DHANALAKSHMI SRINIVASAN ENGINEERING COLLEGE(AUTONOMOUS)

DEPARTMENT OF ARTIFICIAL INTELLIGENCE & DATA SCIENCE

REGULATION-2023

Vision:

An active and committed centre of advanced learning focused on research and training in the fields of Engineering, Technology and Management to serve the nation better.

Mission:

M1: To develop eminent scholars with lifelong learning by following global standards through the offering of UG, PG, and doctoral programmes.

M2: To pursue professional and career growth by collaborating in mutually beneficial partnerships with industries and higher research institutions.

M3: To promote sustained research and training with an emphasis on human values and leadership qualities.

M4: To contribute solutions to the need-based issues of our society through proper means and as dutiful citizens.

Program Educational Objectives(PEOs)

EO1	Graduates will have the ability to adapt, contribute, and innovate new technologies and systems in the key domains of Artificial Intelligence and Data Science.
EO2	Graduates will be able to successfully pursue higher education in reputed institutions with AI Specialization
EO3	Graduates will have the ability to explore research areas and produce outstanding contributions in various fields of Artificial Intelligence and Data Science.

ProgramOutcomes(POs)

PO	Graduate Attribute
PO1	**Engineering knowledge:**Apply the knowledge of mathematics,science,engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2	**Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences
PO3	**Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and Environmental considerations.
PO4	**Conduct investigations of complex problems:** Use research based knowledge and research methods including design of experiments,analysis and interpretation of data, And synthesis of the information to provide valid conclusions.
PO5	**Modern tool usage:**Create,select,and apply appropriate techniques,resources and modern engineering and ITtools including prediction and modeling to complex engineering activities with an understanding of the limitations.
PO6	**The engineer and society:**Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO7	**Environment and Sustainability:**Understand the impact of professional engineering solutions in societal and environmental contexts, and demonstrate knowledge of the need for sustainable development.
PO8	**Ethics:**Apply ethical principles and commit to professional ethics, responsibilities, and norms of engineering practice.
PO9	**Individual and Teamwork:**Function effectively as an individual, and as a member or leader in diverse teams and multidisciplinary settings.
PO10	**Communication:** Communicate effectively on complex engineering activities with the engineering community and society at large. Be able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11	**Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO12	**Life-long Learning:**Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAM SPECIFIC OUTCOMES(PSOs)

Program Specific Outcomes (PSOs):

PSO1	To collect requirements, analyze, design, implement, and test software systems.
PSO2	To analyze errors and debug them accordingly.
PSO3	To impart the knowledge to implement AI programming.

Course Outcomes(COs) of All Courses. Autonomous Regulation – 2023

SEMESTER I

SL. NO.	COURSECODE	COURSE TITLE	CATEGORY	PERIODS PERWEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
THEORY								
1	IP3151	Induction Programme	-	-	-	-	-	-
2	U23HST11	Communicative English	HS	3	0	0	45	3
3	U23MAT12	Matrices and Calculus	BS	3	1	0	60	4
4	U23PHT13	Physics for Engineers and Technologists	BS	3	0	0	45	3
5	U23CYT14	Chemistry for Engineering &Technology	BS	3	0	0	45	3
6	U23GET15	Problem Solving and Python Programming	ES	3	0	0	45	3
7	GE3152	தமிழர்மரபு/Heritage of Tamils	HS	1	0	0	15	1
PRACTICAL								
8	U23GEP13	Problem Solving and Python Programming Laboratory	ES	0	0	4	60	2
9	U23BSP11	Physics and Chemistry Laboratory	BS	0	0	4	60	2
10	U23HSP12	English Laboratory	EEC	0	0	2	30	1

SEMESTER II

SL. NO.	COURSECODE	COURSE TITLE	CATEGORY	PERIODS PERWEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
THEORY								
1	U23HST21	Professional English	HS	2	0	0	30	2
2	U23MAT22	Statistics and Numerical Methods	BS	3	1	0	60	4
3	U23PHT25	Physics for Information Science	BS	3	0	0	45	3
4	U23EET23	Basic Electrical and Electronics Engineering	ES	3	0	0	45	3
5	U23ECT23	Digital Principles and System Design	ES	3	1	0	60	4
6	U23CST21	Programming in C	PC	3	0	0	45	3
7		NCC Credit Course Level 1	-	-	-	-	-	2*
8	GE3252	தமிழரும் ததொழில்நுட்பமும் /Tamils and Technology	HS	1	0	0	15	1
PRACTICAL								
9	U23CSP21	Programming in C Laboratory	PC	0	0	4	4	2
10	U23HSP22	Communication Laboratory	EEC	0	0	4	4	2

SEMESTER III

SL. NO.	COURSECODE	COURSE TITLE	CATEGORY	PERIODS PERWEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
THEORY								
1	U23AIT31	Database Management System	PC	3	0	0	45	3
2	U23AIT32	Data Structures	PC	3	0	0	45	3
3	U23AIT33	Computer Organization and Architecture	PC	3	0	0	45	3
4	U23AIT34	Designand Analysis of Algorithms	PC	3	1	0	60	4
5	U23AIT35	Design Thinking for AI	PC	3	0	0	45	3
PRACTICAL								
6	U23AIP31	Database Management Systems Laboratory	PC	0	0	4	60	2
7	U23AIP32	Data Structures Laboratory	PC	0	0	4	60	2

SEMESTER IV

SL. NO.	COURSECODE	COURSE TITLE	CATEGORY	PERIODS PERWEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
THEORY								
1	U23MAT41	Probability and Statistics	BS	3	1	0	60	4
2	U23AIT41	Artificial Intelligence	PC	3	0	0	45	3

3	U23AIT42	Data Science	PC	3	0	0	45	3
4	U23CST43	Operating Systems	PC	3	0	0	45	3
5	U23AIT44	Fundamentals of Computer Networks and communication	PC	3	0	0	45	3
6	U23GET41	Environmental Sciences and Engineering	BS	2	0	0	30	2
PRACTICAL								
7	U23AIP41	Artificial Intelligence Laboratory	PC	0	0	4	60	2
8	U23AIP42	Data Science Laboratory	PC	0	0	4	60	2

SEMESTER V

SL. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PERWEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
THEORY								
1	U23CST42	Machine Learning	PC	3	0	0	45	3
2	U23AIT52	Big Data Analytics	PC	3	0	0	45	3
3		Open Elective-I	OE	3	0	0	45	3
4	U23AIT53	Data Exploration and Visualization	PC	3	0	0	45	3
5	U23AIV1	Professional Elective-I	PE	3	0	0	45	3
6	U23AIV2	Professional Elective-II	PE	3	0	0	45	3
PRACTICAL								
7	U23CSP42	Machine Learning Laboratory	PC	0	0	4	60	2
8	U23AIP52	BigData Analytics Laboratory	PC	0	0	4	60	2

SEMESTER VI

SL. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PERWEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
THEORY								
1	U23AIT61	IOT and Applications	PC	3	0	0	45	3
2	U23AIT62	Deep Learning	PC	3	0	0	45	3
3		Open Elective-II	OE	3	0	0	45	3
4	U23AIV3	Professional Elective-III	PE	3	0	0	45	3
5	U23AIV4	Professional Elective-IV	PE	3	0	0	45	3

PRACTICAL								
6	U23AIP61	IOT and Applications Laboratory	PC	0	0	4	60	2
7	U23AIP62	Mini Project	PC	0	0	4	60	2

SEMESTER VII

SL. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PERWEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
THEORY								
1	U23CST72	Natural Language Processing	PC	3	0	0	45	3
2	U23AIT72	Robotics and Automation	PC	3	0	0	45	3
3	U23AIT73	Augmented Intelligence	PC	3	0	0	45	3
4	U23AIT74	Universal Human Values and Ethics	ES	3	0	0	45	3
5	U23AIT75	Entrepreneur and Startup	EEC	3	0	0	45	3
PRACTICAL								
6	U23AIP71	Natural Language Processing Laboratory	PC	0	0	4	60	2
7	U23AIP72	Training & Internship	EEC	1	0	0	15	1

SEMESTER VIII

SL. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PERWEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
THEORY								
1	U23AIV5	Professional Elective-V	PE	3	0	0	45	3
2	U23AIV6	Professional Elective-VI	PE	3	0	0	45	3
PRACTICAL								
3	U23AIP81	Project Work	EEC	0	0	20	300	10

VERTICAL – I
(DATASCIENCE)

SL. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PERWEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
THEORY								
1	U23CSV67	Knowledge Engineering	PE	3	0	0	45	3
2	U23AIV12	Recommender Systems	PE	3	0	0	45	3
3	U23AIV13	Soft Computing	PE	3	0	0	45	3
4	U23CSV14	Text and Speech Analysis	PE	3	0	0	45	3
5	U23CSV15	Business Analytics	PE	3	0	0	45	3
6	U23CSV16	Image and video analytics	PE	3	0	0	45	3
7	U23CBT51	Theory of Computation	PE	3	0	0	45	3

VERTICAL–II
(FULL STACK DEVELOPMENT)

SL. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PERWEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
THEORY								
1	U23CSV22	App Development	PE	3	0	0	45	3
2	U23CSV23	Cloud Services Management	PE	3	0	0	45	3
3	U23EET62	Embedded Systems	PE	3	0	0	45	3
4	U23CSV25	Software Testing and Automation	PE	3	0	0	45	3
5	U23CSV26	Web Application Security	PE	3	0	0	45	3
6	U23CSV17	Computer Vision	PE	3	0	0	45	3

VERTICAL–III
(CLOUD COMPUTING AND DATA CENTRE TECHNOLOGIES)

SL. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PERWEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
THEORY								
1	U23CST71	Cloud Computing	PE	3	0	0	45	3
2	U23ITV31	Data Ware housing	PE	3	0	0	45	3
3	U23ITV65	Optimization Techniques	PE	3	0	0	45	3
4	U23ITV67	Game Theory	PE	3	0	0	45	3
5	U23AIV34	Java Programming	PE	3	0	0	45	3
6	U23CSV58	Cognitive Science	PE	3	0	0	45	3

VERTICAL–IV
(CYBERSECURITY AND DATA PRIVACY)

SL. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PERWEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
THEORY								
1	U23CSV63	Cyber Security	PE	3	0	0	45	3
2	U23CSV34	Storage Technologies	PE	3	0	0	45	3
3	U23CSV46	Cryptocurrency and Blockchain Technologies	PE	3	0	0	45	3
4	U23AIV44	R Programming	PE	3	0	0	45	3
5	U23AIV45	Data and Information Security	PE	3	0	0	45	3
6	U23CSV44	Modern Cryptography	PE	3	0	0	45	3

VERTICAL – V
(CREATIVE MEDIA)

SL. NO.	COURE CODE	COURSE TITLE	CATEGORY	PERIODS PERWEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
THEORY								
1	U23CSV52	Multimedia and Animation	PE	3	0	0	45	3
2	U23AIV52	Video Creation and Editing	PE	3	0	0	45	3
3	U23CSV54	Digital marketing	PE	3	0	0	45	3
4	U23CSV57	Multimedia Data Compression and Storage	PE	3	0	0	45	3
5	U23ITV27	DevOps	PE	3	0	0	45	3
6	U23AIV56	Ethics and AI	PE	3	0	0	45	3

VERTICAL – VI
(EMERGING TECHNOLOGIES)

SL. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
THEORY								
1	U23AIV61	Distributed Computing	PE	3	0	0	45	3
2	U23CSV66	3D Printing and Design	PE	3	0	0	45	3
3	U23CBT63	Ethical Hacking	PE	3	0	0	45	3
4	U23ITV41	Digital and Mobile Forensics	PE	3	0	0	45	3
5	U23AIV65	Human Computer Interaction	PE	3	0	0	45	3
6	U23AIV66	Information Retrieval	PE	3	0	0	45	3
7	U23CSV64	Quantum Computing	PE	3	0	0	45	3

OPEN ELECTIVE

SL. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PERWEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
THEORY								
1	U23AIO01	Machine Learning Techniques	OE	3	0	0	45	3
2	U23CST62	Internet of Things	OE	3	0	0	45	3
3	U23AIT41	Artificial Intelligence	OE	3	0	0	45	3
4	U23AIO04	Introduction to Data Science	OE	3	0	0	45	3
5	U23AIO05	Data visualization	OE	3	0	0	45	3
6	U23ITT43	WebTechnology	OE	3	0	0	45	3
7	U23AIV61	Distributed computing	OE	3	0	0	45	3
8	U23AIO08	Grid Computing	OE	3	0	0	45	3
9	U23AIO09	Augmented Reality&Virtual Reality	OE	3	0	0	45	3
10	U23CST72	Natural Language Processing	OE	3	0	0	45	3
11	U23CSV46	Cryptocurrency and Blockchain Technologies	OE	3	0	0	45	3

Semester I

U23HST11 – Communicative English

COURSE OUTCOMES:

CO1 – Remember appropriate words in a situational conversation.
CO2 – Gain understanding of basic grammatical structures and use them in the right context.
CO3 – Read and infer the denotative and connotative meanings of technical texts.
CO4 – Write dialogue, letter and paragraphs on various topics.
CO5 – Prepare effective notes for main sources available.
CO6 – Give operational talk effectively.

U23MAT12 – Matrices and Calculus

COURSE OUTCOMES:

CO1 – Use matrix algebra methods for solving practical problems.
CO2 – Use limit definition and differentiation rules to differentiate functions.
CO3 – Apply differential calculus tools to solve application problems.

CO4 – Apply calculus concepts for functions of several variables.
CO5 – Use multiple integrals for solving area and volume problems.
CO6 – Solve ordinary differential equations for engineering models.

U23PHT13 – Physics for Engineers and Technologists

COURSE OUTCOMES:

CO1 – Differentiate the elastic and plastic nature of materials.
CO2 – Understand production and applications of ultrasonic waves.
CO3 – Gain knowledge of basic quantum mechanics concepts.
CO4 – Develop devices based on laser sources.
CO5 – Understand advantages of optical fiber over metal wire.
CO6 – Demonstrate experiments based on optical fiber.

U23CYT14 – Chemistry for Engineering & Technology

COURSE OUTCOMES:

CO1 – Develop methods to produce soft water for industrial and drinking purposes.
CO2 – Apply knowledge of corrosion and electrodes.
CO3 – Understand methods for synthesis of nanomaterials.
CO4 – Apply phase rule and composites knowledge for material selection.
CO5 – Understand suitable fuels for engineering applications.
CO6 – Apply knowledge of energy resources in energy sectors.

U23GET15 – Problem Solving and Python Programming

COURSE OUTCOMES:

CO1 – Develop algorithmic solutions to simple computational problems.
CO2 – Develop and execute simple Python programs.
CO3 – Develop Python programs using conditionals and loops.
CO4 – Explain concepts of lists and tuples.
CO5 – Read and write data using Python files.
CO6 – Explain the concept of exceptions.

Semester I Practical Subjects

U23GEP13 – Problem Solving and Python Programming Laboratory

COURSE OUTCOMES:

CO1 – Develop algorithmic solutions to computational problems.
CO2 – Develop and execute simple Python programs.
CO3 – Develop applications using sets and dictionaries.
CO4 – Build programs using functions and strings.
CO5 – Construct Python programs using standard libraries.
CO6 – Develop applications using file handling and exception handling.

U23BSP11 – Physics and Chemistry Laboratory

COURSE OUTCOMES:

CO1 – Understand the functioning of physics laboratory equipment.
CO2 – Observe and tabulate experimental data.

CO3 – Solve problems individually and collaboratively.
CO4 – Analyze water quality (acidity, alkalinity).
CO5 – Determine hardness in water.
CO6 – Analyze impurities using electro-analytical techniques.

U23HSP12 – English Laboratory

COURSE OUTCOMES:

CO1 – Identify and comprehend complex academic texts.
CO2 – Interpret communication in formal and informal contexts.
CO3 – Demonstrate opinions effectively in oral and written form.
CO4 – Plan travelogue and construct paragraphs.
CO5 – Develop journal reading skills and small talk.
CO6 – Use technical terms and prepare PowerPoint presentations.

Semester II

U23HST21 – Professional English

COURSE OUTCOMES:

CO1 – Compare and contrast products and ideas in technical texts.
CO2 – Identify cause and effects in events and industrial processes through technical texts.
CO3 – Analyze problems to arrive at feasible solutions and communicate them orally and in written format.
CO4 – Write reports and effective job applications.
CO5 – Recall and comprehend different discourses and genres of texts.
CO6 – Become effective presenters.

U23MAT22 – Statistics and Numerical Methods

COURSE OUTCOMES:

CO1 – Apply hypothesis testing concepts for small and large sample problems.
CO2 – Apply design of experiments concepts in agriculture and engineering.
CO3 – Solve algebraic and transcendental equations.
CO4 – Apply numerical interpolation, differentiation and integration techniques.
CO5 – Solve ordinary differential equations with engineering applications.
CO6 – Understand techniques for solving first and second order differential equations.

U23PHT25 – Physics for Information Science

COURSE OUTCOMES:

CO1 – Understand semiconductor physics and its applications.
CO2 – Explain quantum mechanical concepts relevant to information science.
CO3 – Analyze optical and electronic materials used in information systems.
CO4 – Understand principles of photonic devices.
CO5 – Apply physics concepts in communication and information technology.
CO6 – Demonstrate knowledge of modern physics applications in computing systems.

U23EET23 – Basic Electrical and Electronics Engineering

COURSE OUTCOMES:

CO1 – Understand the basic electrical circuit concepts.
CO2 – Analyze DC and AC circuits using network theorems.
CO3 – Understand working principles of electrical machines.
CO4 – Explain basic electronic devices and circuits.
CO5 – Analyze basic electrical and electronic systems.
CO6 – Apply electrical engineering principles in practical applications.

U23ECT23 – Digital Principles and System Design

COURSE OUTCOMES:

CO1 – Simplify Boolean functions using K-Map.
CO2 – Design and analyze combinational and synchronous sequential circuits.
CO3 – Design and analyze asynchronous circuits.
CO4 – Write HDL code for combinational and sequential circuits.
CO5 – Implement memory management circuits.
CO6 – Implement designs using programmable logic devices.

U23CST21 – Programming in C

COURSE OUTCOMES:

CO1 – Demonstrate knowledge of C programming constructs.
CO2 – Design and implement programs using arrays and strings.
CO3 – Develop modular applications using functions and pointers.
CO4 – Develop applications using structures and unions.
CO5 – Design programs using sequential and random-access file processing.
CO6 – Explain the concept of command line arguments.

Semester II Practical Subjects

U23CSP21 – Programming in C Laboratory

COURSE OUTCOMES:

CO1 – Demonstrate knowledge on C programming constructs.
CO2 – Develop programs using basic constructs.
CO3 – Construct programs using arrays.
CO4 – Develop applications using strings, pointers and functions.
CO5 – Build applications using structures.
CO6 – Develop applications using file processing.

U23HSP22 – Communication Laboratory

COURSE OUTCOMES:

CO1 – Demonstrate technical competency through language skills.
CO2 – Participate effectively in group discussions.
CO3 – Communicate ideas clearly in professional situations.
CO4 – Write technical instructions and reports.
CO5 – Develop decision-making and presentation skills.
CO6 – Prepare job applications and professional documents

Semester III

U23AIT31 – Database Management System

COURSE OUTCOMES:

CO1 – Understand database environment and conceptual data modelling.
CO2 – Apply SQL for database definition, manipulation and querying.
CO3 – Design relational database using normalization techniques.
CO4 – Develop database applications for real-time problems.
CO5 – Design object-relational databases.
CO6 – Apply object-relational queries for database applications.

U23AIT32 – Data Structures

COURSE OUTCOMES:

CO1 – Understand abstract data types and basic data structures.
CO2 – Design and implement linear data structures such as lists, stacks and queues.
CO3 – Apply sorting and searching algorithms for data processing.
CO4 – Implement tree data structures for searching and indexing.
CO5 – Model problems using graph structures and algorithms.
CO6 – Analyze algorithm efficiency and performance for data structures.

U23AIT33 – Computer Organization and Architecture

COURSE OUTCOMES:

CO1 – Understand basic computer organization and functional units.
CO2 – Explain instruction formats and addressing modes.
CO3 – Analyze CPU organization and data path design.
CO4 – Understand memory hierarchy and cache memory concepts.
CO5 – Explain input/output organization and interfacing.
CO6 – Analyze performance of computer architecture systems.

U23AIT34 – Design and Analysis of Algorithms

COURSE OUTCOMES:

CO1 – Understand algorithm design techniques.
CO2 – Analyze algorithm complexity using asymptotic notation.
CO3 – Apply divide and conquer and greedy methods.
CO4 – Apply dynamic programming techniques for optimization problems.
CO5 – Solve graph problems using algorithmic techniques.
CO6 – Evaluate algorithm efficiency for different problem domains.

U23AIT35 – Design Thinking for AI

COURSE OUTCOMES:

CO1 – Understand design thinking concepts for problem solving.
CO2 – Identify real-world problems and analyze user needs.
CO3 – Generate innovative ideas using brainstorming techniques.
CO4 – Develop prototypes for AI-based solutions.
CO5 – Evaluate solutions using testing and feedback.
CO6 – Apply design thinking approach to AI applications.

Semester III Practical

U23AIP31 – Database Management Systems Laboratory

COURSE OUTCOMES:

CO1 – Implement database schemas using SQL.
CO2 – Perform database queries and data manipulation.
CO3 – Develop database applications using stored procedures and triggers.
CO4 – Implement normalization techniques in database design.
CO5 – Develop real-time database applications.
CO6 – Demonstrate transaction and concurrency control mechanisms.

U23AIP32 – Data Structures Laboratory

COURSE OUTCOMES:

CO1 – Implement ADTs using Python classes.
CO2 – Implement linear data structures such as lists, stacks and queues.
CO3 – Implement tree structures for searching and sorting.
CO4 – Implement graph algorithms for problem solving.
CO5 – Implement shortest path algorithms such as Dijkstra and Floyd-Warshall.
CO6 – Implement minimum spanning tree algorithms such as Prim's and Kruskal's.

Semester IV

U23MAT41 – Probability and Statistics

COURSE OUTCOMES:

CO1 – Understand basic probability concepts and distributions.
CO2 – Apply statistical measures for data analysis.
CO3 – Analyze random variables and probability distributions.
CO4 – Apply statistical inference and hypothesis testing.
CO5 – Use correlation and regression techniques for data analysis.
CO6 – Apply statistical methods for solving engineering problems.

U23AIT41 – Artificial Intelligence

COURSE OUTCOMES:

CO1 – Explain intelligent agent frameworks.
CO2 – Apply problem solving techniques.
CO3 – Apply game playing and constraint satisfaction techniques.
CO4 – Perform logical reasoning.
CO5 – Perform probabilistic reasoning under uncertainty.
CO6 – Apply inference rules for AI applications.

U23AIT42 – Data Science

COURSE OUTCOMES:

CO1 – Understand data science fundamentals and the correct process for applying data science.
CO2 – Represent and analyze data in different formats.
CO3 – Infer new information from data using analysis techniques.
CO4 – Collect and transform raw data using Python libraries.

CO5 – Apply Python libraries for data visualization.
CO6 – Understand concepts of data visualization.

U23CST43 – Operating Systems

COURSE OUTCOMES:

CO1 – Understand the basic concepts of operating systems.
CO2 – Explain process management and scheduling algorithms.
CO3 – Analyze synchronization and deadlock handling techniques.
CO4 – Understand memory management techniques.
CO5 – Explain file systems and I/O management.
CO6 – Analyze performance issues in operating systems.

U23AIT44 – Fundamentals of Computer Networks and Communication

COURSE OUTCOMES:

CO1 – Understand basic networking concepts and models.
CO2 – Explain data transmission and switching techniques.
CO3 – Understand routing and network protocols.
CO4 – Analyze transport layer protocols and services.
CO5 – Understand network security and communication systems.
CO6 – Apply networking concepts for real-world applications.

U23GET41 – Environmental Sciences and Engineering

COURSE OUTCOMES:

CO1 – Understand environmental ecosystems and biodiversity.
CO2 – Analyze environmental pollution and its control methods.
CO3 – Understand waste management techniques.
CO4 – Apply environmental protection laws and policies.
CO5 – Analyze environmental impact assessment.
CO6 – Apply sustainable development concepts.

Semester IV Practical

U23AIP41 – Artificial Intelligence Laboratory

COURSE OUTCOMES:

CO1 – Implement fundamental search strategies for AI problems.
CO2 – Apply A* algorithm using heuristic search techniques.
CO3 – Develop game-playing agents using adversarial search.
CO4 – Implement constraint satisfaction problems.
CO5 – Implement logical reasoning strategies for automated inference.
CO6 – Construct probabilistic models for handling uncertainty.

U23AIP42 – Data Science Laboratory

COURSE OUTCOMES:

CO1 – Understand real-world data and information.
CO2 – Apply data science techniques using Excel and Python.
CO3 – Design mathematical models for problem solving.

CO4 – Interpret different data science tools and their advantages.
CO5 – Illustrate opportunities of data science in industries.
CO6 – Apply data modelling for real-world applications.

Semester V

U23CST42 – Machine Learning

COURSE OUTCOMES:

CO1 – Make use of appropriate search algorithms for problem solving.
CO2 – Apply reasoning under uncertainty.
CO3 – Build supervised learning models.
CO4 – Build ensemble and unsupervised learning models.
CO5 – Build deep learning neural network models.
CO6 – Explain gradient descent optimization.

U23AIT52 – Big Data Analytics

COURSE OUTCOMES:

CO1 – Understand concepts of big data and its processing techniques.
CO2 – Apply clustering and classification techniques on big data.
CO3 – Analyze association rules and recommendation systems.
CO4 – Process streaming data using memory-based techniques.
CO5 – Apply NoSQL data management techniques for big data.
CO6 – Visualize large datasets for data analytics applications.

U23AIT53 – Data Exploration and Visualization

COURSE OUTCOMES:

CO1 – Understand the fundamentals of data science and data exploration.
CO2 – Represent and analyze data in different formats.
CO3 – Infer useful information from datasets using analytical techniques.
CO4 – Collect and transform raw data using Python libraries.
CO5 – Apply Python libraries to visualize data.
CO6 – Understand the concepts and importance of data visualization.

U23AIV1 – Professional Elective I

COURSE OUTCOMES:

CO1 – Understand the fundamentals of the selected elective domain.
CO2 – Apply techniques related to the elective subject.
CO3 – Analyze problems in the selected elective area.
CO4 – Design solutions using appropriate tools and techniques.
CO5 – Implement solutions for real-world applications.
CO6 – Evaluate performance of the developed solutions.

U23AIV2 – Professional Elective II

COURSE OUTCOMES:

CO1 – Understand core concepts of the selected elective subject.
CO2 – Apply techniques in the chosen specialization domain.

CO3 – Analyze problems and design solutions.
CO4 – Implement solutions using suitable technologies.
CO5 – Evaluate and optimize system performance.
CO6 – Apply knowledge for real-world applications.

Semester V Practical

U23CSP42 – Machine Learning Laboratory

COURSE OUTCOMES:

CO1 – Implement machine learning algorithms using programming tools.
CO2 – Apply supervised learning algorithms for data analysis.
CO3 – Implement unsupervised learning techniques.
CO4 – Perform model evaluation and validation.
CO5 – Visualize machine learning results.
CO6 – Develop machine learning applications for real datasets.

U23AIP52 – Big Data Analytics Laboratory

COURSE OUTCOMES:

CO1 – Implement big data processing techniques.
CO2 – Apply clustering and classification algorithms on large datasets.
CO3 – Analyze association patterns in data.
CO4 – Implement big data analytics using tools and frameworks.
CO5 – Visualize large-scale datasets.
CO6 – Develop big data analytics applications.

Semester VI

U23AIT61 – Deep Learning

COURSE OUTCOMES:

CO1 – Understand the fundamentals of deep learning and neural networks.
CO2 – Apply activation functions and optimization techniques in neural networks.
CO3 – Implement convolutional neural networks for image processing tasks.
CO4 – Apply recurrent neural networks for sequence modelling problems.
CO5 – Develop deep learning models for real-world applications.
CO6 – Evaluate performance of deep learning models.

U23AIT62 – Natural Language Processing

COURSE OUTCOMES:

CO1 – Understand the fundamentals of natural language processing.
CO2 – Apply text preprocessing and tokenization techniques.
CO3 – Implement syntactic and semantic analysis methods.
CO4 – Apply machine learning techniques for text classification.
CO5 – Develop NLP models for real-world applications.
CO6 – Evaluate performance of NLP systems.

U23AIT63 – Cloud Computing

COURSE OUTCOMES:

CO1 – Understand cloud computing concepts and service models.
CO2 – Explain virtualization technologies used in cloud computing.
CO3 – Analyze cloud architecture and deployment models.
CO4 – Implement cloud services for application deployment.
CO5 – Apply cloud security and data management techniques.
CO6 – Evaluate performance of cloud-based applications.

U23AIV3 – Professional Elective III

COURSE OUTCOMES:

CO1 – Understand concepts related to the chosen elective domain.
CO2 – Apply techniques in the selected specialization area.
CO3 – Analyze domain-specific problems.
CO4 – Design solutions using appropriate tools and technologies.
CO5 – Implement real-world applications in the elective area.
CO6 – Evaluate and optimize system performance.

U23AIV4 – Professional Elective IV

COURSE OUTCOMES:

CO1 – Understand core concepts of the elective subject.
CO2 – Apply techniques related to the elective domain.
CO3 – Analyze problems in the selected field.
CO4 – Design solutions using suitable technologies.
CO5 – Implement applications for real-world problems.
CO6 – Evaluate system performance and effectiveness.

Semester VI Practical

U23AIP61 – Deep Learning Laboratory

COURSE OUTCOMES:

CO1 – Implement neural network models using programming tools.
CO2 – Apply deep learning techniques for image processing tasks.
CO3 – Implement convolutional neural networks.
CO4 – Implement recurrent neural networks for sequential data.
CO5 – Evaluate performance of deep learning models.
CO6 – Develop deep learning applications for real-world datasets.

U23AIP62 – Natural Language Processing Laboratory

COURSE OUTCOMES:

CO1 – Implement text preprocessing and feature extraction techniques.
CO2 – Apply NLP techniques for text analysis.
CO3 – Implement machine learning models for text classification.
CO4 – Perform sentiment analysis and text mining.
CO5 – Evaluate NLP model performance.
CO6 – Develop NLP applications for real-world datasets.

Semester VII

U23AIT71 – Computer Vision

COURSE OUTCOMES:

CO1 – Understand the fundamentals of computer vision and image processing.
CO2 – Apply image preprocessing and feature extraction techniques.
CO3 – Implement image segmentation and object detection methods.
CO4 – Apply deep learning models for computer vision tasks.
CO5 – Develop computer vision applications for real-world problems.
CO6 – Evaluate performance of computer vision models.

U23AIT72 – Reinforcement Learning

COURSE OUTCOMES:

CO1 – Understand the fundamentals of reinforcement learning.
CO2 – Apply Markov Decision Process concepts.
CO3 – Implement value-based reinforcement learning algorithms.
CO4 – Apply policy-based reinforcement learning techniques.
CO5 – Develop reinforcement learning models for real-world applications.
CO6 – Evaluate reinforcement learning models.

U23AIV5 – Professional Elective V

COURSE OUTCOMES:

CO1 – Understand core concepts in the selected elective domain.
CO2 – Apply techniques related to the elective subject.
CO3 – Analyze problems in the selected specialization.
CO4 – Design solutions using appropriate tools.
CO5 – Implement applications in the elective domain.
CO6 – Evaluate system performance and results.

U23AIV6 – Professional Elective VI

COURSE OUTCOMES:

CO1 – Understand advanced concepts in the elective domain.
CO2 – Apply techniques in the chosen specialization area.
CO3 – Analyze domain-specific problems.
CO4 – Design and implement solutions.
CO5 – Develop real-world applications.
CO6 – Evaluate effectiveness of the solutions.

U23AIT73 – Project Work Phase I

COURSE OUTCOMES:

CO1 – Identify real-world problems in the AI and Data Science domain.
CO2 – Conduct literature survey and problem analysis.
CO3 – Design system architecture and methodology.
CO4 – Implement prototype models.
CO5 – Analyze results and refine system design.
CO6 – Present project progress through reports and presentations.

Semester VIII

U23AIT81 – Project Work Phase II

COURSE OUTCOMES:

CO1 – Implement complete project solutions based on Phase I design.
CO2 – Apply AI and Data Science techniques to solve real-world problems.
CO3 – Evaluate performance of the developed system.
CO4 – Analyze results and improve system accuracy.
CO5 – Document the project work with proper technical reports.
CO6 – Present and defend the project work effectively.

VERTICAL – I (Data Science)

U23CSV67 – Knowledge Engineering

COURSE OUTCOMES:

CO1 – Understand the fundamentals of knowledge engineering and knowledge-based systems.
CO2 – Represent knowledge using semantic networks, frames and rules.
CO3 – Apply knowledge acquisition techniques.
CO4 – Design knowledge-based systems for problem solving.
CO5 – Implement inference mechanisms in expert systems.
CO6 – Evaluate performance of knowledge-based systems.

U23AIV12 – Recommender Systems

COURSE OUTCOMES:

CO1 – Understand the fundamentals of recommender systems.
CO2 – Apply collaborative filtering techniques.
CO3 – Apply content-based recommendation methods.
CO4 – Develop hybrid recommender systems.
CO5 – Evaluate recommender system performance.
CO6 – Implement recommender systems for real-world applications.

U23AIV13 – Soft Computing

COURSE OUTCOMES:

CO1 – Understand the concepts of soft computing.
CO2 – Apply fuzzy logic techniques.
CO3 – Implement neural network models.
CO4 – Apply genetic algorithms for optimization problems.
CO5 – Analyze hybrid soft computing techniques.
CO6 – Develop intelligent systems using soft computing.

U23CSV14 – Text and Speech Analysis

COURSE OUTCOMES:

CO1 – Understand text and speech processing fundamentals.
CO2 – Apply text preprocessing and feature extraction techniques.
CO3 – Implement speech signal processing techniques.
CO4 – Apply machine learning for text classification.

CO5 – Develop speech recognition systems.
CO6 – Evaluate performance of text and speech systems.

U23CSV15 – Business Analytics

COURSE OUTCOMES:

CO1 – Understand the fundamentals of business analytics.
CO2 – Apply statistical methods for business data analysis.
CO3 – Analyze business datasets using analytical tools.
CO4 – Apply predictive analytics techniques.
CO5 – Develop business decision models.
CO6 – Evaluate business strategies using analytics.

U23CSV16 – Image and Video Analytics

COURSE OUTCOMES:

CO1 – Understand image and video processing concepts.
CO2 – Apply image preprocessing and enhancement techniques.
CO3 – Extract features from images and videos.
CO4 – Apply machine learning for image classification.
CO5 – Implement video analytics applications.
CO6 – Evaluate performance of visual analytics systems.

U23CBT51 – Theory of Computation

COURSE OUTCOMES:

CO1 – Understand formal languages and automata theory.
CO2 – Design finite automata for language recognition.
CO3 – Analyze context-free grammars and pushdown automata.
CO4 – Understand Turing machines and computability.
CO5 – Analyze complexity of computational problems.
CO6 – Apply theoretical models to computation problems.

VERTICAL – II (Full Stack Development)

U23CSV22 – App Development

COURSE OUTCOMES:

CO1 – Understand mobile application development concepts.
CO2 – Design user interfaces for mobile applications.
CO3 – Implement mobile apps using development frameworks.
CO4 – Integrate APIs and databases in mobile apps.
CO5 – Test and debug mobile applications.
CO6 – Deploy mobile applications.

U23CSV23 – Cloud Services Management

COURSE OUTCOMES:

CO1 – Understand cloud service models and deployment models.
CO2 – Manage cloud resources and services.
CO3 – Implement cloud storage and computing solutions.
CO4 – Apply cloud security practices.
CO5 – Monitor cloud performance and availability.
CO6 – Develop scalable cloud applications.

U23EET62 – Embedded Systems

COURSE OUTCOMES:

CO1 – Understand embedded system architecture.
CO2 – Apply microcontroller programming techniques.
CO3 – Interface sensors and devices with embedded systems.
CO4 – Develop embedded system applications.
CO5 – Analyze real-time system performance.
CO6 – Implement embedded solutions for real-world problems.

U23CSV25 – Software Testing and Automation

COURSE OUTCOMES:

CO1 – Understand software testing fundamentals.
CO2 – Design test cases and testing strategies.
CO3 – Apply automated testing tools.
CO4 – Perform functional and non-functional testing.
CO5 – Analyze software defects and debugging techniques.
CO6 – Evaluate software quality assurance processes.

U23CSV26 – Web Application Security

COURSE OUTCOMES:

CO1 – Understand web application security concepts.
CO2 – Identify common web vulnerabilities.
CO3 – Apply secure coding practices.
CO4 – Implement authentication and authorization mechanisms.
CO5 – Perform security testing on web applications.
CO6 – Develop secure web systems.

U23CSV17 – Computer Vision

COURSE OUTCOMES:

CO1 – Understand image processing fundamentals.
CO2 – Apply feature extraction techniques.
CO3 – Implement object detection methods.
CO4 – Apply deep learning for vision tasks.
CO5 – Develop computer vision applications.
CO6 – Evaluate computer vision model performance.

VERTICAL – III (Cloud Computing & Data Centre Technologies)

U23CST71 – Cloud Computing

COURSE OUTCOMES:

CO1 – Understand cloud architecture and services.
CO2 – Implement virtualization technologies.
CO3 – Deploy applications in cloud environments.
CO4 – Apply cloud storage solutions.
CO5 – Implement cloud security mechanisms.
CO6 – Evaluate cloud system performance.

U23ITV31 – Data Warehousing

COURSE OUTCOMES:

CO1 – Understand data warehouse architecture.
CO2 – Apply ETL processes for data integration.
CO3 – Design multidimensional data models.
CO4 – Implement OLAP operations.
CO5 – Analyze large data repositories.
CO6 – Develop data warehouse applications.

U23ITV65 – Optimization Techniques

COURSE OUTCOMES:

CO1 – Understand optimization problem formulations.
CO2 – Apply linear programming techniques.
CO3 – Solve transportation and assignment problems.
CO4 – Apply nonlinear optimization methods.
CO5 – Analyze optimization algorithms.
CO6 – Apply optimization for engineering applications.

U23ITV67 – Game Theory

COURSE OUTCOMES:

CO1 – Understand game theory fundamentals.
CO2 – Analyze strategic decision-making models.
CO3 – Apply Nash equilibrium concepts.
CO4 – Model competitive scenarios using game theory.
CO5 – Analyze cooperative and non-cooperative games.
CO6 – Apply game theory to economics and computing problems.

U23AIV34 – Java Programming

COURSE OUTCOMES:

CO1 – Understand Java programming fundamentals.
CO2 – Implement object-oriented programming concepts.
CO3 – Develop Java applications using classes and interfaces.
CO4 – Implement exception handling and file operations.
CO5 – Develop GUI applications using Java.
CO6 – Build real-world Java applications.

U23CSV58 – Cognitive Science

CO1 – Understand cognitive science fundamentals.
CO2 – Analyze human cognition and perception.
CO3 – Apply cognitive models in AI systems.
CO4 – Analyze decision-making processes.
CO5 – Develop intelligent cognitive systems.
CO6 – Evaluate cognitive computing applications.