Semester	Course Code KTU	Name of the Course	C O Code	Course Outcome Statement
				CO- CO STATEMENTS
				2023-2027 BATCH
I	MAT101	LINEAR ALGEBRA AND CALCULUS	CO.1	Solve systems of linear equations, diagonalize matrices and characterise quadratic forms
			CO.2	Compute the partial and total derivatives and maxima and minima of multivariable functions
			CO.3	Compute multiple integrals and apply them to find areas and volumes of geometrical shapes, mass and centre of gravity of plane laminas
			CO.4	Perform various tests to determine whether a given series is convergent, absolutely convergent or conditionally convergent
			CO.5	Determine the Taylor and Fourier series expansion of functions and learn their applications.
I	PHT100	ENGINEERING PHYSICS A	CO.1	Compute the quantitative aspects of waves and oscillations in engineering systems.
			CO.2	Apply the interaction of light with matter through interference, diffraction and identify these phenomena in different natural optical processes and optical instruments.
			CO.3	Analyze the behaviour of matter in the atomic and subatomic level through the principles of quantum mechanics to perceive the microscopic processes in electronic devices.
			CO.4	Classify the properties of magnetic materials and apply vector calculus to static magnetic fields and use Maxwell's equations to diverse engineering problems
			CO.5	Analyze the principles behind various superconducting applications, explain the working of solid state lighting devices and fibre optic communication system
I	EST100	ENGINEERING MECHANICS	CO.1	Recall principles and theorems related to rigid body mechanics
			CO.2	Identify and describe the components of system of forces acting on the rigid body
			CO.3	Apply the conditions of equilibrium to various practical problems involving different force system.
			CO.4	Choose appropriate theorems, principles or formulae to solve problems of mechanics.
			CO.5	Solve problems involving rigid bodies, applying the properties of distributed areas and masses
I	HUN 101	LIFE SKILLS	CO.1	Define and Identify different life skills required in personal and professional life
			CO.2	Develop an awareness of the self and apply well-defined techniques to cope with emotions and stress.
			CO.3	Explain the basic mechanics of effective communication and demonstrate these through presentations.
			CO.4	Take part in group discussions
			CO.5	Use appropriate thinking and problem solving techniques to solve new problems
			CO.6	Understand the basics of teamwork and leadership
I	PHL 120	ENGINEERING PHYSICS LAB	CO.1	Develop analytical/experimental skills and impart prerequisite hands on experience for engineering laboratories
			CO.2	Understand the need for precise measurement practices for data recording
			CO.3	Understand the principle, concept, working and applications of relevant technologies and comparison of results with theoretical calculations
			CO.4	Analyze the techniques and skills associated with modern scientific tools such as lasers and fiber optics

			CO.5	Develop basic communication skills through working in groups in performing the laboratory experiments and by interpreting the results	
I	EST 120	BASICS OF CIVIL & MECHANICAL ENGINEERING	CO.1	Recall the role of civil engineer in society and to relate the various disciplines of Civil Engineering.	
			CO.2	Explain different types of buildings, building components, building materials and building construction	
			CO.3	Describe the importance, objectives and principles of surveying	
			CO.4	Summarise the basic infrastructure services MEP, HVAC, elevators, escalators and ramps	
			CO.5	Discuss the Materials, energy systems, water management and environment for green buildings.	
			CO.6	Analyse thermodynamic cycles and calculate its efficiency	
			CO.7	Illustrate the working and features of IC Engines	
			CO.8	Explain the basic principles of Refrigeration and Air Conditioning	
			CO.9	Describe the working of hydraulic machines	
			CO.10	Explain the working of power transmission elements	
			CO.11	Describe the basic manufacturing, metal joining and machining processes	
I	ESL 120	CIVIL & MECHANICAL WORKSHOP	CO.1	Name different devices and tools used for civil engineering measurements	
			CO.2	Explain the use of various tools and devices for various field measurements	
			CO.3	Demonstrate the steps involved in basic civil engineering activities like plot measurement, setting out operation, evaluating the natural profile of land, plumbing and undertaking simple construction work.	
			CO.4	Choose materials and methods required for basic civil engineering activities like field measurements, masonry work and plumbing	
			CO.5	Compare different techniques and devices used in civil engineering measurements	
			CO.6	Identify Basic Mechanical workshop operations in accordance with the material and objects	
			CO.7	Apply appropriate Tools and Instruments with respect to the mechanical workshop trades	
			CO.8	Apply appropriate safety measures with respect to the mechanical workshop trades	
II	MAT 102	VECTOR CALCULUS DIFFERENTIAL EQUATIONS TRANSFORMS	CO.1	Compute the derivatives and line integrals of vector functions and learn their applications	
			CO.2	Evaluate surface and volume integrals and learn their inter-relations and applications	
			CO.3	Solve homogeneous and non-homogeneous linear differential equation with constant coefficients	
			CO.4	Compute Laplace transform and apply them to solve ODEs arising in engineering	
			CO.5	Determine the Fourier transforms of functions and apply them to solve problems arising in engineering	
II	CYT 100	ENGINEERING CHEMISTRY	CO.1	Apply the basic concepts of electrochemistry and corrosion to explore its possible applications in various engineering fields.	
			CO.2	Understand various spectroscopic techniques like UV-Visible, IR, NMR and its applications	
			CO.3	Apply the knowledge of analytical method for characterizing a chemical mixture or a compound. Understand the basic concept of SEM for surface characterisation of nanomaterials.	
			CO.4	Learn about the basics of stereochemistry and its application. Apply the knowledge of conducting polymers and advanced polymers in engineering.	
			CO.5	Study various types of water treatment methods to develop skills for treating wastewater.	
		ENGINEERING GRAPHICS	CO.1	Draw the projection of points and lines located in different quadrants	
			CO.2	Prepare multiview orthographic projections of objects by visualizing them in different positions	
			CO.3	Draw sectional views and develop surfaces of a given object	

II	EST 110	ENGINEERING GRAPHICS	CO.4	Prepare pictorial drawings using the principles of isometric and perspective projections to visualize objects in three dimensions.
			CO.5	Convert 3D views to orthographic views
			CO.6	Obtain multiview projections and solid models of objects using CAD tools
II	EST 130	BASICS OF ELECTRICAL AND ELECTRONICS ENGINEERING	CO.1	Apply fundamental concepts and circuit laws to solve simple DC electric circuits
			CO.2	Develop and solve models of magnetic circuits
			CO.3	Apply the fundamental laws of electrical engineering to solve simple ac circuits in steady state
			CO.4	Describe working of a voltage amplifier
			CO.5	Outline the principle of an electronic instrumentation system
			CO.6	Explain the principle of radio and cellular communication
II	HUN 102	PROFESSIONAL COMMUNICATION	CO.1	Develop vocabulary and language skills relevant to engineering as a profession
			CO.2	Analyze, interpret and effectively summarize a variety of textual content
			CO.3	Create effective technical presentations
			CO.4	Discuss a given technical/non-technical topic in a group setting and arrive at generalizations/consensus
			CO.5	Identify drawbacks in listening patterns and apply listening techniques for specific needs
			CO.6	Create professional and technical documents that are clear and adhering to all the necessary conventions
II	EST 102	PROGRAMING IN C	CO.1	Analyze a computational problem and develop an algorithm/flowchart to find its solution
			CO.2	Develop readable* C programs with branching and looping statements, which uses Arithmetic, Logical, Relational or Bitwise operators
			CO.3	Write readable C programs with arrays, structure or union for storing the data to be processed
			CO.4	Divide a given computational problem into a number of modules and develop a readable multi-function C program by using recursion if required, to find the solution to the computational problem
			CO.5	Write readable C programs which use pointers for array processing and parameter passing
			CO.6	Develop readable C programs with files for reading input and storing output
II	CYL120	ENGINEERING CHEMISTRY LAB	CO.1	Understand and practice different techniques of quantitative chemical analysis to generate experimental skills and apply these skills to various analyses
			CO.2	Develop skills relevant to synthesize organic polymers and acquire the practical skill to use TLC for the identification of drugs
			CO.3	Develop the ability to understand and explain the use of modern spectroscopic techniques for analysing and interpreting the IR spectra and NMR spectra of some organic compounds
			CO.4	Acquire the ability to understand, explain and use instrumental techniques for chemical analysis
			CO.5	Learn to design and carry out scientific experiments as well as accurately record and analyze the results of such experiments
			CO.6	Function as a member of a team, communicate effectively and engage in further learning. Also understand how chemistry addresses social, economical and environmental problems and why it is an integral part of curriculum
II	130	ELECTRICAL & ELECTRONICS WORKSHOP	CO.1	Demonstrate safety measures against electric shocks.
			CO.2	Identify the tools used for electrical wiring, electrical accessories, wires, cables, batteries and standard symbols
			CO.3	Develop the connection diagram, identify the suitable accessories and materials necessary for wiring simple lighting circuits for domestic buildings

II	ESL	ELECTR ELECTR WORK	CO.4	Identify and test various electronic components	
			CO.5	Draw circuit schematics with EDA tools	
			CO.6	Assemble and test electronic circuits on boards	
			CO.7	Work in a team with good interpersonal skills	
III	MAT 203	DISCRETE MATHEMATICAL STRUCTURES	CO.1	Check the validity of predicates in Propositional and Quantified Propositional Logic using truth tables, deductive reasoning and inference theory on Propositional Logic	
			CO.2	Solve counting problems by applying the elementary counting techniques - Rule of Sum, Rule of Product, Permutation, Combination, Binomial Theorem, Pigeonhole Principle and Principle of Inclusion and Exclusion	
			CO.3	Classify binary relations into various types and illustrate an application for each type of binary relation, in Computer Science	
			CO.4	Illustrate an application for Partially Ordered Sets and Complete Lattices, in Computer Science	
			CO.5	Explain Generating Functions and solve First Order and Second Order Linear Recurrence Relations with Constant Coefficients	
			CO.6	Illustrate the abstract algebraic systems - Semigroups, Monoids, Groups, Homomorphism and Isomorphism of Monoids and Groups	
III	CST 201	DATA STRUCTURES	CO.1	Design an algorithm for a computational task and calculate the time/space complexities of that algorithm	
			CO.2	Identify the suitable data structure (array or linked list) to represent a data item required to be processed to solve a given computational problem and write an algorithm to find the solution of the computational problem	
			CO.3	Write an algorithm to find the solution of a computational problem by selecting an appropriate data structure (binary tree/graph) to represent a data item to be processed	
			CO.4	Store a given dataset using an appropriate Hash Function to enable efficient access of data in the given set	
			CO.5	Select appropriate sorting algorithms to be used in specific circumstances	
			CO.6	Design and implement Data Structures for solving real world problems efficiently	
III	CST 203	LOGIC SYSTEM DESIGN	CO.1	Illustrate decimal, binary, octal, hexadecimal and BCD number systems, perform conversions among them and do the operations - complementation, addition, subtraction, multiplication and division on binary numbers	
			CO.2	Simplify a given Boolean Function and design a combinational circuit to implement the simplified function using Digital Logic Gates	
			CO.3	Design combinational circuits - Adders, Code Convertors, Decoders, Magnitude Comparators, Parity Generator/Checker and design the Programmable Logic Devices - ROM and PLA.	
			CO.4	Design sequential circuits - Registers, Counters and Shift Registers.	
			CO.5	Use algorithms to perform addition and subtraction on binary, BCD and floating point numbers	
		ED SING	CO.1	Write Java programs using the object oriented concepts - classes, objects, constructors, data hiding, inheritance and polymorphism	

Sem	Code	Course	CO	Course Outcome
III	CST 205	OBJECT ORIENTED PROGRAMMING USING JAVA	CO.2	Utilise datatypes, operators, control statements, built in packages & interfaces, Input/Output Streams and Files in Java to develop programs
			CO.3	Illustrate how robust programs can be written in Java using exception handling mechanism
			CO.4	Write application programs in Java using multithreading and database connectivity
			CO.5	Write Graphical User Interface based application programs by utilising event handling features and Swing in Java
III	EST 200	DESIGN AND ENGINEERING	CO.1	Explain the different concepts and principles involved in design engineering.
			CO.2	Apply design thinking while learning and practicing engineering.
			CO.3	Develop innovative, reliable, sustainable and economically viable designs incorporating knowledge in engineering.
III	MCN 201	SUSTAINABLE ENGINEERING	CO.1	Understand the relevance and the concept of sustainability and the global initiatives in this direction
			CO.2	Explain the different types of environmental pollution problems and their sustainable solutions
			CO.3	Discuss the environmental regulations and standards
			CO.4	Outline the concepts related to conventional and non-conventional energy
			CO.5	Demonstrate the broad perspective of sustainable practices by utilizing engineering knowledge and principles
III	CSL 201	DATA STRUCTURES LAB	CO.1	Write a time/space efficient program using arrays/linked lists/trees/graphs to provide necessary functionalities meeting a given set of user requirements
			CO.2	Write a time/space efficient program to sort a list of records based on a given key in the record
			CO.3	Examine a given Data Structure to determine its space complexity and time complexities of operations on it
			CO.4	Design and implement an efficient data structure to represent given data
			CO.5	Write a time/space efficient program to convert an arithmetic expression from one notation to another
			CO.6	Write a program using linked lists to simulate Memory Allocation and Garbage Collection
III	CSL 203	OBJECT ORIENTED PROGRAMMING LAB (IN JAVA)	CO.1	Implement the Object Oriented concepts - constructors, inheritance, method overloading & overriding and polymorphism in Java
			CO.2	Implement programs in Java which use datatypes, operators, control statements, built in packages & interfaces, Input/Output streams and Files
			CO.3	Implement robust application programs in Java using exception handling
			CO.4	Implement application programs in Java using multithreading and database connectivity
			CO.5	Implement Graphical User Interface based application programs by utilizing event handling features and Swing in Java
IV	T236	MATICS TIFICIAL GENCE	CO.1	Make use of the concepts, rules and results about linear equations, matrix algebra, vector spaces, eigenvalues & eigenvectors and orthogonality & diagonalization to solve computational problems
			CO.2	Perform calculus operations on functions of several variables and matrices, including partial derivatives and gradients

Sem	Code	Course	CO	Course Outcome			
IV	MA...	MATHE... FOR ART... INTELL...	CO.3	Utilize the concepts, rules and results about probability, random variables, additive & multiplicative rules, conditional probability, probability distributions and Bayes' theorem to find solutions of computational problems			
			CO.4	Train Machine Learning Models using unconstrained and constrained optimization methods			
IV	CST202	COMPUTER ORGANISATION AND ARCHITECTURE	CO.1	Recognize and express the relevance of basic components, I/O organization and pipelining schemes in a digital computer			
			CO.2	Explain the types of memory systems and mapping functions used in memory systems			
			CO.3	Demonstrate the control signals required for the execution of a given instruction			
			CO.4	Illustrate the design of Arithmetic Logic Unit and explain the usage of registers in it			
			CO.5	Explain the implementation aspects of arithmetic algorithms in a digital computer			
			CO.6	Develop the control logic for a given arithmetic problem			
IV	CST 204	DATABASE MANAGEMENT SYSTEMS	CO.1	Summarize and exemplify fundamental nature and characteristics of database systems			
			CO.2	Model real word scenarios given as informal descriptions, using Entity Relationship diagrams.			
			CO.3	Model and design solutions for efficiently representing and querying data using relational model			
			CO.4	Demonstrate the features of indexing and hashing in database applications			
			CO.5	Discuss and compare the aspects of Concurrency Control and Recovery in Database systems			
			CO.6	Explain various types of NoSQL databases			
IV	CST 206	OPERATING SYSTEMS	CO.1	Explain the relevance, structure and functions of Operating Systems in computing devices.			
			CO.2	Illustrate the concepts of process management and process scheduling mechanisms employed in Operating Systems.			
			CO.3	Explain process synchronization in Operating Systems and illustrate process synchronization mechanisms using Mutex Locks, Semaphores and Monitors			
			CO.4	Explain any one method for detection, prevention, avoidance and recovery for managing deadlocks in Operating Systems.			
			CO.5	Explain the memory management algorithms in Operating Systems			
			CO.6	Explain the security aspects and algorithms for file and storage management in Operating Systems.			
IV	AIL202	DATABASE MANAGEMENT SYSTEMS LAB	CO.1	Design database schema for a given real world problem-domain using standard design and modeling approaches.			
			CO.2	Construct queries using SQL for database creation, interaction, modification, and updation.			
			CO.3	Design and implement triggers and cursors.			
			CO.4	Implement procedures, functions, and control structures using PL/SQL.			
			CO.5	Perform CRUD operations in NoSQL Databases.			
			CO.6	Develop database applications using front-end tools and back-end DBMS.			
IV	CSL204	OPERATING SYSTEMS LAB	CO.1	Illustrate the use of systems calls in Operating Systems.			
			CO.2	Implement Process Creation and Inter Process Communication in Operating Systems.			
			CO.3	Implement Fist Come First Served, Shortest Job First, Round Robin and Prioritybased CPU Scheduling Algorithms			
			CO.4	Illustrate the performance of First In First Out, Least Recently Used and Least Frequently Used Page Replacement Algorithms. (			
			CO.5	Implement modules for Deadlock Detection and Deadlock Avoidance in Operating Systems.			
			CO.6	Implement modules for Storage Management and Disk Scheduling in Operating Systems.			
	...200	...ional ...s	CO.1	Understand the core values that shape the ethical behaviour of a professional.			
			CO.2	Adopt a good character and follow an ethical life			

IV	HUT 2	Professi Ethic	CO.3	Explain the role and responsibility in technological development by keeping personal ethics and legal ethics.	
			CO.4	Solve moral and ethical problems through exploration and assessment by established experiments.	
			CO.5	Apply the knowledge of human values and social values to contemporary ethical values and global issues.	
IV	MCN202	CONSTITUTION OF INDIA	CO.1	Explain the background of the present constitution of India and features.	
			CO.2	Utilize the fundamental rights and duties	
			CO.3	Understand the working of the union executive, parliament and judiciary	
			CO.4	Understand the working of the state executive, legislature and judiciary.	
			CO.5	Utilize the special provisions and statutory institutions	
			CO.6	Show national and patriotic spirit as responsible citizens of the country	
V	CST301	FORMAL LANGUAGES AND AUTOMATA THEORY	CO.1	Classify a given formal language into Regular, Context-Free, Context Sensitive, Recursive or Recursively Enumerable.	
			CO.2	Explain a formal representation of a given regular language as a finite state automaton, regular grammar, regular expression and Myhill-Nerode relation.	
			CO.3	Design a Pushdown Automaton and a Context-Free Grammar for a given context-free language.	
			CO.4	Design Turing machines as language acceptors or transducers.	
			CO.5	Explain the notion of decidability.	
V	CST303	COMPUTER NETWORKS	CO.1	Explain the features of computer networks, protocols, and network design models	
			CO.2	Describe the fundamental characteristics of the physical layer and identify the usage in network communication	
			CO.3	Explain the design issues of data link layer, link layer protocols, bridges and switches	
			CO.4	Illustrate wired LAN protocols (IEEE 802.3) and wireless LAN protocols (IEEE 802.11)	
			CO.5	Select appropriate routing algorithms, congestion control techniques, and Quality of Service requirements for a network	
			CO.6	Illustrate the functions and protocols of the network layer, transport layer, and application layer in inter-networking	
V	AMT305	INTRODUCTION TO MACHINE LEARNING	CO.1	Illustrate Machine Learning concepts and basics of supervised learning concepts.	
			CO.2	Describe dimensionality reduction techniques and supervised learning concepts (regression, linear classification).	
			CO.3	Solve real life problems using appropriate machine learning models and evaluate the performance measures and Illustrate the concepts of Multilayer neural network .	
			CO.4	Illustrate basics of parameter estimation models and the working of classifier SVM classifier model	
			CO.5	Describe unsupervised learning concepts	
V	AIT307	INTRODUCTION TO AI	CO.1	Explain the fundamental concepts of intelligent systems and their architecture.	
			CO.2	Illustrate uninformed and informed search techniques for problem solving in intelligent systems.	
			CO.3	Solve Constraint Satisfaction Problems using search techniques.	
			CO.4	Represent AI domain knowledge using logic systems and use inference techniques for reasoning in intelligent systems.	
			CO.5	Illustrate different types of learning techniques used in intelligent systems.	
V	T309	EMENT OF E SYSTEMS	CO.1	Demonstrate Traditional and Agile Software Development approaches	
			CO.2	Prepare Software Requirement Specification and Software Design for a given problem.	
			CO.3	Justify the significance of design patterns and licensing terms in software development, prepare testing, maintenance and DevOps strategies for a project.	

				CO		
V	CST	SOFTWARE MANAGEMENT		CO.4	Make use of software project management concepts while planning, estimation, scheduling, tracking and change management of a project, with a traditional/agile framework.	
				CO.5	Utilize SQA practices, Process Improvement techniques and Technology advancements in cloud based software models and containers & microservices.	
V	MCN301	DISASTER MANAGEMENT		CO.1	Explain the fundamental concepts of intelligent systems and their architecture.	
				CO.2	Illustrate uninformed and informed search techniques for problem solving in intelligent systems.	
				CO.3	Solve Constraint Satisfaction Problems using search techniques.	
				CO.4	Represent AI domain knowledge using logic systems and use inference techniques for reasoning in intelligent systems.	
V	AML311	PYTHON AND MACHINE LEARNING LAB		CO.1	Develop applications in Python programming.	
				CO.2	Implement machine learning algorithms using packages and libraries in Python for various applications.	
				CO.3	Implement python programs for supervised learning methods through Neural network, Regression and classification.	
				CO.4	Implement clustering algorithms.	
				CO.5	Apply dimensionality reduction as a dataset preprocessing step.	
V	AIL333	AI ALGORITHMS LAB		CO.1	State the basics of learning problems with hypothesis and version spaces	
				CO.2	Demonstrate real-world problems as state space problems, optimization problems or constraint satisfaction problems.	
				CO.3	Simulate given problem scenario and analyze its performance	
				CO.4	Develop programming solutions for given problem scenario.	
				CO.5	Design and develop an expert system by using appropriate tools and techniques.	
VI	CST302	COMPILER DESIGN		CO.1	Explain the phases in compilation process(lexical analysis, syntax analysis, semantic analysis, intermediate code generation, code optimization and code generation) and model a lexical analyzer (Cognitive Knowledge Level: Apply)	
				CO.2	Model language syntax using Context Free Grammar and develop parse tree representation using leftmost and rightmost derivations (Cognitive Knowledge Level: Apply)	
				CO.3	Compare different types of parsers(Bottom-up and Top-down) and construct parser for a given grammar (Cognitive Knowledge Level: Apply)	
				CO.4	Build Syntax Directed Translation for a context free grammar, compare various storage allocation strategies and classify intermediate representations (Cognitive Knowledge Level: Apply)	
				CO.5	Illustrate code optimization and code generation techniques in compilation (Cognitive Knowledge Level: Apply)	
VI	AIT304	ROBOTICS AND INTELLIGENT SYSTEM		CO.1	Understand the concepts of manipulator and mobile robotics. (Cognitive Knowledge Level: Understand)	
				CO.2	Choose the suitable sensors, actuators and control for robot design. (Cognitive Knowledge Level: Apply)	
				CO.3	Developing kinematic model of mobile robot and understand robotic vision intelligence. (Cognitive Knowledge Level: Apply)	
				CO.4	Discover the localization and mapping methods in robotics. (Cognitive Knowledge Level: Apply)	
				CO.5	Plan the path and navigation of robot by applying artificial intelligence algorithm. (Cognitive Knowledge Level: Apply)	

VI	CST306	ALGORITHM ANALYSIS AND DESIGN	CO.1	Analyze any given algorithm and express its time and space complexities in asymptotic notations. (Cognitive Level: Apply)	
			CO.2	Derive recurrence equations and solve it using Iteration, Recurrence Tree, Substitution and Master's Method to compute time complexity of algorithms. (Cognitive Level: Apply)	
			CO.3	Illustrate Graph traversal algorithms & applications and Advanced Data structures like AVL trees and Disjoint set operations. (Cognitive Level:Apply)	
			CO.4	Demonstrate Divide-and-conquer, Greedy Strategy, Dynamic programming, Branch-and Bound and Backtracking algorithm design techniques (Cognitive Level: Apply)	
			CO.5	Classify a problem as computationally tractable or intractable, and discuss strategies to address intractability (Cognitive Level: Understand)	
			CO.6	Identify the suitable design strategy to solve a given problem. (Cognitive Level: Analyze)	
VI	CAT308	COMPREHENSIVE COURSE WORK	CO.1	Comprehend the organization and architecture of computer systems (Cognitive Knowledge Level: Understand)	
			CO.2	Comprehend the concepts and applications of data structures (Cognitive Knowledge Level: Understand)	
			CO.3	Comprehend the concepts, functions and algorithms in Operating System (Cognitive Knowledge Level: Understand)	
			CO.4	Comprehend the concepts of artificial intelligence(Cognitive Knowledge Level: Understand	
			CO.5	Comprehend the fundamental principles of database design and manipulation (Cognitive Knowledge Level: Understand)	
VI	AIL332	ROBOTICS LAB	CO.1	Interface different peripherals to arduino board	
			CO.2	Assemble a mobile robot with different sensors and actuators..	
			CO.3	Familiarise about localisation of mobile robots	
			CO.4	Impart intelligence to robot using standard algorithms.	
			CO.5	Familiarise the robot navigation	
VI	CAD334	MINI PROJECT	CO.1	Identify technically and economically feasible problems of social relevance(Cognitive Knowledge Level: Apply)	
			CO.2	Identify and survey the relevant literature for getting exposed to related solutions (Cognitive Knowledge Level: Apply)	
			CO.3	Perform requirement analysis and identify design methodologies and develop adaptable and reusable solutions of minimal complexity by using modern tools and advanced programming techniques (Cognitive Knowledge Level: Apply)	
			CO.4	Prepare technical report and deliver presentation(Cognitive Knowledge Level: Apply)	
			CO.5	Apply engineering and management principles to achieve the goal of the project (Cognitive Knowledge Level: Apply)	
VI	CAT312	CONCEPTS IN GRAPH THEORY	CO.1	Explain vertices and their properties, types of paths, classification of graphs and trees & their properties. (Cognitive Knowledge Level: Understand)	
			CO.2	Demonstrate the fundamental theorems on Eulerian and Hamiltonian graphs. (Cognitive Knowledge Level: Understand)	
			CO.3	Illustrate the working of Prim's and Kruskal's algorithms for finding minimum cost spanning tree and Dijkstra's algorithm for finding shortest paths. (Cognitive Knowledge Level: Apply)	
			CO.4	Explain planar graphs, their properties and an application for planar graphs. (Cognitive Knowledge Level: Apply)	
			CO.5	Illustrate how one can represent a graph in a computer. (Cognitive Knowledge Level: Apply)	
			CO.6	Explain the Vertex Color problem in graphs and illustrate an example application for vertex coloring. (Cognitive Knowledge Level: Apply)	

VI	AIT322		CO.1	Describe the working principles of graphics devices(Cognitive Knowledge level: Understand)
			CO.2	Illustrate line drawing, circle drawing and polygon filling algorithms(Cognitive Knowledge level: Apply)
			CO.3	Demonstrate geometric representations, transformations on 2D & 3D objects, clipping algorithms and projection algorithms(Cognitive Knowledge level: Apply)
			CO.4	Summarize visible surface detection methods(Cognitive Knowledge level: Understand)
			CO.5	Summarize the concepts of digital image representation, processing and demonstrate pixel relationships(Cognitive Knowledge level: Apply)
			CO.6	Solve image enhancement and segmentation problems using spatial domain techniques(Cognitive Knowledge level: Apply)
VI	CST332	FOUNDATIONS OF SECURITY IN COMPUTING	CO.1	Illustrate the operations and properties of algebraic structures, integer arithmetic and modular arithmetic. (Cognitive Knowledge Level: Understand)
			CO.2	Use the concepts of prime numbers and factorization for ensuring security in computing systems (Cognitive Knowledge Level: Apply)
			CO.3	Illustrate the concepts of Linear Congruence, Primitive Roots, Discrete Logarithms and Elliptic Curve Arithmetic (Cognitive Knowledge Level: Apply)
			CO.4	Summarize the threats and attacks related to computer and program security (Cognitive Knowledge Level: Understand)
			CO.5	Outline the key aspects of operating system and database security (CognitiveKnowledge Level: Understand)
VI	CST 342	AUTOMATED VERIFICATION	CO.1	Illustrate an application for model checking. (Cognitive Knowledge Level: Understand)
			CO.2	Describe finite-state modelling for hardware and software. (Cognitive Knowledge Level: Understand)
			CO.3	Identify linear-time properties required to represent the requirements of a system. (Cognitive Knowledge Level: Apply)
			CO.4	Specify a given linear-time property in Linear Temporal Logic (LTL). (Cognitive Knowledge Level: Apply)
			CO.5	Perform LTL model checking using the tool Symbolic Analysis Laboratory (SAL). (Cognitive Knowledge Level: Apply)
VI	AIT352	ARTIFICIAL NEURAL NETWORKS TECHNIQUES	CO.1	Summarize the basic concepts and the learning rules of ANN. (Cognitive KnowledgeLevel: Understand)
			CO.2	Utilize the fundamental learning algorithms namely, Mc-Culloch Pitts, Hebb Perceptron and Adaline to solve real world problems.(Cognitive Knowledge Level: Apply)
			CO.3	Implement Back propagation learning algorithm, Generic Radial Basis Functionnetwork. (Cognitive Knowledge Level: Apply)
			CO.4	Demonstrate Self Organizing Maps and Adaptive Resonance Theory.(Cognitive Knowledge Level: Understand)
			CO.5	Implement training algorithms for pattern association. (Cognitive Knowledge Level:Apply)
VI	AIT362	RAMMING IN R	CO.1	Illustrate uses of conditional and iterative statements in R programs.(Cognitive Knowledge level: Apply)
			CO.2	Write, test and debug R programs (Cognitive Knowledge level: Apply)
			CO.3	Illustrate the use of Probability distributions and basic statistical functions. (Cognitive Knowledge level: Apply)
			CO.4	Visualize different types of data (Cognitive Knowledge level: Apply)

Sem	Code	Course	CO	Course Outcome	
		PROG	CO.5	Comprehend regression modeling using R (Cognitive Knowledge level: Understand)	
VI	AIT372	AUGMENTED REALITY	CO.1	Describe how AR systems work and list the applications of AR. (Cognitive Knowledge Level: Understand)	
			CO.2	Understand and analyse the hardware requirement of AR (Cognitive Knowledge Level: Understand)	
			CO.3	Use computer vision concepts for AR and describe AR techniques (Cognitive Knowledge Level: Apply)	
			CO.4	Analyse and understand the working of various state of the art AR devices (Cognitive Knowledge Level: Apply)	
			CO.5	Describe the applications of mixed reality (Cognitive Knowledge Level: Understand)	
VI	CST 382	INTRODUCTION TO SOFTWARE TESTING	CO.1	List a range of different software testing techniques and be able to apply specific unit testing method to the projects using Junit. (Cognitive Knowledge Level: Understand)	
			CO.2	Explain mutation testing method for a given piece of code to identify hidden defects that can't be detected using other testing methods. (Cognitive Knowledge Level: Understand)	
			CO.3	Explain graph coverage criteria in terms of control flow graph and data flow graph for a given program. (Cognitive Knowledge Level: Understand)	
			CO.4	Demonstrate the importance of black-box approaches in terms of domain and functional testing. (Cognitive Knowledge Level: Understand)	
			CO.5	Illustrate the use of PEX tool with symbolic execution. (Cognitive Knowledge Level: Apply)	
VI	CST 384	CONCEPTS IN DEEP LEARNING	CO.1	Demonstrate basic concepts in machine learning.(Cognitive Knowledge Level: Understand)	
			CO.2	Illustrate the validation process of machine learning models using hyper-parameters and validation sets. (Cognitive Knowledge Level: Understand)	
			CO.3	Demonstrate the concept of the feed forward neural network and its training process. (Cognitive Knowledge Level: Apply)	
			CO.4	Build CNN and Recurrent Neural Network (RNN) models for different use cases. (Cognitive Knowledge Level: Apply)	
			CO.5	Use different neural network/deep learning models for practical applications. (Cognitive Knowledge Level: Apply)	
VI	CST386	WIRELESS NETWORKS AND IoT APPLICATIONS	CO.1	Recognize wireless technologies required for IoT ecosystem (Cognitive Knowledge Level : Understand)	
			CO.2	Perceive the concept of IoT and M2M architecture, IoT examples, and Data Management in IoT (Cognitive Knowledge Level :Apply)	
			CO.3	Outline the hardware components used in IoT including Sensors, Actuators and development boards (Cognitive Knowledge Level : understand)	
			CO.4	Explain the software components of IoT (Cognitive Knowledge Level :Understand)	
			CO.5	Demonstrate the protocols used in IoT and build IoT Programs (Cognitive Knowledge Level : Apply)	
			CO.6	Build IoT-based smart real-time applications such as Smart Healthcare, Smart Agriculture, Smart Environment and Smart Home (Cognitive Knowledge Level : Apply)	
VI	CST394	NETWORK SECURITY	CO.1	Identify the key aspects of security, intrusion detection systems and digital signature schemes (Cognitive Knowledge Level: Apply)	
			CO.2	Explain the security standards used in network communication (Cognitive Knowledge Level:Understand)	
			CO.3	Identify the mechanisms in email security services (Cognitive Knowledge Level: Apply)	
			CO.4	Summarize the protocols used to provide web security (Cognitive Knowledge Level: Understand)	
			CO.5	Explain the fundamental concepts of wireless network security and firewalls (Cognitive Knowledge Level: Understand)	

Sem	Code	Course	CO	Course Outcome	
VI	AIT396	MACHINE LEARNING IN COMPUTATIONAL BIOLOGY	CO.1	Describe the basic concepts of Machine Leaning, Classification, regression and clustering problems, parameters and measures (Cognitive knowledge level:Understand)	
			CO.2	Demonstrate the clustering algorithm on computational biology problems (Cognitive knowledge level: Apply)	
			CO.3	Explain Dimensionality reduction techniques and Decision Trees in computational biology (Cognitive knowledge level : Apply)	
			CO.4	Illustrate Feature Extraction and Pattern recognition and Classification in the domain of Computational Biology analysis (Cognitive knowledge level: Apply)	
			CO.5	Explain the role and challenges of Machine Learning in Computational (Cognitive knowledge level: Understand)	
VI	AIT398	IMAGE AND VIDEO PROCESSING	CO.1	Summarize the steps of digital image processing and pixel relationships. (Cognitive Knowledge Level: Understand)	
			CO.2	Apply spatial and frequency domain methods for image enhancement. (Cognitive Knowledge Level: Apply	
			CO.3	Apply restoration techniques and morphological operations on digital images. (Cognitive Knowledge Level: Apply)	
			CO.4	Compare different methods for digital image and video compression. (Cognitive Knowledge Level: Apply)	
			CO.5	Understand the basics of video processing and video segmentation. (Cognitive Knowledge Level: Understand)	
VI	HUT 300	Industrial Economics & Foreign Trade	CO.1	Explain the problem of scarcity of resources and consumer behaviour, and to evaluatethe impact of government policies on the general economic welfare. (Cognitive knowledge level: Understand)	
			CO.2	Take appropriate decisions regarding volume of output and to evaluate the social cost of production. (Cognitive knowledge level: Apply)	
			CO.3	Determine the functional requirement of a firm under various competitive conditions. (Cognitive knowledge level: Analyse)	
			CO.4	Examine the overall performance of the economy, and the regulation of economic fluctuations and its impact on various sections in the society. (Cognitive knowledge level: Analyse)	
			CO.5	Determine the impact of changes in global economic policies on the business opportunities of a firm. (Cognitive knowledge level: Analyse)	
VI	HUT310	Management for Engineers	CO.1	Explain the characteristics of management in the contemporary context (Cognitive Knowledge level: Understand).	
			CO.2	Describe the functions of management (Cognitive Knowledge level: Understand).	
			CO.3	Demonstrate ability in decision making process and productivity analysis (Cognitive Knowledge level: Understand).	
			CO.4	Illustrate project management technique and develop a project schedule (Cognitive Knowledge level: Apply)	
			CO.5	Summarize the functional areas of management (Cognitive Knowledge level: Understand).	
			CO.6	Comprehend the concept of entrepreneurship and create business plans (Cognitive Knowledge level: Understand).	