PRATHYUSHA ENGINEERING COLLEGE, CHENNAI

AN AUTONOMOUS INSTITUTION

REGULATIONS 2023

B. E. COMPUTER SCIENCE AND ENGINEERING (CYBER SECURITY)

CHOICE BASED CREDIT SYSTEM

CURRICULUM AND SYLLABI FOR SEMESTERS I TO VIII

SEMESTER I

S. NO.	COURSE CODE	COURSE TITLE	CATE-GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	IP23101	Induction Programme	-	-	-	-	-	0
THEORY								
1.	MA23101	Matrices and Calculus	BSC	4	0	0	4	4
2.	PH23101	Engineering Physics	BSC	3	0	0	3	3
3.	CH23101	Engineering Chemistry	BSC	3	0	0	3	3
4.	GE23101	Engineering Graphics	ESC	3	0	0	3	3
5.	HS23101	Heritage of Tamil	HSMC	1	0	0	1	1
PRACTICALS								
7.	LBS23101	Physics and Chemistry Laboratory	BSC	0	0	3	3	1.5
8.	LHS23101	Communication Skills Laboratory	HSMC	0	0	3	3	1.5
9.	MC23102	Idea Laboratory	MC	0	0	3	3	0
10.	MC23101	Mandatory Course (NSS/NSO/YRC)	MC	0	0	2	2	0
TOTAL				**14**	**0**	**11**	**25**	**17**

$ NSS / NCC / NSO / YRC / CLUB ACTIVITIES

SEMESTER II

S. NO.	COURSE CODE	COURSE TITLE	CATE-GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
THEORY								
1.	HS23202	Professional English	HSMC	3	0	0	3	3
2.	HS23203	Tamils and Technology	HSMC	1	0	0	1	1
3.	MA23202	Differential Equations and Transform Techniques	BSC	4	0	0	4	4
4.	CS23201	Problem Solving Using 'C'	ESC	3	0	0	3	3
5.	BE23201	Basic of Electrical and Electronics Engineering	ESC	3	0	0	3	3
PRACTICALS								
6.	LES23201	Engineering Practices Laboratory	ESC	0	0	3	3	1.5
7.	LCS23201	Problem Solving Uisng C Laboratory	ESC	0	0	3	3	1.5
8.	MC23201	Design Thinking	MC	0	0	2	2	0
9.	MC23202	Digital Marketing And Social Media Skills	MC	0	0	2	2	0
			TOTAL	**14**	**0**	**10**	**24**	**17**

SEMESTER III

S. NO.	COURSE CODE	COURSETITLE	CATE GORY	PERIODS PERWEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
THEORY								
1.	MA23303	Discrete Mathematics	BSC	4	0	0	4	4
2.	CS23301	Digital Principles and Computer Organization	PCC	3	0	2	5	4
3.	CS23302	Data Structures	PCC	3	0	0	3	3
4.	CS23303	Object Oriented Programming	PCC	3	0	0	3	3
5.	AD23301	Data Science Using Python	PCC	3	0	0	3	3
6.	MC23301	Mandatory Course	MC	2	0	0	2	0
PRACTICALS								
7.	LCS23301	Data Structures Laboratory	PCC	0	0	3	3	1.5
8.	LCS23302	Object Oriented Programming Laboratory	PCC	0	0	3	3	1.5
9.	LAD23301	Data Science Using Python Laboratory	PCC	0	0	3	3	1.5
10.	EEC23301	Aptitude Skills	EEC	0	1	0	1	1
			TOTAL	**18**	**1**	**11**	**30**	**22.5**

$MOOC/SWAYAM/NPTEL/COURSERA/CERTIFICATIONCOURSES

SEMESTER IV

S. NO.	COURSE CODE	COURSETITLE	CATE GORY	PERIODS PERWEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
THEORY								
1.	CS23402	Computer Networks	PCC	3	0	2	5	4
2.	CS23404	Algorithms	PCC	3	0	2	5	4
3.	CB23401	Database Management Systems and Security	PCC	3	0	0	3	3
4.	CB23402	Operating Systems and Security	PCC	3	0	2	5	4
5.	CB23403	Cryptography and Cyber Security	PCC	3	0	2	5	4
6.	GE23402	Environmental Sciences and Sustainability	BSC	2	0	0	2	2
7.	MC23401	Mandatory Course	MC	2	0	0	2	0
PRACTICALS								
8.	LCB23401	Database Management Systems and Security Laboratory	PCC	0	0	3	3	1.5
9.	EEC23401	Foreign Language/Advanced Aptitude Skills	EEC	0	1	0	1	1
10.	LCB23402	MINIPROJECT	EEC	0	0	2	2	1
			TOTAL	**19**	**1**	**13**	**33**	**24.5**

SEMESTER V

S. NO.	COURSE CODE	COURSETITLE	CATE GORY	PERIODSPER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
THEORY								
1.	CS23503	Distributed Computing	PCC	3	0	0	3	3
2.	CB23501	Information Security	PCC	2	0	2	4	3
3.	CS23601	Internet of Things	PCC	3	0	2	5	4
4.	CS23501	Artificial Intelligence and Machine Learning	PCC	3	0	2	5	4
5.		Professional Elective I	PEC	-	-	-	-	3
6.		Professional Elective II	PEC	-	-	-	-	3
7.	MC23501	Mandatory Course$	MC	2	0	0	2	0
PRACTICALS								
8.	EEC23501	Coding Skills	EEC	0	0	2	2	1
9.	ECB23501	Internship/Industrial Training	EEC	0	0	0	0	2
			TOTAL	**-**	**-**	**-**	**-**	23

$MOOC/SWAYAM/NPTEL/COURSERA/CERTIFICATIONCOURSES

SEMESTER VI

S. NO.	COURSE CODE	COURSETITLE	CATEGORY	PERIODSPER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
THEORY								
1.	CB23601	Cyber Forensics	PCC	3	0	2	5	4
2.	CB23602	Network Security	PCC	3	0	2	5	4
3.		Open Elective–I*	OEC	3	0	0	3	3
4.		Professional Elective III	PEC	-	-	-	-	3
5.		Professional Elective IV	PEC	-	-	-	-	3
6.		Professional Elective V	PEC	-	-	-	-	3
7.	MC23601	Mandatory Course[&]	MC	2	0	0	2	0
PRACTICALS								
9.	EEC23601	Preparedness for Career Opportunities	EEC	0	0	2	2	1
10.	LCB23601	MINIPROJECT-II / SRP	EEC	0	0	2	2	1
			TOTAL	**-**	**-**	**-**	**-**	**22**

***Open Elective–I Shall be chosen from the list of open electives offered by other Programmes**

[&]MOOC/SWAYAM/NPTEL/COURSERA/CERTIFICATIONCOURSES

SEMESTER VII

S. NO.	COURSE CODE	COURSETITLE	CATE GORY	PERIODS PERWEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
THEORY								
1.	CB23701	Vulnerability Assessment & Penetration Testing	PCC	3	0	2	5	4
2.	CB23702	Digital and Mobile Forensics	PCC	3	0	2	5	4
3.		Elective Management	HSMC	3	0	0	3	3
4.		Open Elective–II**	OEC	3	0	0	3	3
5.		Open Elective–III**	OEC	3	0	0	3	3
6.		Professional Elective VI	PEC	-	-	-	-	3
7.	MC23701	Mandatory Course[&]	MC	2	0	0	2	0
PRACTICALS								
8.	ECB23701	Summer internship	EEC	0	0	0	0	2
			TOTAL	**-**	**-**	**-**	**-**	**22**

Internship from ABROAD UNIVERSITIES / INDUSTRIES

[&]**MOOC/SWAYAM/NPTEL/COURSERA/CERTIFICATIONCOURSES**

SEMESTER VIII

S. NO.	COURSE CODE	COURSETITLE	CATE GORY	PERIODS PERWEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
THEORY								
1.	HS23804	Professional Ethics and Human Values	HSMC	3	0	0	3	3
2.		Professional Elective VII	PEC	-	-	-	-	3
PRACTICALS								
3.	LCB23801	Project Work / Internship	EEC	0	0	20	20	10
			TOTAL	-	-	-	-	**16**

ELECTIVE – MANAGEMENT COURSES

SL. NO	COURSE CODE	COURSE TITLE	CATE GORY	PERIODS PERWEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	GE23703	Principles of Management	HSMC	3	0	0	3	3
2.	GE23704	Total Quality Management	HSMC	3	0	0	3	3
3.	GE23705	Engineering Economics and Financial Accounting	HSMC	3	0	0	3	3
4.	GE23706	Human Resource Management	HSMC	3	0	0	3	3
5.	GE23707	Knowledge Management	HSMC	3	0	0	3	3
6.	GE23708	Industrial Management	HSMC	3	0	0	3	3

MANDATORY COURSES

S. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	MC23101	NSS/NSO/YRC/CLUB ACTIVITIES	MC	0	0	2	2	0
2.	MC23102	IDEA LABORATORY	MC	0	0	3	3	0
3.	MC23201	DESIGN THINKING	MC	0	0	2	2	0
4.	MC23202	DIGITAL MARKETING AND SOCIAL MEDIA SKILLS	MC	0	0	2	2	0
5.	MC23301	MOOC/SWAYAM/COURSERA/ONLINE CERTIFICATION	MC	2	0	0	2	0
6.	MC23401	MOOC/SWAYAM/COURSERA/ONLINE CERTIFICATION	MC	2	0	0	2	0
7.	MC23501	MOOC/SWAYAM/COURSERA/ONLINE CERTIFICATION	MC	2	0	0	2	0
8.	MC23601	MOOC/SWAYAM/COURSERA/ONLINE CERTIFICATION	MC	0	0	0	0	0
9.	MC23701	MOOC/SWAYAM/COURSERA/ONLINE CERTIFICATION	MC	0	0	0	0	0

PROFESSIONAL ELECTIVE COURSES: VERTICALS

Vertical I Data Science	Vertical II Full Stack Development	Vertical III Cloud Computing and Data Center Technologies	Vertical IV Cyber Security and Data Privacy	Vertical V Creative Media	Vertical VI Emerging Technologies	Vertical VII Artificial Intelligence and Machine Learning
Exploratory Data Analysis	Web Technologies	Cloud Computing	Ethical Hacking	Augmented Reality/Virtual Reality	Augmented Reality/Virtual Reality	Knowledge Engineering
Recommender Systems	App Development	Virtualization	Digital and Mobile Forensics	Multimedia and Animation	botic Process Automation	Soft Computing
Neural Networks and Deep Learning	Cloud Services Management	Cloud Services Management	Social Network Security	Video Creation and Editing	Neural Networks and Deep Learning	Neural Networks and Deep Learning
Text and Speech Analysis	UI and UX Design	Multimedia Data Compression and Storage	Modern Cryptography	UI and UX Design	Cyber security	Text and Speech Analysis
Business Analytics	Software Testing and Automation	Storage Technologies	Engineering Secure software systems	Digital marketing	Quantum Computing	Optimization Techniques
Computer Vision	Web Application Security	Software Defined Networks	Cryptocurrency and Blockchain Technologies	Visual Effects	Cryptocurrency and Blockchain Technologies	Game Theory
Big Data Analytics	DevOps	Stream Processing	Network Security	Game Development	Security and Privacy in Cloud	Cognitive Science

Course Name and Outcomes - All Semesters

SEMESTER I

COURSE NAME	COURSE OUTCOMES
Matrices and Calculus	CO1: Use the matrix algebra methods for solving practical problems. CO2: Apply differential calculus tools in solving various application problems. CO3: Use differential calculus ideas on several variable functions. CO4: Apply different methods of integration in solving practical problems. CO5: Apply multiple integral ideas in solving areas, volumes and other practical problems.
Engineering Physics	CO1: Understand the importance of mechanics. CO2: Express their knowledge in electromagnetic waves. CO3: Demonstrate a strong foundational knowledge in oscillations, optics and lasers. CO4: Understand the importance of quantum physics. CO5: Comprehend and apply quantum mechanical principles towards the formation of energy bands.
Engineering Chemistry	CO1: Infer the quality of water and propose treatment methodologies. CO2: Identify and apply nanomaterials concepts. CO3: Apply phase rule and composites knowledge. CO4: Recommend suitable fuels. CO5: Recognize and apply various energy resources.
Heritage of Tamil	CO1: Appreciate the linguistic, literary and cultural legacy of the Tamils. CO2: Understand various periods in Tamil culture and its uniqueness.
Engineering Graphics	CO1: Use BIS conventions and specifications for engineering drawing. CO2: Construct the conic curves and cycloid. CO3: Solve projection of lines problems. CO4: Draw orthographic, isometric and perspective projections of solids. CO5: Draw the development of simple solids.
Physics and Chemistry Laboratory	**Physics Lab**

	CO1: Apply elasticity concepts for modulus measurements. CO2: Determine compressibility using ultrasonic waves. CO3: Use optics principles in communication. CO4: Understand thermal properties of materials. CO5: Use basic instruments for measurements. **Chemistry Lab** CO1: Analyse the quality of water samples with respect to their acidity, alkalinity, hardness andDO. CO2: Determine the amount of metal ions through volumetric and spectroscopic techniques CO3: Aanalyse and determine the composition of alloys. CO4: Learn simple method of synthesis of nanoparticles CO5:Quantitatively analyse the impurities in solution by electroanalytical techniques
Communication Skills Laboratory	CO1: Comprehend academic texts. CO2: Speak fluently in various contexts. CO3: Express opinions effectively. CO4: Write clearly in different media. CO5: Use listening and speaking strategies effectively.
IDEA LAB	CO1understand the concept of manufacturing processes. CO2- Describe the working of the machine element. CO3- Discuss about the various electronic components and equipments CO4- Describe the fabrication of PCB design using Ki CAD software

SEMESTER II

COURSE NAME	COURSE OUTCOMES
Professional English	CO1: Use appropriate words in a professional context. CO2: Understand basic grammatical structures and apply them. CO3: Read and infer meanings from technical texts. CO4: Write definitions, descriptions, narrations and essays.

Tamils and Technology	CO1: Appreciate traditional Tamil technological wisdom. CO2: Explore the connection between language, science and engineering.
Differential Equations and Transform Techniques	CO1: Solve higher order ordinary differential equations which arise in engineering applications. CO2: Solve the partial differential equations in solving engineering problems. CO3: Apply Fourier series techniques in engineering applications. CO4: Understand the Fourier transform techniques in solving engineering problems. CO5: Understand the Z-transforms techniques in solving difference equations.
Problem Solving Using C	CO1: Demonstrate knowledge on C Programming constructs CO2: Develop simple applications in C using basic constructs CO3: Design and implement applications using arrays and strings CO4: Develop and implement modular applications in C using functions. CO5: Develop applications in C using structures and pointers. CO6: Design applications using sequential and random access file processing
Basic of Electrical and Electronics Engineering	CO1: Students can able to compute the electric circuit parameters for simple problems CO2: Students can able to understand the working principle and applications of electrical machines CO3: Students can able to analyze the characteristics of analog electronic devices CO4: Students can able to understand the basic concepts of digital electronics CO5: Students can able to understand the operating principles of measuring instruments
Engineering Practices Laboratory	CO1: Draw pipe line plan; lay and connect various pipe fittings used in common household plumbing work; Saw; plan; make joints in wood materials used in common household wood work. CO2: Weld various joints in steel plates using arc welding work; Machine various

	simple processes like turning, drilling, tapping in parts; Assemble simple mechanical assembly ofcommon household equipments; Make a tray out of metal sheet using sheet metal work. CO3: Wire various electrical joints in common household electrical wire work. CO4: Solder and test simple electronic circuits.
Problem Solving Using C Laboratory	CO1: Demonstrate knowledge on C programming constructs. CO2: Develop programs in C using basic constructs. CO3: Develop programs in C using arrays. CO4: Develop applications in C using strings, pointers, functions. CO5: Develop applications in C using structures. CO6: Develop applications in C using file processing.
Design Thinking	CO1: Understand the concepts of design thinking. CO2: Apply problem-solving skills in creative ways.

SEMESTER III

COURSE NAME	COURSE OUTCOMES
Discrete Mathematics	CO1: Apply the concepts needed to test the logic of a program. CO2: Analyse the structures on many levels CO3: Transform a finite set into another finite set which relates to input and output functions in computer science. CO4: Analyse the counting principles. CO5: Implement the concepts and properties of algebraic structures such as groups, rings and fields.
Digital Principles and Computer Organization	CO1 : Design various combinational digital circuits using logic gates CO2 : Design sequential circuits and analyze the design procedures CO3 : State the fundamentals of computer systems and analyze the execution of an instruction CO4 : Analyze different types of control design and identify hazards

	CO5 : Identify the characteristics of various memory systems and I/O communication
Data Structures	CO1:explain abstract data types CO2:design, implement, and analyze linear data structures, such as lists, queues, and stacks, according to the needs of different applications CO3:design, implement, and analyze efficient tree structures to meet requirements such as searching, indexing, and sorting CO4:model problems as graph problems and implement efficient graph algorithms to solve them
Object Oriented Programming	CO1:Apply the concepts of classes and objects to solve simple problems CO2:Develop programs using inheritance, packages and interfaces CO3:Make use of exception handling mechanisms and multithreaded model to solve real world problems CO4:Build Java applications with I/O packages, string classes, Collections and generics concepts CO5:Integrate the concepts of event handling and JavaFX components and controls for developing GUI based applications
Data Science Using Python	CO1: Define the data science process CO2: Understand different types of data description for data science process CO3: Gain knowledge on relationships between data CO4: Use the Python Libraries for Data Wrangling CO5: Apply visualization Libraries in Python to interpret and explore data
Data Structures Laboratory	CO1:implement ADTs as Python classes CO2:design, implement, and analyse linear data structures, such as lists, queues, and stacks, according to the needs of different applications CO3:design, implement, and analyse efficient tree structures to meet requirements such as searching, indexing, and sorting CO4:model problems as graph problems

	and implement efficient graph algorithms to solve them
Object Oriented Programming Laboratory	CO1 : Design and develop java programs using object oriented programming concepts CO2 : Develop simple applications using object oriented concepts such as package, exceptions CO3 : Create GUIs and event driven programming applications for real world problems CO4: Implement multithreading, and generics concepts CO5: Implement and deploy web applications using Java
Data Science Using Python Laboratory	CO1: Make use of the python libraries for data science CO2: Make use of the basic Statistical and Probability measures for data science. CO3: Perform descriptive analytics on the benchmark data sets. CO4: Perform correlation and regression analytics on standard data sets CO5: Present and interpret data using visualization packages in Python.
Aptitude Skills	CO1: Improve logical and analytical thinking. CO2: Solve aptitude-based problems for placements.

SEMESTER IV

COURSE NAME	COURSE OUTCOMES
Computer Networks	CO 1: Articulate the basic layers and its functions in computer networks. CO 2: Examine the basics of how data flows from one node to another. CO 3: Analyze routing algorithms. CO 4: Evaluate protocols for various functions in the network. CO 5: Analyze the working of various application layer protocols.
Algorithms	CO1: Design efficient algorithms. CO2: Analyze algorithm complexity and apply suitable techniques.
Database Management Systems and	CO1: Model an application's data

Security	requirements using conceptual modeling and design database schemas based on the conceptual model. CO2: Formulate solutions to a broad range of query problems using relational algebra/SQL. CO3: Demonstrate an understanding of normalization theory and apply such knowledge to the normalization of a database. CO4: Run transactions and estimate the procedures for controlling the consequences of concurrent data access. CO5: Understand and handle security issues in database management systems
Operating Systems Security	CO1:To gain understanding on the concepts of Operating Systems. CO2:To acquire knowledge on process r CO3: To have understanding on memory, file and I/O management activities of OS. CO4: To understand security issues in operating systems and appreciate the need for security models CO5: To gain exposure to the operating systems security models of WINDOWS and UNIX OS
Cryptography and Cyber Security	CO1: Understand the fundamentals of networks security, security architecture, threats and vulnerabilities CO2: Apply the different cryptographic operations of symmetric cryptographic algorithms CO3: Apply the different cryptographic operations of public key cryptography CO4: Apply the various Authentication schemes to simulate different applications. CO5: Understand various cyber crimes and cyber security.
Environmental Sciences and Sustainability	CO1: To recognize and understand the functions of environment, ecosystems and biodiversity and their conservation. CO2: To identify the causes, effects of environmental pollution and natural disasters and contribute to the preventive measures in the society. CO3: To identify and apply the understanding of renewable and non-renewable resources and contribute to the sustainable measures to preserve them for future generations.

	CO4 To recognize the different goals of sustainable development and apply them for suitable technological advancement and societal development. CO5 To demonstrate the knowledge of sustainability practices and identify green materials, energy cycles and the role of sustainable urbanization.
Database Management Systems and Security Laboratory	CO1: Create databases with different types of key constraints. CO2: Write simple and complex SQL queries using DML and DCL commands. CO3: Realize database design using 3NF and BCNF. CO4: Use advanced features such as stored procedures and triggers. CO5: Secure databases and mitigate attacks on databases.
CRYPTOGRAPHY AND CYBER SECURITY LABORATORY	CO1: Develop a code for classical encryption techniques. CO2: Build a symmetric and asymmetric algorithms. CO3: Construct a code for various Authentication schemes. CO4: Apply the principles of digital signature.
Foreign Language/Advanced Aptitude Skills	Gain proficiency in a new language or enhance aptitude skills.
MINI PROJECT I	Apply interdisciplinary knowledge in solving real-life problems.

SEMESTER V

COURSE NAME	COURSE OUTCOMES
Distributed Computing	CO1: Explain the foundations of distributed systems (K2) CO2: Solve synchronization and state consistency problems (K3) CO3 Use resource sharing techniques in distributed systems (K3) CO4: Apply working model of consensus and reliability of distributed systems (K3) CO5: Explain the fundamentals of cloud computing (K2)
Information Security	CO1: Identify various vulnerabilities related to memory attacks. CO2: Apply security principles in software development.

	CO3: Evaluate the extent of risks. CO4: Involve selection of testing techniques related to software security in the testing phase of software development. CO5: Use tools for securing software.
Embedded and IOT	CO1: Explain the architecture of embedded processors. CO2: Write embedded C programs. CO3: Design simple embedded applications. CO4: Compare the communication models in IOT CO5: Design IoT applications using Arduino/Raspberry Pi /open platform.
COMPUTER NETWORKS	CO 1: Articulate the basic layers and its functions in computer networks. CO 2: Examine the basics of how data flows from one node to another. CO 3: Analyze routing algorithms. CO 4: Evaluate protocols for various functions in the network. CO 5: Analyze the working of various application layer protocols.
Coding Skills	CO1: Improve programming fluency. CO2: Solve coding problems efficiently.
Internship/Industrial Training	CO1: Gain industry exposure. CO2: Apply academic knowledge to real-world applications.

SEMESTER VI

COURSE NAME	COURSE OUTCOMES
Cyber Forensics	CO1: Understand the basics of cyber crime and computer forensics CO2: Apply a number of different computer forensic tools to a given scenario CO3: Analyze and validate forensics data CO4: Understand Admissibility of evidence in India with Cyber laws and Case Studies CO5: Identify the vulnerabilities in a given network infrastructure CO6: Implement real-world hacking techniques to test system security
Network Security	CO1: Describe computer and network security fundamental concepts and principles. CO2: : Acquire the knowledge of various authentication protocols, key exchange mechanism, and digital certificates. CO3 : To get better knowledge on fundamental concepts of cryptography,

	encryption and hashing techniques. CO4: Identify and assess different types of threats and attacks such as social engineering, rootkit, and botnets,etc. CO5: Acquire Demonstrate the ability to select among available network security technology and protocols such as IDS, firewalls, SSL , TLS, etc.
Preparedness for Career Opportunities	Enhance soft and technical skills for career readiness.
MINI PROJECT-II / SRP	Demonstrate technical project development capabilities.

SEMESTER VII

COURSE NAME	COURSE OUTCOMES
Vulnerability Assessment & Penetration Testing	CO1: Identify and classify different types of vulnerabilities and threats affecting computer systems and networks. CO2: Demonstrate the ability to use industry-standard tools for vulnerability scanning and exploitation. CO3: Apply penetration testing methodologies to assess the security posture of information systems. CO4: Interpret results from penetration tests and vulnerability scans to propose effective remediation strategies. CO5: Document and communicate findings in a professional penetration testing report adhering to ethical and legal standards.
Digital and Mobile Forensics	O1: Understand the principles and legal considerations of digital and mobile forensics investigations. CO2: Apply standard procedures for evidence collection, preservation, and chain of custody in digital environments. CO3: Use forensic tools to analyze data from computers, mobile devices, and storage media. CO4: Investigate and reconstruct events from logs, deleted files, and application data. CO5: Prepare detailed forensic reports that can be used in legal proceedings or internal investigations.
Elective Management	Apply managerial principles in tech management contexts.
Summer Internship	Apply engineering knowledge in a practical work setting.

SEMESTER VIII

COURSE NAME	COURSE OUTCOMES
Professional Ethics and Human Values	CO1: Understand the fundamental concepts of human values and their relevance in shaping personal and professional life. CO2: Demonstrate ethical reasoning and decision-making skills in real-world engineering and workplace scenarios. CO3: Recognize the significance of professional responsibility, integrity, and accountability in engineering practice. CO4: Apply principles of ethics to resolve conflicts and dilemmas in professional and social contexts. CO5: Analyze the role of global codes of conduct and sustainability in fostering responsible engineering and innovation.
Project Work / Internship	CO1: Plan, design, and implement a complete technical project. CO2: Demonstrate teamwork and documentation skills.