

**ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES, TIRUPATI  
(AUTONOMOUS)  
DEPARTMENT OF IOT AND CYBER SECURITY INCLUDING BLOCKCHAIN  
TECHNOLOGY (CIC)  
COURSE OUTCOMES (CO'S)  
AK20 REGULATION**

COURSE NAME	COURSE OUTCOMES	
Algebra & Calculus (20ABS9901)	CO1	Make use of matrix algebra techniques that is needed by engineers for practical application
	CO2	Utilize mean value theorems to real life problems.
	CO3	Interpret with functions of several variables which is useful in optimization. Variables which is useful in optimization.
	CO4	Analyze 2-dimensional and 3- dimensional concepts in coordinate systems
	CO5	Utilize the concept of special functions.
Chemistry (20ABS9904)	CO1	Interpret the behaviour and interactions between matter and energy at both the atomic and molecular levels between mater and energy at both the atomic and molecular levels
	CO2	Apply the electrochemical principles to the construction of betteries, fuel cells and electrochemical sensors
	CO3	Outline the preparation ,mechanism properties and applications of polymer and conducting polymer
	CO4	Analyze the separation of gaseous and liquid mixtures using instrumental methods and their applications
	CO5	Understand the disadvantages of using hardwater in domestically and industrially and select suitable treatment
Problem Solving and Programming (20AES0501)	CO1	Able to know interconnection of peripherals and connects of algorithms and flowcharts
	CO2	Able to know problem solving aspects, design and analysis of algorithm
	CO3	Able to know flow control, input output and implementation functions
	CO4	Able to solve computational problems using functions, array and pointers
	CO5	Able to organise real world heterogeneous data and apply searching ,sorting techniques with exception handling
Engineering Graphics (20AES0301)	CO1	Ability to discuss the conventions and methods of Engineering Drawing
	CO2	Ability to demonstrate drafting practices, visualization and projection skills
	CO3	Ability to perform basic sketching techniques of Engineering components
	CO4	Ability to draft the orthographic and pictorial views of a given Engineering components
	CO5	Ability to increasingly use architectural and engineering scales
Information Technology And Numerical Methods (20AES0505)	CO1	Usage of Digital World and Exploring Cyber space
	CO2	Explain the needs of hardware and software required for a computation task.
	CO3	Peripheral devices, networking and internet concepts
	CO4	Analyze the concepts of Errors, Algebraic & Transcendental Equations to solve different Engineering problems
	CO5	Analyze Interpolation using the concepts of the numerical methods and apply the Integration in numerical methods
	CO6	Apply the concepts of O.D.E on numerical method
Computer Science And Engineering Workshop (20AES0506)	CO1	Assemble and disassembling parts of a computer
	CO2	Develop Documents using Word processors
	CO3	Develop presentations using the presentation tool
	CO4	Perform computations using spreadsheet tool
	CO5	Design Graphics, Videos and Web pages
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
Problem Solving And Programming Lab (20AES0503)	CO1	Assemble and disassembling parts of a Computer
	CO2	Identify to control structure to 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
Applied Physics LAB(20ABS9902)	CO1	Analyze the intensity variation of light due to interference and diffraction & illustrate the propagation of electromagnetic waves.
	CO2	Analyze and apply the concepts of LASER S and optical fibers.
	CO3	Infer the properties of dielectric magnetic material
	CO4	Apply the fundamentals of semi conductors for device applications
	CO5	Implement the behavior of superconductors in diverse fields & interpret the properties of nanomaterials for multiple applications.
Probability And Statistics (20ABS9911)	CO1	Interpret the characteristics through correlation and regression tools.
	CO2	Make use of the concepts of probability and their applications.
	CO3	Apply discrete and continuous probability distributions.
	CO4	Inference the components of a classical hypothesis test for large sample
	CO5	Inspect the components of a classical hypothesis test for small samples.
Communicative English (20AHS9901)	CO1	Understand the context, topic, and pieces of specific information from social or transactional dialogues spoken by native speakers of English
	CO2	Apply grammatical structures to formulate sentences and correct word forms
	CO3	Analyze discourse markers to speak clearly on a specific topic in informal discussions
	CO4	Evaluate reading/listening texts and to write summaries based on global comprehension of these texts.
	CO5	Create a coherent paragraph interpreting a figure/graph/chart/table
Data Structures (20AES0502)	CO1	Analyze and evaluate the efficiency of an algorithm
	CO2	Implement linear data structures
	CO3	Implement non -linear data structures
	CO4	Solve the problem of efficiently using graphs and Hashing techniques
	CO5	Implement advanced sorting and organizing the file
Web Design (20AES0507)	CO1	Add elements to web pages, including colors, text, images, and more
	CO2	Add advanced features to your website including special effects
	CO3	Apply the CSS Knowledge to add colors and text formatting
	CO4	Apply advanced CSS style presentation and techniques
	CO5	Develop HTML and CSS Programs.
Communicative English Lab (20AHS9902)	CO1	Create Awareness on mother tongue influence and neutralize it in order to improve fluency in spoken English
	CO2	Understanding the different aspects of the language with emphasis on LSRW skills and make use of different strategies in discussion
	CO3	Improve word knowledge and apply skills in various languages learning activities
	CO4	Analyze speech sounds, stress ,rhythm, intonation and syllable division for better listening and speaking comprehension
	CO5	Evaluate and exhibit acceptable etiquette essential in social and professional presentations.
Applied Physics Lab (20ABS9907)	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	CO1	Select the data structure appropriate for solving the problem
	CO2	Implement searching and sorting algorithms

Lab (20AES0504)	CO3	Derive new data types
	CO4	Illustrate the working of linear and non linear data structure
	CO5	Organize the data using Files structure
Environmental Studies (20AMC9903)	CO1	To recognize and to understand the importance and scope of Environmental Studies.
	CO2	To understand the importance of protecting natural resources, ecosystem for future generation by communication each other in the society crate the awareness
	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	By studying Environmental Science, students are exposed to the environment the enables one to find out solution of various environmental problems, encountered on and often.
	CO5	At the end of the course, it is expected that student will be able to identify and analyze environmental problems as well as the risks associated with these problems and efforts to be taken to protect the environment from getting polluted. These will enable every human being to live in a more sustainable manner.
Discrete Mathematical Structures (20ABS9914)	CO1	Apply mathematical logic to solve problems.
	CO2	Understand the concepts and perform the operations related to sets, relations and functions.
	CO3	Apply basic counting techniques to solve combinatorial problems.
	CO4	Formulate problems to solve recurrence relations
	CO5	Apply Graph Theory in solving computer science problems
Digital Electronics & Microprocessors (20APC3601)	CO1	Design Logic circuit using basic concepts of Boolean algebra.
	CO2	Design Logic circuit using basic concepts of PLDs.
	CO3	Design sequential logic circuits.
	CO4	Design application using 8086 Microprocessor.
	CO5	Design application using 8051 Microcontroller.
Database Management Systems (20APC3602)	CO1	Know the fundamentals of Databases
	CO2	Understand SQL and PL/SQL Concepts
	CO3	Design a database for a real-world information system
	CO4	Process and Optimize the query
	CO5	Working of transaction and concurrency techniques in real time applications
Basics of Python Programming (20APC3604)	CO1	Understanding the syntax and semantics of Python programming.
	CO2	Apply modularity to programs.
	CO3	Select appropriate data structure of Python for solving a problem.
	CO4	Implement Mutable and Immutable data types
	CO5	Interpret the concepts of object oriented programming as used in Python
Basics of Electrical & Electronics Engineering (20AES0205)	CO1	Apply concepts of KVL/KCL in solving DC circuits
	CO2	Illustrate working principles of induction motor - DC Motor
	CO3	Identify type of electrical machine based on their operation
	CO4	Describe operation and characteristics of diodes and transistors.
	CO5	Make use of diodes and transistors in simple, typical circuit applications.
	CO6	Understand operation of basic op-amp circuits
Database Management Systems Laboratory (20APC3603)	CO1	Write SQL Queries
	CO2	Implement PL/SQL programs
	CO3	Design database for any real world problem
Basics of Python Programming Lab(20APC3605)	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 Python
	CO5	Implement the problem in terms of real world object using OOPs concepts

Basics of Electrical & Electronics Engineering Lab (20AES0206)	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
	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.
Client Side Scripting (20ASC3601)	CO1	Analyze and understand the basic concepts of web programming.
	CO2	Implement Arrays, Functions and Strings
	CO3	Apply techniques of form validation using Java Script.
	CO4	Describe important concepts related to client side Web Security.
	CO5	Save client information in cookie by server
Constitution Of India (20AMC9902)	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.
	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, Judiciary.
	CO5	Discuss the functions of local administration bodies
Computer Organization (20APC3606)	CO1	Understand computer architecture concepts related to the design of modern processors, memories and I/Os
	CO2	Design Arithmetic and control unit
	CO3	Identify the hardware requirements of Primary and Secondary memory
	CO4	Understand the importance of I/O devices and its interface circuits.
	CO5	Identify pipeline hazards and possible solutions to those hazards
Computer Networks (20APC3607)	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
Object Oriented Programming through Java (20APC3609)	CO1	Understanding the Syntax, Semantics and features of Java Programming Language.
	CO2	To gain knowledge on Object Oriented Programming concepts.
	CO3	Raise Exceptions and handle exceptions.
	CO4	Analyze the method of creating Multi-threading programs
	CO5	Ability to create GUI applications & perform event handling.
Operating Systems(20APC3611)	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
Managerial Economics And Financial Analysis (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	CO1	Students are expected to become more aware of themselves, and their surroundings (family, society, nature)

Values (20AHS9905)	CO2	They would become more responsible in life, and in handling problems with sustainable solutions, while keeping human relationships and human nature in mind.
	CO3	They would have better critical ability.
	CO4	They would also become sensitive to their commitment towards what they have understood (human values, human relationship and human society).
	CO5	It is hoped that they would be able to apply what they have learnt to their own self in different day-to-day settings in real life, at least a beginning would be made in this direction.
Computer Networks Lab (20APC3608)	CO1	Deal with Error detection/ correction techniques
	CO2	Learn about Data link layer protocols
	CO3	Learn about network layer protocols
	CO4	Able to get knowledge about simulator
Object Oriented Programming through Java Lab (20APC3610)	CO1	Demonstrate java compiler and eclipse platform and learn how to use net beans IDE to create java application
	CO2	Ability to create user friendly interfaces
	CO3	Ability to solve the problem using object oriented approach and design solutions which are robust
	CO4	Implement exception handling and Templates
	CO5	Ability to create GUI components and implementations
Operating Systems Lab (20APC3612)	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.
Server Side Scripting (20ASC3602)	CO1	Learn the installation guide of MYSQL,XAMPP5,APACHE and PHP
	CO2	Able to design code for simple dynamic web pages
	CO3	Design PHP and SQL/MySQL Integration.
	CO4	Design Basic Projects
	CO5	Able to provide protection to web server
Cryptography and Network Security (20APC3613)	CO1	Understand basic Cryptographic algorithm, Security issues
	CO2	Identify various type of vulnerabilities of a computer network
	CO3	Outline various Security algorithms.
	CO4	Design secure system
	CO5	Investigate the threats and identify the solution for the threats
Embedded System and Internet of Things (20APC3615)	CO1	Understand the Fundamental Concept of Embedded System
	CO2	Analyze TM4C Architecture, Instruction Set, addressing modes to develop programs for various applications using Assembly and Embedded C.
	CO3	Develop an embedded system by interfacing the microcontrollers and IDE tools.
	CO4	Understand the basic concept of Internet of Things.
	CO5	Implement the IoT basic application by Arduino Microcontroller.
Fundamentals of Blockchain Technology (20APC3617)	CO1	Understand the fundamentals of Money used in blockchain
	CO2	Describe the basics of Blockchain
	CO3	State Decentralization Architecture
	CO4	Relate Bitcoin usage in Blockchain Technology
	CO5	Implement Blockchain for various use cases
Mathematical Modelling and Simulation (20AOE9926)	CO1	Develop various mathematical techniques in modeling and modeling in dynamics through O.D.E of First order.
	CO2	Analyze a modelling in Epidemics through system of O.D.E of First order.
	CO3	Correlate a Mathematical modeling of Circular motion and Motion of Satellites.
	CO4	Construct mathematical modeling through difference equations and also through Functional equations and Integral equations
	CO5	Valuate the Simulation for given mathematical model in real problem
Optimization Techniques	CO1	Explain the need of optimization of engineering systems
	CO2	Understand optimization of electrical and electronics engineering problems

(20AOE0303)	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.
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
Software Engineering (20APE3601)	CO1	Characterize software engineering models
	CO2	Focus on analysis in software project management
	CO3	Design important features of software project management
	CO4	Test the software specifications
	CO5	Measure the software quality
Distributed database (20APE3602)	CO1	Understand theoretical and practical aspects of distributed database systems.
	CO2	Study and identify various issues related to the development of distributed database system.
	CO3	Understand the design aspects of object-oriented database system and related development
Automata Theory and Compiler Design (20APE3603)	CO1	Understanding the basics of Formal Language and Regular Expressions.
	CO2	Understanding about parsing, syntax and control flow statement
	CO3	Know the concept of expressions and overloading functions
	CO4	Gain knowledge in run time storage.
	CO5	Generate code
Cryptography and Network Security Lab (20APC36143)	CO1	Implement the cipher techniques
	CO2	Develop the various security algorithms
	CO3	Use different open source tools for network security and analysis
	CO4	Configure and Implement Firewall
	CO5	Implement Various Security Models and Tools
Embedded System and Internet of Things Lab (20APC3616)	CO1	Interface peripherals like switches, LEDs, stepper motor etc
	CO2	To Know the control of all embedded Components.
	CO3	To apply the knowledge in real time applications.
	CO4	To work on different actuating systems & sensors.
	CO5	To understand technologies like IoT, machine languages.
Soft Skills (20ASA0502)	CO1	Recognize the importance of verbal and non verbal skills
	CO2	Develop the interpersonal and intrapersonal skills
	CO3	Apply grammatical structures to formulate sentences and correct word forms.
	CO4	Create trust among people and develop employability skills
	CO5	Identify and apply communication skills effectively for professional
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.
Cyber Security (20APC3618)	CO1	Analyze threats and risks within context of the cyber security architecture
	CO2	Appraise cyber security incidents to apply appropriate response
	CO3	Evaluate decision making outcomes of cyber security scenarios
Advanced IoT Programming	CO1	Demonstrate knowledge on the characteristics of sensors and principles of IoT.
	CO2	Select appropriate sensors for the given application development.

(20APC3620)	CO3	Design basic IoT Applications using Arduino.
	CO4	Design IoT Applications using Raspberry Pi.
	CO5	Perform Data Acquisition and analysis using Cloud and Tkinter
Building Private Blockchain (20APC3622)	CO1	Recall the structure and mechanism of Bitcoin, Ethereum, Hyperledger and Multichain Blockchain platforms
	CO2	Infer the importance of consensus in transactions and how transactions are stored on Blockchain.
	CO3	Setup your own private Blockchain and deploy smart contracts on Ethereum.
	CO4	Deploy the business network using Hyperledger Composer.
	CO5	Implement Blockchain for various use cases.
Mobile Application Development (20APE3604)	CO1	Demonstrate knowledge on mobile platforms, mobile user interface and user interface design requirements.
	CO2	Design user interfaces by analyzing user requirements
	CO3	Develop mobile applications for Messaging, Location-Based Services, and Networking
	CO4	Develop mobile applications and publish in different mobile platforms
	CO5	Use Android studio and iOS tools to develop mobile applications.
Real Time Operating Systems (20APE3605)	CO1	Characterize real-time systems and describe their functions
	CO2	Design and implement a real-time system
	CO3	Apply formal methods to the analysis and design of real-time systems
	CO4	Apply formal methods for scheduling real-time systems
	CO5	Characterize and describe reliability and fault tolerance issues and approaches
Design and Analysis Of Algorithms (20APE3606)	CO1	Analyze the complexity of the algorithms
	CO2	Use techniques of greedy and dynamic programming to solve the problems.
	CO3	Implement traversal, backtracking and searching techniques.
	CO4	Choose the appropriate algorithm for solving minimization problem.
	CO5	Able to prove that a certain problem is NP-Complete
Cyber Security Lab (20APC3619)	CO1	Analyze and resolve security issues in networks and computer systems to secure an IT infrastructure.
	CO2	Interpret and forensically investigate security incidents
	CO3	Recognize attacks on systems and Designing a counter attack incident response and incident response methodology.
	CO4	Use forensic tools and collect evidence of a computer crime.
Advanced IoT Programming Lab (20ASA0502)	CO1	Identify different types of Sensors and study their functionality in IoT
	CO2	Demonstrate skills in connecting peripherals to Arduino/Raspberry Pi for data exchange.
	CO3	Develop a Cloud platform to upload and analyze any sensor data
	CO4	Demonstrate skills in connecting GSM, GPS, Gateways to micro controllers and perform Data Management in IoT.
	CO5	Build a complete working IoT system involving prototyping, programming and data analysis.
Building Private Blockchain LAB (20APC3623)	CO1	Recall the structure and mechanism of Bitcoin, Ethereum, Hyperledger and Multichain Blockchain platforms
	CO2	Infer the importance of consensus in transactions and how transactions are stored on Blockchain.
	CO3	Setup your own private Blockchain and deploy smart contracts on Ethereum.
	CO4	Deploy the business network using Hyperledger Composer.
	CO5	Implement Blockchain for various use cases.
Basics of Cloud Computing (20ASA0501)	CO1	Ability to understand various service delivery models of a cloud computing architecture.
	CO2	Understanding cloud service providers.
	CO3	Configure various virtualization tools such as Virtual Box, VMware workstation.
	CO4	Analyze authentication, confidentiality and privacy issues in cloud computing.
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.