrument transformers to use them effectively.

POWER SYSTEM ANALYSIS 20APC0217	CO1	Remember and understand the concepts of per unit values, YBus and Zbus formation.
	CO2	Apply the concepts of good algorithm for the given power system network and obtain the converged load flow solution.
	CO3	Analyse the symmetrical faults and unsymmetrical faults and carry out the fault calculations.
	CO4	Design and select efficient Circuit Breakers to improve system stability.
SWITCHGEAR AND PROTECTION 20APC0218	CO1	Acquire knowledge on various types of fuses, breakers and relays used for power system protection.
	CO2	Design protection system for generators and transformers.
	CO3	Identify various types of the relays in protecting feeders, lines and bus bars.
	CO4	Demonstrate the protection of a power system from over voltages.
MICROPROCESSORS AND MICROCONTROLLERS 20APC0418	CO1	Understand architecture details of 8085
	CO2	Review and analyze details of 8085 and 8086 architecture
	CO3	Illustrate brief details of 8086 operations
	CO4	Determine Importance of low power MSP 430 and its advancements
	CO5	Analyze Inbuilt peripherals of MSP 430 also Power management features.
ELECTRICAL MEASUREMENTS LAB 20APC0219	CO1	Understand calibration of various electrical measuring instruments.
	CO2	Accurately determine the values of inductance and capacitance using AC bridges.
	CO3	Analyze coefficient of coupling between two coupled coils.
	CO4	Accurately determine the values of very low resistances.
	CO5	Understand the working principles of displacement transducers.
POWER SYSTEM ANALYSIS LAB 20APC0220	CO1	Acquire practical knowledge on calculation of sequence impedance, fault currents, voltages and sub transient reactance's. Get the practical knowledge on how to draw the equivalent circuit of three winding transformer.
	CO2	Acquire knowledge on development of MATLAB program for formation of Y and Z buses.
	CO3	Acquire knowledge on development of MATLAB programs for Gauss-Seidel and Fast Decouple Load Flow studies.
	CO4	Acquire knowledge on development of SIMULINK model for single area load frequency problem
SWITCHGEAR AND PROTECTION LAB 20APC0221	CO1	Understand the operation and characteristics of switch gear used in protection of power systems.
	CO2	Analyze the protection of parallel, radial feeders & over voltage induction relay.
	CO3	Analyze the functioning of various protection schemes using MATLAB.
	CO1	Learn fundamental computer programming concepts used for numerical analysis.
	CO2	Solve linear equations, difference equations and differential equations in MATLAB.

NUMERICAL TECHNIQUES USING MATLAB 20ASC0203	CO3	Determination of roots for polynomials.
	CO4	Determination of polynomials using Euler, Runge-Kutta and LSC fitting methods
Professional Ethics And Human Values 20AMC9904	CO1	It ensures students sustained happiness through identifying the essentials of human values and skills.
	CO2	The students will understand the importance of Values and Ethics in their personal lives and professional careers.
	CO3	The students will learn the rights and responsibilities as an employee, team member and a global citizen.
	CO4	Students understand practically the importance of trust, mutually satisfying human behavior and enriching interaction with nature.
	CO5	Students can able to develop appropriate technologies and management patterns to create harmony in professional and personal life.