ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES – TIRUPATI
AUTONOMOUS
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

COURSE NAME	COURSE OUTCOMES	
Algebra and Calculus (19ABS9901)	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
Chemistry (19ABS9904)	CO1	Understand the behaviour of, and 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 & thermo 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.
Problem Solving and Programming (19AES0501)	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
Engineering Graphics Lab (19AES0301)	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 drawings using CAD packages.
Engineering Workshop Practice (19ALC0301)	CO1	Apply wood working skills in real world applications.
	CO2	Build different parts with metal sheets in real world applications.
	CO3	Apply fitting operations in various applications.
	CO4	Apply different types of basic electric circuit connections.
	CO5	Demonstrate soldering and brazing.
Chemistry Lab (19ABS9909)	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
Problem Solving and Programming Lab (19AES0503)	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.
Basics of Electrical and	CO1	Apply concepts of KVL/KCL in solving DC circuits

COURSE NAME	COURSE OUTCOMES	
Electronics Engineering (19AES0202)	CO2	Illustrate working principles of induction motor - DC Motor
	CO3	Identify type of electrical machine based on their operation
Probability and Statistics (19ABS9911)	CO1	Interpret the association of characteristics and through correlation and regression tools.
	CO2	Make use of the concepts of probability and their applications.
	CO3	Apply discrete and continuous probability distributions.
	CO4	Design the components of a classical hypothesis test for large sample.
	CO5	Design the components of a classical hypothesis test for small samples.
Applied Physics (19ABS9902)	CO1	Analyze the 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.
Data Structures (19AES0502)	CO1	Select Appropriate Data Structure for solving a real world problem
	CO2	Select appropriate file organization technique depending on the processing to be done
	CO3	Construct Indexes for Databases
	CO4	Analyze the Algorithms
	CO5	Develop Algorithm for Sorting large files of data
Communicative English - I (19AHS9901)	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
Computer science and Engineering Workshop Lab (19ALC0501)	CO1	Construct a computer from its parts and prepare it for use
	CO2	Develop Documents using Word processors
	CO3	Develop presentations using the presentation tool
	CO4	Perform computations using spreadsheet tool
	CO5	Connect computer using wired and wireless connections
	CO6	Design Graphics, Videos and Web pages
	CO7	Connect things to computers
Communicative English - I Lab (19AHS9902)	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.
Basics of Electrical and Electronics Engineering Lab (19AES0204)	CO1	Verify Kirchoff's Laws & Superposition theorem for dc supply
	CO2	Analyze the performance of AC and DC Machines by testing.
	CO3	Study I – V Characteristics of PV Cell & Perform speed control of dc shunt motor

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	CO4	Ability to operate diodes for finding V-I Characteristics.
	CO5	Ability to construct and operate rectifiers without & with filters
	CO6	Ability to construct and operate BJT & FET Characteristics.
Applied Physics Lab (19ABS9907)	CO1	Analyze the 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.
Data Structures Lab (19AES0504)	CO1	Select the data structure appropriate for solving the problem
	CO2	Implement searching and sorting algorithms
	CO3	Design new data types
	CO4	Illustrate the working of stack and queue
	CO5	Organize the data in the form of files
Numerical Methods (19ABS9921)	CO1	Analyze the concepts of Errors, Relative and Percentage Errors
	CO2	Analyze the concepts of Algebraic & Transcendental Equations to solve different Engineering problems
	CO3	Analyze Interpolation using the concepts of the Numerical Methods
	CO4	Apply the concepts of Integration in Numerical Methods
	CO5	Apply the concepts of O.D.E on Numerical Methods
Basics of Python Programming (19AES0509)	CO1	Apply the features of Python language in various real applications.
	CO2	Select appropriate data structure of Python for solving a problem.
	CO3	Design object oriented programs using Python for solving real-world problems.
	CO4	Apply modularity to programs.
Basics Civil & Mechanical Engineering (19AES0101)	CO1	Understand principles of Stress and Strain and able to draw SFD & BMD for simply supported beams and cantilever beams.
	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.
Discrete Mathematics (19APC0501)	CO1	Understand basics of Mathematical Logic
	CO2	Understand the properties of Compatibility, Equivalence and Partial Ordering relations, Lattices
	CO3	Understand the general properties of Algebraic Systems, Semi Groups, Monoids and Groups.
	CO4	Design solutions for problems using Graphs
	CO5	Understand the fundamental principles of counting
Database Management Systems(19APC0502)	CO1	Demonstrate the basic elements of a relational database management system,
	CO2	Ability to design entity relationship and convert entity relationship diagrams into RDBMS and formulate SQL queries on the respective data.
	CO3	Apply normalization for the development of application software.
	CO4	Define Transactions which preserve the integrity of database
	CO5	Ability to understand Storage and Indexing Techniques
Digital Logic Design (19APC0503)	CO1	Develop a digital logic and apply it to solve real life problems.
	CO2	Analyze, design and implement combinational logic circuits.
	CO3	Classify different semiconductor memories.
	CO4	Analyze, design and implement sequential logic circuits.

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	CO5	Analyze digital system design using PLA.
Biology for Engineers (19AMC9901)	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
Basics of Python Programming Lab (19AES0510)	CO1	Design solutions to mathematical problems.
	CO2	Organize the data for solving the problem.
	CO3	Develop Python programs for numerical and text based problems.
	CO4	Select appropriate programming construct for solving the problem.
	CO5	Illustrate object oriented concepts.
Basic Civil & Mechanical Engineering Lab (19AES0102)	CO1	Understand principles of Bending Stress and Strain and
	CO2	Understand basic principles of Strain Measurement
	CO3	Understand common building materials used in construction and analyze characteristics of common building materials.
Database Management Systems Lab (19APC0505)	CO1	Design databases
	CO2	Retrieve information from data bases
	CO3	Use procedures to program the data access and manipulation
	CO4	Create user interfaces and generate reports
Object Oriented Programming Through Java (19APC0512)	CO1	To solve real world problems using OOP techniques.
	CO2	To apply code reusability through inheritance, packages and interfaces
	CO3	To solve problems using java collection framework and I/O classes.
	CO4	To develop applications by using parallel streams for better performance.
	CO5	To develop applets for web applications.
	CO6	To build GUIs and handle events generated by user interactions.
	CO7	To use the JDBC API to access database
Communicative English II (19AHS9903)	CO1	Prioritize information from reading texts after selecting relevant and useful points
	CO2	Paraphrase short academic texts using suitable strategies and conventions
	CO3	Make formal structured presentations on academic topics using PPT slides with relevant graphical elements
	CO4	Participate in group discussions using appropriate conventions and language strategies
	CO5	Prepare a CV with a cover letter to seek internship/ job
	CO6	Collaborate with a partner to make presentations and Project Reports
Design Thinking and Product Innovation (19AES0302)	CO1	Generate and develop different design ideas.
	CO2	Appreciate the innovation and benefits of design thinking.
	CO3	Experience the design thinking process in IT and agile software development.
	CO4	Understand design techniques related to variety of software services
Computer Organization (19APC0506)	CO1	Ability to use memory and I/O devices effectively
	CO2	Able to explore the hardware requirements for cache memory and virtual memory
	CO3	Ability to design algorithms to exploit pipelining and multiprocessors

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Design and Analysis of Algorithms (19APC0511)	CO1	Analyze the complexity of the algorithms
	CO2	Use techniques divide and conquer, greedy, dynamic programming, backtracking, branch and bound to solve the problems.
	CO3	Identify and analyze criteria and specifications appropriate to new problems, and choose the appropriate algorithmic design technique for their solution.
	CO4	Able to prove that a certain problem is NP-Complete.
Formal Languages and Automata Theory (19APC0509)	CO1	Construct finite state diagrams while solving problems of computer science.
	CO2	Design of new grammar and language.
	CO3	Find solutions to the problems using PDA.
	CO4	Find solutions to the problems using Turing machines.
Environmental Studies (19AMC9903)	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
Communicative English II Lab (19AMC9904)	CO1	Prioritize information from reading texts after selecting relevant and useful points.
	CO2	Make formal structured presentations on academic topics using PPT slides with relevant graphical elements.
	CO3	Participate in Group discussions using appropriate conventions and language strategies.
	CO4	Paraphrase short academic text using suitable strategies and conventions.
	CO5	Collaborate with a partner to make presentations and Project
Design Thinking and Product Innovation Lab (19AES0303)	CO1	Identify objectives of the project
	CO2	How they shape the design of the system
	CO3	Using MIT to develop the platform
	CO4	How they are informed by computational thinking literature.
Computer Organization Lab (19APC0504)	CO1	Represent numbers and perform arithmetic operations.
	CO2	Minimize the Boolean expression using Boolean algebra and design it using logic gates
	CO3	Analyse and design combinational circuit.
	CO4	Design and develop sequential circuits
	CO5	Understand and apply the fundamentals of assembly level programming of microprocessors and microcontroller.
Object Oriented Programming through Java Lab (19APC0514)	CO1	Develop efficient programs using multithreading.
	CO2	Design reliable programs using Java exception handling features.
	CO3	Extend the programming functionality supported by Java.
	CO4	Select appropriate programming construct to solve a problem.
Operating Systems(19APC0515)	CO1	Distinguish between the different types of operating system environments.
	CO2	Apply the concepts of process synchronization & CPU scheduling
	CO3	Develop solutions to deadlock and memory management
	CO4	Analyze various disk scheduling algorithms and file system interfaces
	CO5	Analyze the various security issues and goals of protection

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Artificial Intelligence (19APC0521)	CO1	Apply searching techniques for solving a problem
	CO2	Design Intelligent Agents
	CO3	Develop Natural Language Interface for Machines
	CO4	Design mini robots
	CO5	Summarize past, present and future of Artificial Intelligence
Compiler Design (19APC0520)	CO1	Able to design a compiler for a simple programming language
	CO2	Able to use the tools related to compiler design effectively and efficiently
	CO3	Ability to write optimized code
Software Engineering (19APC0507)	CO1	Introduce SE and Models
	CO2	Discusses Techniques on SPM
	CO3	Focus on Requirements analysis and Specification
	CO4	Highlights some important facets of Software Design
	CO5	Testing Techniques and Quality Control Activities
	CO6	Discusses on Software Quality Assurance and Trends
Sensors & Internet of Things(19APE0417)	CO1	Understand the characteristics of sensors and Transducers.
	CO2	Identify the different types of sensors and recent trends.
	CO3	Determine the Market perspective of IoT.
	CO4	Compare and Contrast the use of Devices, Gateways and Data Management in IoT.
	CO5	To design IoT applications using Arduino
Optimization Techniques (19APC0513)	CO1	Explain the need of optimization of engineering systems
	CO2	Understand optimization of electrical and electronics engineering problems
	CO3	Apply classical optimization techniques, linear programming, simplex algorithm, transportation problem
	CO4	Apply unconstrained optimization and constrained non-linear programming and dynamic programming
	CO5	Formulate optimization problems.
Microprocessors and Interfacing (19APC0428)	CO1	Understand concepts of Intel x85 and 8086 series of processors
	CO2	Develop various programming using 8086 instruction set.
	CO3	Understand concepts of 8086 interrupts and Memory, I/O interfacing
	CO4	Understand concepts of Interfacing programmable devices for 8086
	CO5	Understand concepts of Intel 8051 series of microcontrollers
Data Warehousing and Mining (19APE0501)	CO1	Understand the basic concepts of data warehouse and data Mining
	CO2	Apply pre-processing techniques for data cleansing
	CO3	Analyze and evaluate performance of algorithms for Association Rules
	CO4	Analyze Classification and Clustering algorithms
Design Patterns(19APE0502)	CO1	Know the underlying object oriented principles of design patterns.
	CO2	Understand the context in which the pattern can be applied.
	CO3	Understand how the application of a pattern affects the system quality and its tradeoffs.
Computer Graphics (19APE0503)	CO1	Explain the basic concepts used in computer graphics.
	CO2	Inspect various algorithms to scan, convert the basic geometrical primitives, transformations, Area filling, clipping.
	CO3	Assess the importance of viewing and projections.
	CO4	Define the fundamentals of animation, virtual reality and its related technologies.

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	CO5	Analyze the typical graphics pipeline
Professional Ethics And Human Values (19AMC9904)	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.
Operating Systems Lab (19APC0517)	CO1	Ensure the development of applied skills in operating systems related areas.
	CO2	Able to write software routines modules or implementing various concepts of operating system.
Artificial Intelligence Lab (19APC0522)	CO1	Implement search algorithms
	CO2	Solve Artificial Intelligence Problems
	CO3	Design Chatbot
	CO4	Implement Text Classification
Compiler Design Lab (19APC0508)	CO1	Develop compiler tools
	CO2	Design simple compiler
Computer Networks (19APC0510)	CO1	Understand the basics of data communications and networking
	CO2	Classify the functionalities of two sub layers of Data link Layer
	CO3	Know briefly about Network Layer through algorithms and protocols
	CO4	Distinguish the services provided by Transport Layer
	CO5	Recognize the services offered by Application Layer to the user
Grid and Cloud computing (19APC0516)	CO1	Apply the security models in the grid and the cloud environment.
	CO2	Use the grid and cloud tool kits.
	CO3	Apply the concept of virtualization.
	CO4	Apply grid computing techniques to solve large scale scientific problems
Machine Learning (19APC0513)	CO1	Understand the concepts of computational intelligence like machine learning
	CO2	Ability to get the skill to apply machine learning techniques to address the real time problems in different areas
	CO3	Understand the Neural Networks and its usage in machine learning application.
Web Programming(19APC0523)	CO1	Demonstrate knowledge on web page design elements, dynamic content and database Interaction,
	CO2	Demonstrate understanding of what is XML and how to parse and use XML data.
	CO3	Use HTML, CSS, JavaScript, JQuery, Bootstrap and PHP technologies for web application development
	CO4	Design client-server applications using web technologies.
	CO5	Able to do server side programming with Java Servelets, JSP and PHP.
Object oriented analysis and design (19APE0504)	CO1	Analyze the problem from object oriented perspective
	CO2	Model complex systems using UML Diagrams
	CO3	Choose the suitable design patterns in software design
	CO4	Adapt Object-Oriented Design Principles
	CO5	Identify the challenges in testing object-oriented software
Cyber Security (19APE0505)	CO1	Analyze threats and risks within context of the cyber security architecture
	CO2	Appraise cyber security incidents to apply appropriate response

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	CO3	Evaluate decision making outcomes of cyber security scenarios
Big Data Analytics (19APE0506)	CO1	Explain the concepts and challenges of big data
	CO2	Determine why existing technologies are inadequate to analyze the large data.
	CO3	Outline the operations viz. Collect, manage, store, query, and analyze various forms of big data.
	CO4	Apply large-scale analytic tools to solve some of the open big data problems.
	CO5	Analyze the impact of big data for business decisions and strategies.
	CO6	Design different big data applications.
Entrepreneurship Development (19AHEMB02)	CO1	Understand the concept of Entrepreneurship and challenges in the world of Competition.
	CO2	Apply the Knowledge in generating ideas for New Ventures and design business plan structure.
	CO3	Analyze various sources of finance and subsidies to entrepreneurs.
	CO4	Evaluate the role of central government and state government in promoting women Entrepreneurship.
	CO5	Study the role of incubations in fostering startups.
Neural Networks and Fuzzy Logic (19APC0216)	CO1	Understand the basic architecture of artificial neural network terminologies and techniques.
	CO2	Understand approaches and architectures of Artificial Intelligence.
	CO3	Perform the training of neural networks using various learning rules.
	CO4	Create different neural networks of various architectures both feed forward and feed backward.
	CO5	Application of ANN to System Identification and Pattern recognition.
Cellular Mobile Communications (19APE0413)	CO1	Understand impairments due to multipath fading channel..
	CO2	Understand the fundamental techniques to overcome the different fading effects.
	CO3	To understand Co-channel and Non Co-channel interferences
	CO4	Able to familiar with cell coverage for signal and traffic, diversity techniques and mobile antennas.
	CO5	Understanding of frequency management, channel assignment and types of handoff
Machine Learning Using Python Lab (19APC0525)	CO1	Understand complexity of Machine Learning algorithms and their limitations
	CO2	Understand modern notions in data analysis-oriented computing;
	CO3	Be capable of confidently applying common Machine Learning algorithms in practice and implementing their own
	CO4	Be capable of performing experiments in Machine Learning using real-world data.
Grid and Cloud Computer Lab (19APC0518)	CO1	Design and Implement applications on the Cloud.
	CO2	Design and implement applications on the Grid.
	CO3	Use the grid and cloud tool kits.
Web Programming Lab (19APC0524)	CO1	Demonstrate knowledge on web page design elements, dynamic content and database Interaction,
	CO2	Demonstrate understanding of XML and how to parse and use XML data.
	CO3	Use HTML, CSS, JavaScript, JQuery, Bootstrap and PHP technologies for web application development
	CO4	Design client-server applications using web technologies.
	CO5	Able to do server side programming with Java Servlets, JSP and PHP.
	CO6	Able to do bootstrap programming on WebPages.
Constitution Of India (19AMC9902)	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.

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	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