

# B. Sc. (Digital and Forensic Science)

## Syllabus

### AFFILIATED COLLEGES

Program Code : 26E

2025– 2026 onwards



## BHARATHIAR UNIVERSITY

(A State University, Accredited with “A” Grade by NAAC,  
Ranked 13<sup>th</sup> among Indian Universities by MHRD-NIRF,  
World Ranking: Times -801-1000, Shanghai -901-1000, URAP - 982)

Coimbatore - 641 046, Tamil Nadu, India

Programme Educational Objectives (PEOs)	
The B.Sc. Digital and Cyber Forensic Science program describe accomplishments that graduates are expected to attain within five to seven years after graduation.	
PEO1	Expertise with the knowledge on investigation of cyber offenses and online frauds
PEO2	Exhibit high standards with regard to application of digital cyber forensic techniques in recovery and investigation of material found in digital devices.
PEO3	Proficiency in various techniques to mitigate the complexities associated with threats on data transmission and recovery.



<b>Programme Specific Outcomes (PSOs)</b>	
<b>After the successful completion of B.Sc. Digital and Cyber Forensic Science program the students are expected to</b>	
<b>PSO1</b>	Impart education with domain knowledge effectively and efficiently in par with the expected quality standards for Digital and Cyber Forensic Science professional.
<b>PSO2</b>	Ability to apply the mathematical, technical and critical thinking skills in the discipline of Digital and Cyber Forensic Science to find solutions for complex problems.
<b>PSO3</b>	Ability to engage in life-long learning and adopt fast changing technology to prepare for professional development.
<b>PSO4</b>	Expose the students to learn the important Digital and Cyber Forensic Science such as Cyber Policing, Web Application Security, Malware Analysis and Cyber Threat Intelligence and Mobile and Network forensics so that they can opportunity to be a part of industry 5.0 applications irrespective of domains.
<b>PSO5</b>	Inculcate effective communication skills combined with professional & ethical attitude.

Programme Outcomes (POs)	
On successful completion of the B.Sc. Digital and Cyber Forensic Science	
<b>PO1</b>	Exhibit good <b>domain knowledge</b> and completes the assigned responsibilities effectively and efficiently in par with the expected quality standards.
<b>PO2</b>	Apply <b>analytical and critical thinking</b> to identify, formulate, analyze, and solve complex problems in order to reach authenticated conclusions
<b>PO3</b>	<b>Design and develop research based solutions</b> for complex problems with specified needs through appropriate consideration for the public health, safety, cultural, societal, and environmental concerns.
<b>PO4</b>	Establish the ability to <b>Listen, read, proficiently communicate and articulate complex ideas</b> with respect to the needs and abilities of diverse audiences.
<b>PO5</b>	<b>Deliver innovative ideas to instigate new business ventures</b> and possess the qualities of a good entrepreneur
<b>PO6</b>	Acquire the qualities of a <b>good leader and engage in efficient decision making.</b>
<b>PO7</b>	Graduates will be able to undertake any responsibility as an <b>individual/member of multidisciplinary teams and have an understanding of team leadership</b>
<b>PO8</b>	Function as <b>socially responsible individual</b> with ethical values and accountable to ethically validate any actions or decisions before proceeding and actively contribute to the societal concerns.
<b>PO9</b>	Identify and <b>address own educational needs</b> in a changing world in ways sufficient to maintain the competence and to allow them to contribute to the advancement of knowledge
<b>PO10</b>	<b>Demonstrate knowledge and understanding of management principles</b> and apply these to one own work to manage projects and in multidisciplinary environment.

**BHARATHIAR UNIVERSITY::COIMBATORE 641 046**

**B. Sc. Digital and Cyber Forensic Science (CBCS PATTERN)**

(For the students admitted from the academic year 2025-2026 and onwards)

**Scheme of Examination**

Part	Title of the Course	Hours / Week	Examination				Credits
			Duration in Hours	Maximum Marks			
				CIA	CEE	Total	
	Semester I						
I	Language – I	6	3	25	75	100	4
II	English – I	4	3	25	75	100	4
III	Core I : Programming Concepts in C	5	3	25	75	100	4
III	Core Lab I : Programming Lab – C	4	3	20	30	50	2
III	Core II : Data Structures	5	3	25	75	100	4
III	Allied I : Introduction to Linear Algebra	4	3	25	75	100	4
IV	Environmental Studies *	2	3	-	50	50	2
	Total	30		145	455	600	24
	Semester II						
I	Language – II	6	3	25	75	100	4
II	English – II	4	3	25	25	50	2
III	Core III : Programming in C++	6	3	25	75	100	4
III	Core Lab II : Programming Lab – C++	5	3	20	30	50	2
III	Core Lab III : Office Automation and Internet	3	3	20	30	50	2
III	Allied II :Discrete Mathematics	4	3	25	75	100	4
IV	Value Education – Human Rights*	2	3	-	50	50	2
	Naan Mudhalvan Courses***			25	25	50	2
	Total	30		165	385	550	22
	Semester III						
I	Language - III	6	3	25	75	100	4
II	English - III	4	3	25	75	100	4
III	Core IV : Python Programming	5	3	25	75	100	4
III	Core V : Introduction to Cyber Crime	4	3	25	75	100	4
III	Core Lab IV : Python Programming Lab	3	3	20	30	50	2
III	Allied III : Software Security	4	3	25	75	100	4
III	Skill Based Subject I :Cyber Law	3	3	25	25	50	2
IV	Tamil @/ Advanced Tamil (OR)Non-Major Elective-I (Yoga for Human Excellence)# / Women’s Rights#	1	3	-	50	50	1
	Health and Wellness**			100	-	100	1
	Naan Mudhalvan–Skill Course***		-	25	25	50	2
	Total	30		295	505	800	28

<b>Semester IV</b>							
I	Language - IV	6	3	25	75	100	4
II	English - IV	4	3	25	75	100	4
III	Core VI : Digital Forensics	4	3	25	75	100	4
III	Core VII : Cyber Security	4	3	25	75	100	4
III	Core Lab V : Forensics Lab	3	3	20	30	50	2
III	Allied IV : Intellectual Property Rights and Privacy	4	3	25	75	100	4
III	Skill Based Subject II : Capstone Project Work Phase I	3	3	20	30	50	2
IV	Tamil **/ Advanced Tamil* (OR) Non-Major Elective – II (General Awareness)*	2	3	-	50	50	2
	Naan Mudhalvan–Skill Course***		-	25	25	50	2
	<b>Total</b>	<b>30</b>		<b>190</b>	<b>510</b>	<b>700</b>	<b>28</b>
<b>Semester V</b>							
III	Core VIII : Linux System Administration	6	3	25	75	100	4
III	Core Lab VI : Linux System Administration	6	3	20	30	50	2
III	Core IX : Mobile and Network Forensics	6	3	25	75	100	4
III	Elective – I : Network Security and Management / Artificial Neural Network and Fuzzy Systems / Software Agents	6	3	25	75	100	3
III	Skill Based Subject III : Capstone Project Work	6	3	20	30	50	2
	Naan Mudhalvan–Skill Course***			25	25	50	2
	<b>Total</b>	<b>30</b>		<b>140</b>	<b>310</b>	<b>450</b>	<b>17</b>
<b>Semester VI</b>							
III	Core X : Cryptography and Network Security	5	3	25	75	100	4
III	Core XI : Project Work Lab	5	3	25	75	100	4
III	Core Lab VII :Cryptography and Network Security Lab	5	3	20	30	50	2
III	Elective - II : Cyber Policing / Web Application Security/ Malware Analysis and Cyber Threat Intelligence	6	3	25	75	100	3
III	Elective - III : Client Server Computing/ Open Source Software/ Principles of Source Coding	6	3	25	75	100	3
III	Skill based Subject IV : Ethical Hacking	3	3	25	25	50	2
V	Extension Activities**	-	-	50	-	50	2
	Naan Mudhalvan–Skill Course***			25	25	50	2
	<b>Total</b>	<b>30</b>		<b>220</b>	<b>380</b>	<b>600</b>	<b>22</b>
	<b>Grand Total</b>			<b>1155</b>	<b>2545</b>	<b>3700</b>	<b>141</b>

## Guidelines for Evaluation :

# Govt. - (Non-Autonomous Colleges), \$ Aided – (Non-Autonomous Colleges), @ Self-Financing (Non –Autonomous).

Evaluation of the candidates shall be made through internal and external marks.

Paper Type	Total Marks	Internal		External		Overall Passing Minimum for Total Marks (Internal+ External)
		Maximum Marks	Passing Minimum for Internal	Maximum Marks	Passing Minimum for External	
Core and Allied Theory Paper	100	25	10	75	30	40
Skilled Based Subject Theory Paper	50	25	10	25	10	20
Foundation Course Theory Paper	50	-	-	50	20	20
Health and Wellness	100	100	40	-	-	40
Core Practical Paper and Skill Based Subject Lab Paper	50	20	8	30	12	20
Capstone Project Work Lab	50	20	8	30	12	20
Project Work Lab	100	25	10	75	30	40

## INTERNAL MARKS BREAK UP

### Core Paper, Allied Subject and Skilled Based Subject (Theory)

Components	CIA I	CIA II	Model	Attendance	Assignment or Seminar	Total
Marks	5	5	10	2	3	25

### Practical Paper & Skill Based Subject Lab

Components	Observation	Record	Model Practical	Total
Program 1 and Program 2	5	5	10	20

### Project

Components	Topic Selection	First and Second Review	Mock Viva Presentation	Report	Total
Capstone Project Work Lab	5	5	5	5	20
Project Work Lab	5	10	5	5	25

## Internal Examination Question Paper Pattern

### Core Paper, Allied Subject and Skilled Based Subject (Theory)

**Duration: 2 Hours**

Blooms Classification	Knowledge Level	Section	Type	No. of Questions to be answered	Marks
Remember, Understand	K1,K2	A	Objective type, questions, fill in the blanks, true or false, expand the following	All questions	4 X 1 = 4
Understand, Apply	K2,K3	B	Paragraph about 3 pages	All question either or pattern unit wise	5 X 2 = 10
Apply, Analyze	K3,K4	C	Essay type about 5 pages	2 out of 5 questions	2 X 8 = 16
<b>Total</b>					<b>30</b>



### **UNIVERSITY EXTERNAL MARKS BREAK UP**

#### **Practical Paper & Skill Based Subject Lab Paper**

Components	Max. Marks	Aim & Algorithm	Keying	Output	Record	Total	Passing Minimum External
Program 1	10	4	4	2	10	30	12
Program 2	10	4	4	2			

#### **Project**

Components	Report	Presentation	Viva-voce	Total	Passing Minimum External
Capstone Project Work Lab	15	10	5	30	12
Project Work Lab	40	20	15	75	40

### **University Examination Question Paper Pattern**

#### **Core Paper & Allied Paper (Theory)**

**Duration: 3 Hours**

Blooms Classification	Knowledge Level	Section	Type	No. of Questions to be answered	Marks
Remember, Understand	K1,K2	A	Objective type questions, fill in the blanks, true or false, expand the following	All questions	10 X 1 = 10
Understand, Apply	K2,K3	B	Paragraph about 3 pages	Either or Pattern (Unit Wise)	5 X 5 = 25
Apply, Analyze	K3,K4	C	Essay type about 5 pages	Either or Pattern (Unit Wise)	5 X 8 = 40
<b>Total</b>					<b>75</b>

#### **Skill Based Subject Paper (Theory)**

**Duration: 3 Hours**

Blooms Classification	Knowledge Level	Section	Type	No. of Questions to be answered	Marks
Remember, Understand	K1,K2	A	Objective type questions	All questions	4 X 1 = 4
Understand, Apply	K2,K3	B	Paragraph about 2 pages	Either or Pattern (Unit Wise)	5 X 2 = 10
Apply, Analyze	K3,K4	C	Essay type about 4 pages	2 out of 5 questions (Unit Wise)	2 X 8 = 16
<b>Total</b>					<b>25</b>

#### **Foundation Course Paper (Theory)**

**Duration: 3 Hours**

Section	Type	No. of Questions to be answered	Marks
A	Essay type about 5 pages	5 out of 10 questions	5 X 10 = 50
<b>Total</b>			<b>50</b>

#### **Note**

*	No Continuous Internal Assessment (CIA), University Examinations Only.
**	No University Examinations, Continuous Internal Assessment (CIA) Only.
***	Naan Mudhalvan – Skill courses- external marks (CEE) will be assessed by industry and internal will be offered by respective course teacher.
****	No University Examinations, Continuous Internal Assessment (CIA) Only will be handled by Department of Physical Education (PD)
*****	Summer Internship / Industrial Training during the Summer Vacation in II Year, IV Semester for 30 hours. The capstone project report to be prepared and it should be submitted during viva-voce. (Refer Project Guidelines)





# First Semester

Course Code		Programming Concepts in C	L	T	P	C
Core/elective/Supportive		Core: I	5	0	0	4
Pre - requisite		Basic knowledge in computers	Syllabus version		2025-26 onwards	
Course Objectives						
To introduce the concepts of Procedure Oriented Programming and the various programming constructs of C programming						
Expected Course Outcomes						
1	Describe about the about the fundamentals of computers, history and various types of software and hardware devices.					K1
2	Interpret the concepts of Variables, Constant, Operators and various types of expressions					K2
3	Apply the concept of Decision making statements and looping constructs for solving basic programs					K3
4	Use the concepts of files and pointers inside a C program					K3
5	Develop programs incorporating all the C language constructs					K4
6	Test the correctness of the programs and identify logical and syntax errors					K5
K1 – Remember K2 – Understand K3 – apply K4- Analyze K5 – evaluate K6- Create						
UNIT I Fundamentals of Computers 12						
Fundamentals of Computers : Introduction – History of Computers-Generations of Computers-Classification of Computers-Basic Anatomy of a Computer System-Input Devices-Processor-Output Devices-Memory Management – Types of Software- Overview of Operating System- Programming Languages-Translator Programs-Problem Solving Techniques - Overview of C.						
UNIT II Overview of C 11						
Overview of C - Introduction - Character set - C tokens - keyword & Identifiers - Constants - Variables - Data types - Declaration of variables - Assigning values to variables - Defining Symbolic Constants - Arithmetic, Relational, Logical, Assignment, Conditional, Bitwise, Special, Increment and Decrement operators - Arithmetic Expressions - Evaluation of expression - precedence of arithmetic operators - Type conversion in expression – operator precedence & associativity - Mathematical functions - Reading & Writing a character - Formatted input and output.						
UNIT III Decision Making and Branching 12						
Decision Making and Branching: Introduction – if, if....else, nesting of if ...else statements- else if ladder – The switch statement, The?: Operator – The goto Statement. Decision Making and Looping: Introduction- The while statement- the do statement – the for statement-jumps in loops. Arrays – Character Arrays and Strings						
UNIT IV Functions 12						
User-Defined Functions: Introduction – Need and Elements of User-Defined Functions- Definition-Return Values and their types - Function Calls – Declarations – Category of Functions- Nesting of Functions - Recursion – Passing Arrays and Strings to Functions - The Scope, Visibility and Lifetime of Variables – Multi File Programs – Structures and Unions.						

UNIT V	Pointers	13
Pointers: Introduction-Understanding pointers-Accessing the address of a variable-Declaration and Initialization of pointer Variable – Accessing a variable through its pointer-Chain of pointers- Pointer Expressions – Pointer Increments and Scale factor- Pointers and Arrays- Pointers and Strings – Array of pointers – Pointers as Function Arguments- Functions returning pointers – Pointers to Functions – Pointers and Structures. File Management in C.		
Total Lecture Hours		60 Hours
Text Book(s)		
1	E Balagurusamy: Computing Fundamentals & C Programming – Tata McGraw-Hill, Second Reprint 2008.	
Reference book(s):		
1	Ashok N Kamthane: Programming with ANSI and Turbo C, Pearson, 2002. 2. Henry Mullish& Hubert L.Cooper: The Sprit of C, Jaico, 1996.	
	Related Online Contents (MOOC, SWAYAM,NPTEL, Websites etc)	
1	<a href="https://onlinecourses.swayam2.ac.in/aic20_sp06/preview">https://onlinecourses.swayam2.ac.in/aic20_sp06/preview</a>	
2	<a href="https://onlinecourses.swayam2.ac.in/arp19_ap79/preview">https://onlinecourses.swayam2.ac.in/arp19_ap79/preview</a>	
Course Designed by :		

	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PO8</b>	<b>PO9</b>	<b>PO10</b>
<b>CO1</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>
<b>CO2</b>	<b>M</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>
<b>CO3</b>	<b>S</b>	<b>M</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>
<b>CO4</b>	<b>S</b>	<b>M</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>
<b>CO5</b>	<b>S</b>	<b>M</b>	<b>M</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>
<b>CO6</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>

\*S-Strong; M-Medium; L-Low

Course Code		Programming Lab - C		L	T	P	C
Core/elective/Supportive		Core Lab : I		0	0	4	4
Pre - requisite		<input type="checkbox"/> Basic knowledge in computers		Syllabus version		2025-26 onwards	
Course Objectives							
To introduce the concepts of Procedure Oriented Programming and the various programming constructs of C programming.							
Expected Course Outcomes							
1	Apply the various basic programming constructs like decision making statements. Looping statements, functions, structures, pointers and files						K3
2	Design programs using the concept of files in C and be able to simulate operations						K4
3	Determine the efficient techniques in programming to solve various scientific problems						K5
K1 – Remember K2 – Understand K3 – apply K4- Analyze K5 – evaluate K6- Create							
EXERCISE 1		Implementation of Control structures					6
Develop various C Programs using Control Structures							
Develop various C programs using Switch case.							
EXERCISE 2		Implementation of Loopings					6
Develop various C program for the implementation of looping							
Develop various C program for the implementation of looping &Conrtol Structures							
EXERCISE 3		Implementation of Functions					9
Develop a C program to illustrate recursive function.							
Develop a C program to find the palindrome in a given sentence							
Develop a C program to manipulate strings using string functions.							
Develop a C Program using Functions							
EXERCISE 4		Implementation of Pointers					6
Develop a C program to swap two integers using pointers.							
Develop a C program using Array of Pointers.							
EXERCISE 5		Implementation of Structures					6
Develop a C program using the structures.							
Develop a C program using Array of Structures.							
EXERCISE 6		Implementation of Files					6
Develop a C program to calculate electricity bill using files							
EXERCISE 7		Implementation of Security					6
Develop a C program to encrypt and decrypt a string							
Develop a G program to encrypt and decrypt Files							
Total Lecture Hours							45 Hours

Text Book(s)	
1	E Balagurusamy: Computing Fundamentals & C Programming – Tata McGraw-Hill, Second Reprint 2008.
Reference Book(s)	
1	Ashok N Kamthane: Programming with ANSI and Turbo C, Pearson, 2002. 2. Henry Mullish & Hubert L. Cooper: The Sprit of C, Jaico, 1996.
Course Designed by :	

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	M	L	L	L	L	L	L	L	L
CO2	S	M	M	L	L	L	L	L	L	L
CO3	S	S	S	L	L	L	L	L	L	L

\*S-Strong; M-Medium; L-Low



Course Code		Data Structures	L	T	P	C
Core/elective/Supportive		Core : II	5	-	-	4
Pre - requisite		<input type="checkbox"/> Basic knowledge of Programming Constructs	Syllabus version		2025-26 onwards	
Course Objectives						
<input type="checkbox"/> To introduce the concept of data structures and the types of data structures						
<input type="checkbox"/> To demonstrate how various data structures can be implemented and used in various applications						
Expected Course Outcomes						
1	Define the concept of Data structure and list the various classifications of data structures.					K1
2	Demonstrate how arrays, stacks, queues, linked lists, trees, heaps, Graphs and Hash Tables are represented in the main memory and various operations are performed on those data structures.					K2
3	Illustrate the various file organizations like Sequential, Random and Linked organizations.					K2
4	Discover the real time applications of the various data structures					K3
5	Design algorithms for various sorting and searching techniques					K4
K1 – Remember K2 – Understand K3 – apply K4- Analyze K5 – evaluate K6- Create						
UNIT I	INTRODUCTION					12 Hours
Introduction: Introduction of Algorithms, Analyzing Algorithms. Arrays: Sparse Matrices - Representation of Arrays. Stacks and Queues. Fundamentals - Evaluation of Expression Infix to Postfix Conversion - Multiple Stacks and Queues						
UNIT II	LINKED LIST					12
Linked List: Singly Linked List - Linked Stacks and Queues - Polynomial Addition - More on Linked Lists - Sparse Matrices - Doubly Linked List and Dynamic - Storage Management - Garbage Collection and Compaction.						
UNIT III	NON LINEAR DATA STRUCTURES					12 Hours
Trees: Basic Terminology - Binary Trees - Binary Tree Representations - Binary Trees -Traversal - More on Binary Trees - Threaded Binary Trees - Binary Tree Representation of Trees - Counting Binary Trees. Graphs: Terminology and Representations - Traversals, Connected Components and Spanning Trees, Shortest Paths and Transitive Closure						
UNIT IV	EXTERNAL - SORTING					12 Hours
External Sorting: Storage Devices -Sorting with Disks: K-Way Merging - Sorting with Tapes Symbol Tables: Static Tree Tables - Dynamic Tree Tables - Hash Tables: Hashing Functions - Overflow Handling.						



<b>UNIT V</b>	<b>INTERNAL - SORTING</b>	<b>12 Hours</b>
Internal Sorting: Insertion Sort - Quick Sort - 2 Way Merge Sort - Heap Sort - Shell Sort - Sorting on Several Keys. Files: Files, Queries and Sequential organizations - Index Techniques -File Organizations.		
<b>Total Hours</b>		<b>60 Hours</b>
<b>Text Book(s)</b>		
<b>1</b>	Ellis Horowitz, Sartaj Shani, Data Structures, Galgotia Publication.	
<b>Reference Book(s)</b>		
<b>1</b>	Ellis Horowitz, Sartaj Shani, Sanguthevar Rajasekaran, Computer Algorithms, Galgotia Publication.	
<b>Related Online Contents (MOOC, SWAYAM,NPTEL, Websites etc)</b>		
<b>1</b>	<a href="https://onlinecourses.swayam2.ac.in/aic20_sp06/preview">https://onlinecourses.swayam2.ac.in/aic20_sp06/preview</a>	
<b>2</b>	<a href="https://onlinecourses.swayam2.ac.in/arp19_ap79/preview">https://onlinecourses.swayam2.ac.in/arp19_ap79/preview</a>	
<b>Course Designed by :</b>		

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
<b>CO1</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>
<b>CO2</b>	<b>M</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>
<b>CO3</b>	<b>S</b>	<b>M</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>
<b>CO4</b>	<b>S</b>	<b>M</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>
<b>CO5</b>	<b>S</b>	<b>M</b>	<b>M</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>

\*S-Strong; M-Medium; L-Low



Course Code		Introduction to Linear Algebra		L	T	P	C
Core/elective/Supportive		Allied : I		4	0	0	4
Pre - requisite		None		Syllabus version	2025-26 onwards		
Course Objectives							
To introduce the computational techniques and algebraic skills essential for the study of systems of linear equations, matrix algebra, and vector spaces							
Expected Course Outcomes							
1	Explain the concept/theory in linear algebra, to develop dynamic and graphical views to the related issues of the chosen topics as outlined in “course content,” and to formally prove theorems						K2
2	Recognize the basic applications of the chosen topics and their importance in the modern science						K3
3	Develop simple mathematical models, and apply basic linear algebra techniques learned from the chosen topics to solve simple problems						K3
4	Report and communicate effectively with others and present mathematical results in a logical and coherent fashion						K4
5	Appraise the power and beauty of mathematics, and solve problems independently and collaboratively as part of a team						K5
K1 – Remember K2 – Understand K3 – apply K4- Analyze K5 – evaluate K6- Create							
UNIT I							15
Introduction – Vectors and Matrices – Length and Dot Products – Solving Linear Equations – Linear Equations – The Idea of Elimination – Elimination Using Matrices – Rules for Matrix Operations – Inverse Matrices – Elimination = Factorization: $A = LU$ – Transposes and Permutations							
UNIT II							15
Vector Spaces and Subspaces – Spaces of Vectors – The Null space of A: Solving $Ax = 0$ – The Rank and the Row Reduced Form – The complete solution to $Ax=b$ – Independence, Basis, and Dimensions – Dimensions of the four Subspaces – Orthogonality – Orthogonality of the Four Subspaces – Projections – Least Squares Approximations – Orthogonal Bases and Gram – Schmidt.							
UNIT III							15
Determinants – The Properties of Determinants – Permutations and Cofactors – Cramer’s Rule, Inverse, and Volumes – Eigen values and Eigenvectors – Introduction to Eigen values – Diagonalizing a Matrix – Applications to Differential Equations – Symmetric Matrices – Positive Definite Matrices – Similar Matrices – The Singular Value Decomposition							
UNIT IV							15
Singular value Decomposition – Linear Transformations – The Idea of a Linear Transformation – The Matrix of a Linear Transformation – Change of Basis – Diagonalization and the Pseudo inverse.							

<b>UNIT V</b>		15
Complex Vectors and Complex Matrices – Complex Numbers – Hermitian and Unitary Matrices – The Fast Fourier Transform – Applications – Numerical Linear Algebra.		
<b>Total Lecture Hours</b>		<b>75 Hours</b>
<b>Text Book(s)</b>		
<b>1</b>	Gilbert Strang(2016). Introduction to Linear Algebra, 5 <sup>th</sup> Edition. Wellesley –	
<b>Reference Books</b>		
<b>1</b>	S.Lang (1997). Introduction to Linear Algebra. Second Edition. Springer.	
<b>2</b>	Gilbert Strang (2006). Linear Algebra and Its Applications. Fourth Edition. Cengage Learning.	
<b>3</b>	David C. Lay, Steven R. Lay, and Judi J. McDonald (2014). Linear Algebra and Its Applications. 5 <sup>th</sup> Edition. Pearson.	
<b>Related Online Contents (MOOC, SWAYAM, NPTEL, Websites etc)</b>		
<b>1</b>	<a href="https://onlinecourses.swayam2.ac.in/aic20_sp06/preview">https://onlinecourses.swayam2.ac.in/aic20_sp06/preview</a>	
<b>2</b>	<a href="https://onlinecourses.swayam2.ac.in/arp19_ap79/preview">https://onlinecourses.swayam2.ac.in/arp19_ap79/preview</a>	
<b>Course Designed by :</b>		

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
<b>CO1</b>	L	L	L	L	L	L	L	L	L	L
<b>CO2</b>	M	L	L	L	L	L	L	L	L	L
<b>CO3</b>	S	M	L	L	L	L	L	L	L	L
<b>CO4</b>	S	M	L	L	L	L	L	L	L	L
<b>CO5</b>	S	M	M	L	L	L	L	L	L	L

\*S-Strong; M-Medium; L-Low



# Second Semester

Course Code		Programming in C++	L	T	P	C
Core/elective/Supportive		Core : III	6	0	0	4
Pre - requisite		<input type="checkbox"/> Basic knowledge of Procedure Oriented Programming concepts <input type="checkbox"/> Basic knowledge in C Programming	Syllabus version		2025-26 onwards	
Course Objectives						
To introduce the concepts of Object Oriented Programming Paradigm and the programming constructs of C++						
Expected Course Outcomes						
1	Describe the procedural and object oriented paradigm with concepts of streams, classes, functions, data and objects					K1
2	Demonstrate the various basic programming constructs like decision making statements. Looping statements and functions					K2
3	Explain the object oriented concepts like overloading, inheritance, polymorphism, virtual functions, constructors and destructors					K3
4	Explain the various file stream classes; file types, usage of templates and exception handling mechanisms.					K3
5	Compare the pros and cons of procedure oriented language with the concepts of object oriented language					K5
6	Develop programs incorporating the programming constructs of object oriented programming concepts					K5
K1 – Remember K2 – Understand K3 – apply K4- Analyze K5 – evaluate K6- Create						
UNIT I						
Introduction to C++		Introduction to C++			18	
Introduction to C++ - key concepts of Object-Oriented Programming –Advantages – Object Oriented Languages – I/O in C++ - C++ Declarations. Control Structures : - Decision Making and Statements : If .. else, jump, goto, break, continue, Switch case statements - Loops in C++ : for, while, do - functions in C++ - inline functions – Function Overloading.						
UNIT II		Classes and Objects			18	
Classes and Objects: Declaring Objects – Defining Member Functions – Static Member variables and functions – array of objects –friend functions – Overloading member functions – Bit fields and classes – Constructor and destructor with static members.						
UNIT III		Operator Overloading and Inheritance			18	
Operator Overloading: Overloading unary, binary operators – Overloading Friend functions – type conversion – Inheritance: Types of Inheritance – Single, Multilevel, Multiple, Hierarchical, Hybrid, Multi path inheritance – Virtual base Classes – Abstract Classes.						
UNIT IV		Pointers and Polymorphism			18	
Pointers – Declaration – Pointer to Class, Object – this pointer – Pointers to derived classes and Base classes – Arrays – Characteristics – array of classes – Memory models – new and delete operators – dynamic object – Binding, Polymorphism and Virtual Functions.						

<b>UNIT V</b>	<b>File and Exception Handling</b>	<b>18</b>
Files – File stream classes – file modes – Sequential Read / Write operations – Binary and ASCII Files – Random Access Operation – Templates – Exception Handling - String – Declaring and Initializing string objects – String Attributes – Miscellaneous functions .		
<b>Total Lecture Hours</b>		<b>90 Hours</b>
<b>Text Book(s)</b>		
<b>1</b>	Ashok N Kamthane, Object-Oriented Programming with Ansi And Turbo C++, Pearson Education, 2003.	
<b>Reference Books</b>		
<b>1</b>	E. Balagurusamy, Object-Oriented Programming with C++, TMH, 1998.	
<b>2</b>	Maria Litvin & Gray Litvin, C++ for you, Vikas publication, 2002.	
<b>3</b>	John R Hubbard, Programming with C, 2nd Edition, TMH publication, 2002	
<b>Related Online Contents (MOOC, SWAYAM, NPTEL, Websites etc)</b>		
<b>1</b>	<a href="https://onlinecourses.swayam2.ac.in/aic20_sp06/preview">https://onlinecourses.swayam2.ac.in/aic20_sp06/preview</a>	
<b>2</b>	<a href="https://onlinecourses.swayam2.ac.in/arp19_ap79/preview">https://onlinecourses.swayam2.ac.in/arp19_ap79/preview</a>	
<b>Course Designed by :</b>		

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
<b>CO1</b>	<b>M</b>	<b>M</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>
<b>CO2</b>	<b>M</b>	<b>M</b>	<b>M</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>
<b>CO3</b>	<b>S</b>	<b>M</b>	<b>M</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>
<b>CO4</b>	<b>S</b>	<b>S</b>	<b>M</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>
<b>CO5</b>	<b>S</b>	<b>S</b>	<b>M</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>
<b>CO6</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>

\*S-Strong; M-Medium; L-Low



Course Code		Programming Lab – C++	L	T	P	C
Core/elective/Supportive		Core Lab : II	-	0	5	2
Pre - requisite		<input type="checkbox"/> Basic knowledge of Procedure Oriented Programming concepts <input type="checkbox"/> Basic knowledge in C Programming	Syllabus version		2025-26 onwards	
Course Objectives						
To introduce he concepts of Object Oriented Programming Paradigm and the programming constructs of C++						
Expected Course Outcomes						
1	Apply the various basic programming constructs like decision making statements. Looping statements, functions, concepts like overloading, inheritance, polymorphism, virtual functions , constructors and destructors					K3
2	Illustrate the concept of Virtual Classes, inline functions and friend functions					K4
3	Compare the various file stream classes; file types, usage of templates and exception handling mechanisms.					K5
4	Compare the pros and cons of procedure oriented language with the concepts of object oriented language					K5
K1 – Remember K2 – Understand K3 – apply K4- Analyze K5 – evaluate K6- Create						
PROGRAM - 1						
Write a C++ Program to create a class to implement the data structure STACK. Write a constructor to initialize the TOP of the STACK. Write a member function PUSH () to insert an element and member function POP () to delete an element check for overflow and underflow conditions.						
PROGRAM - 2						
Write a C++ Program to create a class ARITHMETIC which consists of a FLOAT and an INTEGER variable. Write member functions ADD (), SUB (), MUL (), DIV () to perform addition, subtraction, multiplication, division respectively. Write a member function to get and display values.						
PROGRAM - 3						
Write a C++ Program to read an integer number and find the sum of all the digits until it reduces to a single digit using constructors, destructors and inline member functions.						
PROGRAM - 4						
Write a C++ Program to create a class FLOAT that contains one float data member. Overload all the four Arithmetic operators so that they operate on the object FLOAT.						
PROGRAM - 5						
Write a C++ Program to create a class STRING. Write a Member Function to initialize, get and display stings. Overload the operators ++ and == to concatenate two Strings and to compare two strings respectively.						
PROGRAM -6						
Write a C++ Program to create class, which consists of EMPLOYEE Detail like E_Number, E_Name, Department, Basic, Salary, Grade. Write a member function to get and display them. Derive a class PAY from the above class and write a member function to calculate DA, HRA and PF depending on the grade.						

<b>PROGRAM -7</b>		
Write a C++ Program to create a class SHAPE which consists of two VIRTUAL FUNCTIONS Calculate_Area() and Calculate_Perimeter() to calculate area and perimeter of various figures. Derive three classes SQUARE, RECTANGLE, TRIANGLE from class Shape and Calculate Area and Perimeter of each class separately and display the result.		
<b>PROGRAM -8</b>		
Write a C++ Program to create two classes each class consists of two private variables, a integer and a float variable. Write member functions to get and display them. Write a FRIEND Function common to both classes, which takes the object of above two classes as arguments and the integer and float values of both objects separately and display the result.		
<b>PROGRAM -9</b>		
Write a C++ Program using Function Overloading to read two Matrices of different Data Types such as integers and floating point numbers. Find out the sum of the above two matrices separately and display the sum of these arrays individually.		
<b>PROGRAM -10</b>		
Write a C++ Program to check whether the given string is a palindrome or not using Pointers.		
<b>PROGRAM -11</b>		
Write a C++ Program to create a File and to display the contents of that file with line numbers.		
<b>PROGRAM -12</b>		
Write a C++ Program to merge two files into a single file.		
<b>Total Lecture Hours</b>		<b>60 Hours</b>
<b>Text Book(s)</b>		
<b>1</b>	Ashok N Kamthane, Object-Oriented Programming with Ansi And Turbo C++, Pearson Education, 2003.	
<b>Reference Books</b>		
<b>1</b>	E. Balagurusamy, Object-Oriented Programming with C++, TMH, 1998.	
<b>2</b>	Maria Litvin & Gray Litvin, C++ for you, Vikas publication, 2002.	
<b>3</b>	John R Hubbard, Programming with C, 2nd Edition, TMH publication, 2002	
<b>Course Designed by :</b>		

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
<b>CO1</b>	<b>S</b>	<b>S</b>	<b>M</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>
<b>CO2</b>	<b>S</b>	<b>S</b>	<b>M</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>
<b>CO3</b>	<b>S</b>	<b>S</b>	<b>M</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>
<b>CO4</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>

\*S-Strong; M-Medium; L-Low



Course code		Office Automation and Internet	L	T	P	C
Core/Elective/Supportive		Core Lab : III	0	0	3	2
Pre-requisite		Basic Knowledge of Office Automation Tools	Syllabus Version		2025-26 Onwards	
Course Objectives:						
The main objectives of this course are to:						
1. Acquire and apply the computer applications in different aspects.						
2. Get an insight knowledge on office automation.						
3. Know the database maintenance in every type of applications.						
4. Get the knowledge in effective power point presentation.						
5. Impart knowledge and essential skills necessary to use the internet.						
Expected Course Outcomes:						
On the successful completion of the course, student will be able to:						
1	Understand the fundamentals of Internet and the Web concepts					K2
2	Create and apply various statistical tools available in excel.					K3,K6
3	To gain knowledge making effective presentation using power point presentation					K4
4	Understand the basic concepts and evaluate the database using excel.					K5
K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate; K6 - Create						
Programs				36 hours		
1. Prepare your resume in word and assume that you are studying in final year of your graduation and are eagerly looking for a job. Visit any job portal and upload your resume.						
2. Create a flowchart for any program use proper shapes like ellipse, arrows, rectangle, parallelogram and grouping to group all the parts of the flowchart into one single object.						
3. Create a simple mathematical calculations using formulas in excel sheet.						
4. Prepare students mark list for your class and calculate Total, Average, Result and Ranking by using arithmetic, logical functions and sorting using excel sheet.						
5. Create different types of charts for a range in students mark list using excel sheet.						
6. Create a power-point presentation with minimum 10 slides The first slide must contain the topic of the presentation and name of the presentation. a. At least one table,5 bullets,5 numbers, font size, font face, font color. b. Use word art to write the heading for each slides. Insert at least one clip-art, one picture, one audio and one video. c. Use custom animation option to animate the text, move left to right one line at a time and Use proper transition for the slides. d. Last slide must contain thank you.						
7. Open your inbox in the Gmail account created, check the mail received from your peer from other college inviting you for his college fest, and download the invitation. Reply to the mail with a thank you note for the invite and forward the mail to other friends.						
8. Create your own Google classroom and invite all your friends through email id. Post study material in Google classroom using Google drive. Create a separate folder for every subject and upload all unit wise E-Content Materials.						
9. Create and share a folder in Google Drive using ‘share a link’ option and set the permission to access that folder by your friends only.						
10. Create poster for Department Seminar or Conference using any open source tools.						

Text Book(s)	
1	Ian Lamont, Google Drive & Docs in 30 Minutes, 2 <sup>nd</sup> Edition.
2	
Reference Books	
1	Sherry Kinkoph Gunter, My Google Apps, 2014.
2	
3	
Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]	
1	<a href="https://www.youtube.com/watch?v=NzPNk44tdlQ">https://www.youtube.com/watch?v=NzPNk44tdlQ</a>
2	<a href="https://www.youtube.com/watch?v=PKuBtQuFa-8">https://www.youtube.com/watch?v=PKuBtQuFa-8</a>
4	<a href="https://www.youtube.com/watch?v=hGERlhP58ZE">https://www.youtube.com/watch?v=hGERlhP58ZE</a>
Course Designed By:	

Mapping with Programme Outcomes										
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	M	S	S	S	S	M	M	S	L
CO2	S	M	S	S	S	S	S	S	S	M
CO3	S	S	S	S	S	S	S	S	S	S
CO4	S	S	S	S	S	S	S	S	S	S

\*S-Strong; M-Medium; L-Low

Course Code		Discrete Mathematics	L	T	P	C
Core/elective/Supportive		Allied : II	4	0	0	4
Pre - requisite		Basic knowledge in Mathematics	Syllabus version		2025-26 onwards	
Course Objectives						
<div><input type="checkbox"/> Introduce students to the techniques, algorithms, and reasoning processes involved in the study of discrete mathematical structures.</div> <div><input type="checkbox"/> Introduce students to set theory, inductive reasoning, elementary and advanced counting techniques, equivalence relations, recurrence relations, graphs, and trees.</div> <div><input type="checkbox"/> Introduce students to prove mathematical statements by means of inductive reasoning</div>						
Expected Course Outcomes						
1	Understand discrete mathematical preliminaries and apply discrete mathematics in formal representation of various computing constructs					K2
2	Demonstrate an understanding of relations ,functions, Combinatorics and lattices					K2
3	Apply the techniques of discrete structures and logical reasoning to solve a variety of problems and write an argument using logical notation					K3
4	Analyze and construct mathematical arguments that relate to the study of discrete structures					K4
5	Develop and model problems with the concepts and techniques of discrete mathematics.					K4
K1 – Remember K2 – Understand K3 – apply K4- Analyze K5 – evaluate K6- Create						
UNIT I	MATHEMATICAL LOGIC					15
Proposition – Logical Operators – Truth Tables – Laws of Logic – Equivalances – Rules of interface – validity Arguments – Consistency of Specifications – Propositional Calculus – Quantifiers and universe of discourse.						
UNIT II	PROOF TECHNIQUES & RELATIONS AND FUNCTIONS					15
PROOF TECHNIQUES: Introduction – Methods of proving theorems – Direct Proofs, Proof by Contraposition, Vacuous and trivial proofs, Proofs by contradiction – Mistakes in Proofs – Mathematical induction – Strong Mathematical induction – Strong mathematical induction and well ordering – Program Correctness.						
RELATIONS AND FUNCTIONS: Definition and properties of binary relations – Representing Relations – Closures of Relations – Composition of Relations – Equivalence Relations – Partitions and Covering of sets – Partial Orderings – n-array Relations and their applications. Functions – Injective, Surjective, Bijective functions, Composition, identity and inverse.						
UNIT III	COMBINATORICS					15
Basics of Counting – The Pigeonhole principle – Permutations and Combinations with and without repetition, Permutations with indistinguishable elements – distributions of objects – Generating permutations and combinations in lexicographic order.						

<b>UNIT IV</b>	<b>RECURRENCE RELATIONS</b>	<b>15</b>
Some Recurrence Relation Models – Solution of linear homogeneous recurrence relations with constant coefficients – solution of linear non-homogeneous recurrence relations by the method of characteristic roots – Divide and conquer recurrence relations.		
<b>UNIT V</b>	<b>LATTICES</b>	<b>15</b>
Lattices as partially ordered set – Properties of Lattices – Lattices as algebraic system – Sub lattices – Direct Product and Homomorphism – Some special lattices.		
<b>Total Lecture Hours</b>		<b>75</b> Hours
<b>Text Book(s)</b>		
<b>1</b>	Kenneth H. Rosen, “Discrete Mathematics and its applications”, McGraw Hill, 2011.	
<b>2</b>	Judith L.Gersting, “Mathematical Structures for Computer Science”, W.H> Freeman and Company, 2014	
<b>3</b>	Tremblay J.P. and Manohar R., “Discrete and Combinatorial Mathamatics – An Introduction”, Addison Wesley, 2009.	
<b>Reference Books</b>		
<b>1</b>	Doerr Alan and Levasseur K., “Applied Discrete Structures for Computer Science”, Galgotia Publications, 2002	
<b>2</b>	Benard Kolman, Robert C. Busby and Sharan Ross, “ Discrete Mathematical Structures”, Pearson Education, 2014	
<b>Related Online Contents (MOOC, SWAYAM,NPTEL, Websites etc)</b>		
<b>1</b>	<a href="https://onlinecourses.swayam2.ac.in/aic20_sp06/preview">https://onlinecourses.swayam2.ac.in/aic20_sp06/preview</a>	
<b>2</b>	<a href="https://onlinecourses.swayam2.ac.in/arp19_ap79/preview">https://onlinecourses.swayam2.ac.in/arp19_ap79/preview</a>	
<b>Course Designed by :</b>		

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	M	L	L	L	L	L	L	L	L	L
CO2	M	L	L	L	L	L	L	L	L	L
CO3	S	M	L	L	L	L	L	L	L	L
CO4	S	M	M	L	L	L	L	L	L	L
CO5	S	S	S	L	L	L	L	L	L	L

\*S-Strong; M-Medium; L-Low



# Third Semester

Course Code		Python Programming	L	T	P	C
Core/elective/Supportive		Core : IV	5	0	0	4
Pre - requisite		<input type="checkbox"/> Knowledge in Basics of Object Oriented Programming	Syllabus Version		2025-26 onwards	
Course Objectives						
To introduce the concepts of the various programming constructs of Python programming						
Expected Course Outcomes						
1	Apply the various basic programming constructs like operators, expressions, decision making statements and Looping statements					K2
2	Summarize the concept of lists, tuples , functions and error handling					K2
3	Apply the concept of Decision making statements, looping constructs , functions for solving basic programs					K3
4	Analyze the concepts of Lists, tuples and error handling mechanisms					K4
5	Evaluate a program incorporating all the python language constructs					K5
K1 – Remember K2 – Understand K3 – apply K4- Analyze K5 – evaluate K6- Create						
UNIT I	BASICS					15
Python - Variables - Executing Python from the Command Line - Editing Python Files -Python Reserved Words - Basic Syntax-Comments - Standard Data Types – Relational Operators -Logical Operators - Bit Wise Operators - Simple Input and Output.						
UNIT II	CONTROL STATEMENTS, LISTS, TUPLES					15
<b>CONTROL STATEMENTS:</b> Control Flow and Syntax - Indenting - if Statement - statements and expressions- string operations- Boolean Expressions -while Loop - break and continue - for Loop. <b>LISTS:</b> List-list slices - list methods - list loop–mutability–aliasing - cloning lists - list parameters. <b>TUPLES:</b> Tuple assignment, tuple as return value -Sets–Dictionaries.						
UNIT III	FUNCTIONS					15
Definition - Passing parameters to a Function - Built-in functions- Variable Number of Arguments - Scope – Type conversion-Type coercion-Passing Functions to a Function – Mapping Functions in a Dictionary – Lambda - Modules - Standard Modules – sys – math – time - dir – help Function.						
UNIT IV	ERROR HANDLING					15
Run Time Errors - Exception Model - Exception Hierarchy - Handling Multiple Exceptions - Data Streams - Access Modes Writing - Data to a File Reading - Data From a File - Additional File Methods - Using Pipes as Data Streams - Handling IO Exceptions - Working with Directories.						
UNIT V	OBJECT ORIENTED FEATURES					15
Classes Principles of Object Orientation - Creating Classes -Instance Methods - File Organization - Special Methods - Class Variables – Inheritance – Polymorphism - Type Identification - Simple Character Matches - Special Characters – Character Classes – Quantifiers - Dot Character - Greedy						



Matches – Grouping - Matching at Beginning or End - Match Objects – Substituting - Splitting a String - Compiling Regular Expressions.	
<b>Total Lecture Hours</b>	
<b>75 Hours</b>	
<b>Text Book(s)</b>	
<b>1</b>	Mark Summerfield. —Programming in Python 3: A Complete introduction to the Python Language, Addison-Wesley Professional, 2009.
<b>2</b>	Martin C. Brown, —PYTHON: The Complete Reference, McGraw-Hill, 2001
<b>Reference Book(s)</b>	
<b>1</b>	Allen B. Downey, ``Think Python: How to Think Like a Computer Scientist,,,,, 2nd edition, Updated for Python 3, Shroff/O,,Reilly Publishers, 2016
<b>2</b>	Guido van Rossum and Fred L. Drake Jr, —An Introduction to Python – Revised and updated for Python 3.2, Network Theory Ltd., 2011.
<b>Course Designed by :</b>	

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	L	L	L	L	L	L	L	L	L	L
CO2	M	L	L	L	L	L	L	L	L	L
CO3	S	M	L	L	L	L	L	L	L	L
CO4	S	S	M	L	L	L	L	L	L	L
CO5	S	S	S	L	L	L	L	L	L	L

\*S-Strong; M-Medium; L-Low



Course Code		Python Programming - Lab	L	T	P	C
Core/elective/Supportive		Core Lab : IV	0	0	3	2
Pre - requisite		<input type="checkbox"/> Knowledge in basic Programming	Syllabus version		2025-26 onwards	
Course Objectives						
To introduce the concepts of python programming constructs of C++						
Expected Course Outcomes						
1	Apply the concept of Decision making statements, looping constructs , functions for solving basic programs					K3
2	Analyze the concepts of Lists, tuples and error handling mechanisms					K4
3	Evaluate a program incorporating all the python language constructs					K5
K1 – Remember K2 – Understand K3 – apply K4- Analyze K5 – evaluate K6- Create						
PROGRAM - 1						5
Write a python program that displays the following information: Your name, Full address Mobile number, College name, Course subjects.						
PROGRAM - 2						5
Write a python program to find the largest three integers using if-else and conditional operator.						
PROGRAM - 3						5
Write a python program that asks the user to enter a series of positive numbers (The user should enter a negative number to signal the end of the series) and the program should display the numbers in order and their sum.						
PROGRAM - 4						5
Write a python program to find the product of two matrices [A]m <sub>x</sub> p and [B]p <sub>x</sub> r						
PROGRAM - 5						5
Write recursive functions for GCD of two integers.						
PROGRAM -6						10
Write recursive functions for the factorial of positive integer.						
PROGRAM -7						5
Write recursive functions for Fibonacci Sequence up to given number n.						
PROGRAM -8						5
Write recursive functions to display prime number from 2 to n.						
PROGRAM -9						10
Write a python program that writes a series of random numbers to a file from 1 to n and display.						
PROGRAM -10						5
Write a python program to sort a given sequence: String, List and Tuple.						
PROGRAM -11						10
Write a python program to make a simple calculator.						
PROGRAM -12						10
Write a python program for Linear Search and Binary Search.						
Total Lecture Hours						75 Hours

Text Book(s)	
1	Mark Summerfield. —Programming in Python 3: A Complete introduction to the Python Language, Addison-Wesley Professional, 2009.
2	Martin C. Brown, —PYTHON: The Complete Reference, McGraw-Hill, 2001
Reference Book(s)	
1	Allen B. Downey, ``Think Python: How to Think Like a Computer Scientist,,,,, 2nd edition, Updated for Python 3, Shroff/O,,Reilly Publishers, 2016
2	Guido van Rossum and Fred L. Drake Jr, —An Introduction to Python – Revised and updated for Python 3.2, Network Theory Ltd., 2011.
Course Designed by :	

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	M	M	L	L	L	L	L	L	L
CO2	S	S	M	L	L	L	L	L	L	L
CO3	S	S	S	L	L	L	L	L	L	L

\*S-Strong; M-Medium; L-Low



Course Code		Introduction to Cyber Crime	L	T	P	C
Core/elective/Supportive		Core : V	4	0	0	4
Pre - requisite		Basic knowledge in Internet and data crimes.	Syllabus version		2025-26 onwards	
Course Objectives						
<input type="checkbox"/> To explain the concept of cybercrime and various types of attacks						
<input type="checkbox"/> To explain the impact of cybercrime on society						
Expected Course Outcomes						
1	Understand the concept of cybercrime and emerging crime threats and attacks in cyberspace					K2
2	Classify the main typologies, characteristics, activities, actors and forms of cybercrime, including the definitional, technical and social aspects					K3
3	Evaluate behavioral aspects of the various type of attacks in cyberspace					K4
4	Analyze the impact of cybercrime crime on businesses and individuals and discuss the impact of cybercrime on society					K4
K1 – Remember K2 – Understand K3 – apply K4- Analyze K5 – evaluate K6- Create						
UNIT I	Cyber Crime - Overview					12
Cyber Crime- Overview, Internal and External Attacks, Attack Vectors. Cybercrimes against Individuals – E-mail spoofing and online frauds, Phishing and its forms, Spamming, Cyber- defamation, Cyber stalking, Cyber Bullying and harassment, Computer Sabotage, Pornographic offenses, Password Sniffing. Key loggers and Screen loggers. Cyber Crimes against Women and Children.						
UNIT II	Cybercrime against organization					12
Cybercrime against organization – Unauthorized access of computer, Password Sniffing, Denial-of-service (DOS) attack, Backdoors and Malwares and its types, E-mail Bombing, Salami Attack, Software Piracy, Industrial Espionage, Intruder attacks.						
UNIT III	Security Policies Violations					12
Security policies violations, Crimes related to Social Media, ATM, Online and Banking Frauds. Intellectual Property Frauds. Cyber Crimes against Women and Children.						
UNIT IV	Global Perspective On Cybercrimes					12
A global perspective on cybercrimes, Phases of cyber-attack – Reconnaissance, Passive Attacks, Active Attacks, Scanning, Gaining Access, Maintaining Access, Lateral movement and Covering Tracks. Detection Avoidance, Types of Attack vectors, Zero-day attack, Overview of Network based attacks.						
UNIT V	Cybercrime and Cloud Computing					12
Cybercrime and cloud computing, Different types of tools used in cybercrime, Password Cracking – Online attacks, Offline attacks, Remote attacks, Random Passwords, Strong and weak passwords. Viruses and its types. Ransomware and Crypto currencies. DoS and DDoS attacks and their types. Cybercriminal syndicates and nation state groups.						
Total Lecture Hours						60 Hours

Text Book(s)		
1	Nina Godbole and Sunit Belapore; "Cyber Security: Understanding Cyber Crimes, Computer Forensics and Legal Perspectives", Wiley Publications, 2011.	
2	Shon Harris, "All in One CISSP, Exam Guide Sixth Edition", McGraw Hill, 2013.	
3	Bill Nelson, Amelia Phillips and Christopher Steuart; "Guide to Computer Forensics and Investigations" – 3rd Edition, Cengage, 2010 BBS.	
Reference Book(s)		
1	William Stallings; "Cryptography and Network Security: Principles and Practices", Fifth Edition, Prentice Hall Publication Inc., 2007.	
2	Atul Jain; "Cyber Crime: Issues, Threats and Management", 2004.	
3	Majid Yar; "Cybercrime and Society", Sage Publications, 2006.	
4	Michael E Whiteman and Herbert J Mattord; "Principles of Information Security", Vikas Publishing House, New Delhi, 2003. 8. Matt Bishop, "Computer Security Art and Science", Pearson/PHI, 2002	
Related Online Contents (MOOC, SWAYAM, NPTEL, Websites etc)		
1	<a href="https://onlinecourses.swayam2.ac.in/aic20_sp06/preview">https://onlinecourses.swayam2.ac.in/aic20_sp06/preview</a>	
2	<a href="https://onlinecourses.swayam2.ac.in/arp19_ap79/preview">https://onlinecourses.swayam2.ac.in/arp19_ap79/preview</a>	
Course Designed by :		

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	L	L	L	L	L	L	L	L	L	L
CO2	M	L	L	L	L	L	L	L	L	L
CO3	S	M	L	L	L	L	L	L	L	L
CO4	S	M	M	L	L	L	L	L	L	L

\*S-Strong; M-Medium; L-Low

Course Code		Software Security	L	T	P	C
Core/elective/Supportive		Allied : III	4	0	0	4
Pre - requisite		Basic Knowledge about software and hardware	Syllabus Version		2025-26 onwards	
Course Objectives						
<input type="checkbox"/> To explain the need for software security						
<input type="checkbox"/> To explain the various types of security attacks and the risks associated.						
Expected Course Outcomes						
1	Explain the various types of security attacks and its implications					K2
2	Illustrate the concepts of security risk management and security testing					K2
3	Apply the various testing methodologies to evaluate the risks associated.					K3
4	Compare and contrast the implications of good and bad software design					K4
5	Classify the various tools for penetration testing					K4
K1 – Remember K2 – Understand K3 – apply K4- Analyze K5 – evaluate K6- Create						
UNIT I	Low Level Attacks					12
Need for Software Security – Memory Based Attacks – Low Level Attacks Against Heap and Stack - Stack Smashing – Format String Attacks – Stale Memory Access Attacks – ROP (Return Oriented Programming) – Malicious Computation Without Code Injection. Defense against Memory Based Attacks – Stack Canaries – Non-Executable Data - Address Space Layout Randomization (ASLR), Memory-Safety Enforcement, Control-Flow Integrity (CFI) –Randomization						
UNIT II	Secure Design					12
Isolating the Effects of Untrusted Executable Content - Stack Inspection – Policy Specification Languages – Vulnerability Trends – Buffer Overflow – Code Injection - Generic Network Fault Injection – Local Fault Injection - SQL Injection - Session Hijacking. Secure Design – Threat Modeling and Security Design Principles - Good and Bad Software Design - Web Security Browser Security: Cross-Site Scripting (XSS), Cross-Site Forgery (CSRF) – Database Security –File Security						
UNIT III	Security Risk Management					12
Risk Management Life Cycle – Risk Profiling – Risk Exposure Factors – Risk Evaluation and Mitigation – Risk Assessment Techniques – Threat and Vulnerability Management.						
UNIT IV	Security Testing					12
Traditional Software Testing – Comparison - Secure Software Development Life Cycle – Risk Based Security Testing – Prioritizing Security Testing with Threat Modeling – Shades of Analysis: White, Grey and Black Box Testing.						



UNIT V	Penetration Testing	12
Advanced Penetration Testing – Planning And Scoping – DNS Groper – DIG (Domain Information Graph) – Enumeration – Remote Exploitation – Web Application Exploitation - Exploits And Clients side Attacks – Post Exploitation – Bypassing Firewalls and Avoiding Detection - Tools for Penetration Testing		
Total Lecture Hours		60 Hours
Text Book(s)		
1	Robert C. Seacord, “Secure Coding in C and C++ (SEI Series in Software Engineering)”,Addison-Wesley Professional, 2005.	
2	Jon Erickson , “Hacking: The Art of Exploitation”, 2 <sup>nd</sup> Edition, No Starch Press, 2008.	
3	Mike Shema, “Hacking Web Apps: Detecting and Preventing Web Application SecurityProblems”, First edition, Syngress Publishing, 2012	
Reference Book(s)		
1	Bryan Sullivan and Vincent Liu, “Web Application Security, A Beginner's Guide”, KindleEdition, McGraw Hill, 2012	
2	Evan Wheeler, “Security Risk Management: Building an Information Security RiskManagement Program from the Ground Up”, First edition, Syngress Publishing, 2011	
3	Chris Wysopal, Lucas Nelson, Dino Dai Zovi, and Elfriede Dustin, “The Art of SoftwareSecurity Testing: Identifying Software Security Flaws (Symantec Press)”, Addison-Wesley Professional, 2006	
4	Lee Allen, “Advanced Penetration Testing for Highly-Secured Environments: The UltimateSecurity Guide (Open Source: Community Experience Distilled)”, Kindle Edition, PacktPublishing, 2012	
Related Online Contents (MOOC, SWAYAM,NPTEL, Websites etc)		
1	<a href="https://onlinecourses.swayam2.ac.in/aic20_sp06/preview">https://onlinecourses.swayam2.ac.in/aic20_sp06/preview</a>	
2	<a href="https://onlinecourses.swayam2.ac.in/arp19_ap79/preview">https://onlinecourses.swayam2.ac.in/arp19_ap79/preview</a>	
Course Designed by :		

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
<b>CO1</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>
<b>CO2</b>	<b>M</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>
<b>CO3</b>	<b>S</b>	<b>M</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>
<b>CO4</b>	<b>S</b>	<b>M</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>
<b>CO5</b>	<b>S</b>	<b>M</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>

\*S-Strong; M-Medium; L-Low

Course Code		Cyber Law	L	T	P	C
Core/elective/Supportive		Skill Based Subject : I	3	0	0	2
Pre - requisite		Basic knowledge in Internet and data crimes.	Syllabus Version		2025-26 onwards	
Course Objectives						
<input type="checkbox"/> To explain about the various types of cybercrimes <input type="checkbox"/> To know about the various cyber laws and their applicability						
Expected Course Outcomes						
1	Explain the various types of cybercrimes					K2
2	Demonstrate the various types of cyber laws and their applicability					K2
3	Classification of civil, criminal cases and Essential elements of criminal law					K4
4	Determine the sections of Indian Evidence act					K5
K1 – Remember K2 – Understand K3 – apply K4- Analyze K5 – evaluate K6- Create						
UNIT I	Introduction to Cyberspace					9
Introduction to Cyberspace, Cybercrime and Cyber Law :The World Wide Web, Web Centric Business, e-Business Architecture, Models of e-Business, e-Commerce, Threats to virtual world. IT Act 2000 - Objectives, Applicability, Non-applicability, Definitions, Amendments and Limitations. Cyber Crimes- Cyber Squatting, Cyber Espionage, Cyber Warfare, Cyber Terrorism, Cyber Defamation. Social Media-Online Safety for women and children, Misuse of Private information.						
UNIT II	Regulatory Framework					9
Regulatory Framework of Information and Technology Act 2000 -Information Technology Act 2000, Digital Signature, E-Signature, Electronic Records, Electronic Evidence and Electronic Governance. Controller, Certifying Authority and Cyber Appellate Tribunal. (Rules announced under the Act), Network and Network Security, Access and Unauthorized Access, Data Security, E Contracts and E Forms.						
UNIT III	Offences and Penalties IT acts					9
Offences and Penalties Information Technology (Amendment) Act 2008 – Objective, Applicability and Jurisdiction; Various cyber-crimes under Sections 43 (a) to (j), 43A, 65, 66, 66A to 66F, 67, 67A, 67B, 70, 70A, 70B, 80 etc. along with respective penalties, punishment and fines, Penal Provisions for Phishing, Spam, Virus, Worms, Malware, Hacking, Trespass and Stalking; Human rights in cyberspace, International Co-operation in investigating cybercrimes.						
UNIT IV	Classification of Civil and Criminal cases					9
Classification – civil, criminal cases-Essential elements of criminal law- Constitution and hierarchy of criminal courts. Criminal Procedure Code. Cognizable and non-cognizable offences. Bailable and non-bailable offences. Sentences which the court of Chief Judicial Magistrate may pass.						
UNIT V	Indian Evidence Act					9
Indian Evidence Act – Evidence and rules of relevancy in brief. Expert witness. Cross examination and re-examination of witnesses. Sections 32, 45, 46, 47, 57, 58, 60, 73, 135, 136, 137, 138, 141. Section 293 in the code of criminal procedure. Secondary Evidence Section 65-B.						
Total Lecture Hours						45 Hours



<b>Text Book(s)</b>	
<b>1</b>	Karnika Seth; “Computers, Internet and New Technology Laws”, Lexis Nexis Butters worth Wadhwa, 2012.
<b>2</b>	VikasVashishth.; “Law and practice of intellectual property in India”3. Jonathan Rosenoer; “Cyber Law: The Law of Internet”, Springer- Verlag,New York, 1997.
<b>3</b>	Sreenivasulu N.S; “Law Relating to Intellectual Property”, PatridgePublishing, 2013
<b>4</b>	Pavan Duggal; “Cyber Law – The Indian Perspective”, Saakshar LawPublications.
<b>Reference Book(s)</b>	
<b>1</b>	Harish Chander; “Cyber Laws and IT Protection”, PHI Learning Pvt. Ltd,2012.
<b>2</b>	Nina Godbole and SunitBelapore; “Cyber Security: Understanding CyberCrimes, Computer Forensics and Legal Perspectives”, Wiley Publications,2011.
<b>3</b>	Vakul Sharma; “Information Technology: Law and Practice”, UniversalLaw Publishing Co., India, 2011.
<b>4</b>	The Copyright Act, 1957
<b>5</b>	The Patent Act, 1970 The Indian Evidence Act, 1872.
<b>Related Online Contents (MOOC, SWAYAM,NPTEL, Websites etc)</b>	
<b>1</b>	<a href="https://onlinecourses.swayam2.ac.in/aic20_sp06/preview">https://onlinecourses.swayam2.ac.in/aic20_sp06/preview</a>
<b>2</b>	<a href="https://onlinecourses.swayam2.ac.in/arp19_ap79/preview">https://onlinecourses.swayam2.ac.in/arp19_ap79/preview</a>
<b>Course Designed by :</b>	

	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PO8</b>	<b>PO9</b>	<b>PO10</b>
<b>CO1</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>
<b>CO2</b>	<b>M</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>
<b>CO3</b>	<b>S</b>	<b>M</b>	<b>M</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>
<b>CO4</b>	<b>S</b>	<b>S</b>	<b>M</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>

\*S-Strong; M-Medium; L-Low



# Fourth Semester

Course Code		Digital Forensics	L	T	P	C
Core/elective/Supportive		Core : VI	4	0	0	4
Pre - requisite		None	Syllabus Version		2025-26 onwards	
Course Objectives						
<input type="checkbox"/> To introduce the principle and concepts of digital forensic						
<input type="checkbox"/> To detail about the various investigation procedures like data acquisition nd evidence gathering						
Expected Course Outcomes						
1	Explain the principles of network ,mobile and cyber forensic science					K2
2	Illustrate the cyber-crime investigation procedures					K2
3	Apply the cyber-crime techniques to data acquisition and evidence collection					K3
4	Analyzing the digital evidences and arriving at conclusions					K4
5	Examine the Volatile and Non-volatile Digital Evidence					K4
K1 – Remember K2 – Understand K3 – apply K4- Analyze K5 – evaluate K6- Create						
UNIT I	Basics of Digital Forensics					12
Digital Forensics- Introduction, Objective and Methodology, Rules of DigitalForensics, Good Forensic Practices, Daubert’s Standards, Principles of DigitalEvidence. Overview of types of Computer Forensics – Network Forensics, MobileForensics, Social Media Forensics and E-mail Forensics. Services offered byDigital Forensics. First Responder – Role, Toolkit and Do’s and Don’ts						
UNIT II	Cyber Crime Investigation					12
Introduction to Cyber Crime Investigation, Procedure for Search and seizure ofdigital evidences in cyber-crime incident- Forensics Investigation Process- Presearch consideration, Acquisition, Duplication & Preservation of evidences,Examination and Analysis of evidences, Storing of Evidences, Documentation andReporting, Maintaining the Chain of Custody.						
UNIT III	Data Acquisition and Evidence Gathering					12
Data Acquisition of live system,Shutdown Systems and Remote systems, servers. E-mail Investigations, PasswordCracking. Seizing and preserving mobile devices. Methods of data acquisition ofevidence from mobile devices. Data Acquisition and Evidence Gathering fromSocial Media. Performing Data Acquisition of encrypted systems. Challenges andissues in cyber-crime investigation.						
UNIT IV	Analysis of Digital Evidences					12
Search and Seizure of Volatile and Non-volatile Digital Evidence, Imaging andHashing of Digital Evidences, Introduction to Deleted File Recovery,Steganography and Steganalysis, Data Recovery Tools and Procedures,Duplication and Preservation of Digital Evidences, Recover Internet Usage Data,Recover Swap files/Temporary Files/Cache Files. Software and Hardware toolsused in cyber-crime investigation – Open Source and Proprietary tools. Importanceof Log Analysis in forensic analysis. Understanding Storage Formats for DigitalEvidences – Raw Format, Proprietary Formats, Advanced Forensic Formats.						

UNIT V		Windows and Linux Forensics	12
Windows Systems Artifacts: File Systems, Registry, Event logs, Shortcut files, Executables. Alternate Data Streams (ADS), Hidden files, Slack Space, DiskEncryption, Windows registry, startup tasks, jumplists, Volume Shadow, shellbags, LNK files, Recycle Bin Forensics (INFO, \$i, \$r files). Forensic Analysis of the Registry – Use of registry viewers, Regedit. Extracting USB related artifacts and examination of protected storages. Linux System Artifact: Ownership and Permissions, Hidden files. User Accounts and Logs.			
Total Lecture Hours			60 Hours
Text Book(s)			
1	Nina Godbole and Sunit Belapore; “Cyber Security: Understanding CyberCrimes, Computer Forensics and Legal Perspectives”, Wiley Publications, 2011.		
2	Bill Nelson, Amelia Phillips and Christopher Steuart; “Guide to ComputerForensics and Investigations” – 3rd Edition, Cengage, 2010 BBS.		
3	Shon Harris; “All in One CISSP Guide, Exam Guide Sixth Edition”, McGraw Hill, 2013.		
Reference Book(s)			
1	LNJN National Institute of Criminology and Forensic Science, “A ForensicGuide for Crime Investigators – Standard Operating Procedures”, LNJNNICFS, 2016.		
2	Peter Hipson; “Mastering Windows XP Registry”, Sybex, 2002.		
3	Harlan Carvey; “Windows Forensic Analysis Toolkit”, Syngress, 2012.		
4	Anthony Reyes, Jack Wiles; “The Best Damn Cybercrime and DigitalForensic Book”, Syngress, USA, 2007.		
5	Cory Altheide and HalanCarvey; “Digital Forensics with Open SourceTools”, Syngress Publication.		
	Related Online Contents (MOOC, SWAYAM, NPTEL, Websites etc)		
1	<a href="https://onlinecourses.swayam2.ac.in/aic20_sp06/preview">https://onlinecourses.swayam2.ac.in/aic20_sp06/preview</a>		
2	<a href="https://onlinecourses.swayam2.ac.in/arp19_ap79/preview">https://onlinecourses.swayam2.ac.in/arp19_ap79/preview</a>		
Course Designed by :			

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	L	L	L	L	L	L	L	L	L	L
CO2	M	L	L	L	L	L	L	L	L	L
CO3	S	M	L	L	L	L	L	L	L	L
CO4	S	S	M	L	L	L	L	L	L	L
CO5	S	S	S	L	L	L	L	L	L	L

\*S-Strong; M-Medium; L-Low

Course Code		Cyber Security	L	T	P	C
Core/elective/Supportive		Core : VII	4	0	0	3
Pre - requisite		None	Syllabus Version		2025-26 onwards	
Course Objectives						
<div><input type="checkbox"/> To introduce the concepts of various cyber security threats and attacks</div> <div><input type="checkbox"/> To detail about the concepts of network and web security</div>						
Expected Course Outcomes						
1	Outline the concepts of various security aspects like threats, attacks and authentication procedures					K2
2	Compare the various type security attacks by inspecting their characteristics					K2
3	Analyze security issues in network and computer systems					K4
4	Evaluate and Communicate the human role in security systems					K5
5	Interpret and forensically investigate security incidents					K5
K1 – Remember K2 – Understand K3 – apply K4- Analyze K5 – evaluate K6- Create						
UNIT I Introduction to Cyber Security 12						
Introduction to Cyber Security. Confidentiality, Integrity and Availability – Triad. Attacks: Threats, Vulnerabilities and Risk. Risk Management, Risk Assessment and Analysis. Information Classification, Policies, Standards, Procedure and Guidelines. Controls: Physical, Logical and Administrative; Security Frameworks, Defence in-depth: Layers of Security. Identification and Authentication – Factors.Authorization and Access Controls- Models, Methods and Types of Access Control.						
UNIT II Basics of Cryptography 12						
Definitions and Concepts, Symmetric and Asymmetric Cryptosystems, Classical Encryption Techniques – Substitution Techniques, Transposition Techniques, Block Ciphers and Stream Ciphers, Hybrid Encryption Techniques, One-Time Pad. E-mail security, Internet and Web Security. Steganography and its detection, Data Encryption Standard (DES), Principles of public key cryptosystems-The RSA algorithm-Key management - Diffie Hellman Key exchange.						
UNIT III Network and Wireless Attacks 12						
Network Sniffing, Wireshark, packet analysis, display and capture filters, Ettercap, DNS Poisoning, ARP Poisoning, Denial of services, Vulnerability scanning, Setup network IDS/IPS, Router attacks, Man-in-the-middle Attack, Nmap, open ports, filtered ports, service detection, network vulnerability assessment, Evade anti-viruses and firewalls, Protocols, MAC Filtering, Packet Encryption, Packet Sniffing, Types of authentication, Attacks on WEP , WPA and WPA-2 Encryption, fake hotspots.						
UNIT IV Network Security 12						
IP security architecture, Security protocols, IPSec, Web Security – Firewalls, IDS, IDPS – Types and Technologies. Trusted systems – Electronic payment protocols. Network Security Applications, Authentication Mechanisms: Passwords, Cryptographic authentication protocol, Kerberos, X.509 LDAP Directory. Digital Signatures.						
UNIT V Web Security 12						
Web Security: SSL Encryption, TLS, SET. Intrusion detection. Securing online payments (OTP).						
Total Lecture Hours						60 Hours



Text Book(s)	
1	William Stallings; “Cryptography and Network Security: Principles and Practices”, Fifth Edition, Prentice Hall Publication Inc., 2007.
2	Nina Godbole and SunitBelapore; “Cyber Security: Understanding Cyber Crimes, Computer Forensics and Legal Perspectives”, Wiley Publications,2011.
Reference Book(s)	
1	Matt Bishop, “Computer Security Art and Science”, Pearson/PHI, 2002.
2	Michael E Whiteman and Herbert J Mattord; “Principles of Information Security”, Vikas Publishing House, New Delhi, 2003.
3	AtulKahate “Cryptography and Network Security” McGraw Hill Education (India), 2008.
4	Alfred J. Menezes, Paul. C. Van Oorschot, and Scott A. Vanstone “Handbook of Applied Cryptography”, CRC press, Lib of Congress -2006
Related Online Contents (MOOC, SWAYAM,NPTEL, Websites etc)	
1	<a href="https://onlinecourses.swayam2.ac.in/aic20_sp06/preview">https://onlinecourses.swayam2.ac.in/aic20_sp06/preview</a>
2	<a href="https://onlinecourses.swayam2.ac.in/arp19_ap79/preview">https://onlinecourses.swayam2.ac.in/arp19_ap79/preview</a>
Course Designed by :	

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	L	L	L	L	L	L	L	L	L	L
CO2	M	L	L	L	L	L	L	L	L	L
CO3	S	M	L	L	L	L	L	L	L	L
CO4	S	S	M	L	L	L	L	L	L	L
CO5	S	S	S	L	L	L	L	L	L	L

\*S-Strong; M-Medium; L-Low



Course Code		Forensics Lab	L	T	P	C
Core/elective/Supportive		Core Lab : V	0	0	3	2
Pre - requisite		None	Syllabus Version		2025-26 onwards	
Course Objectives						
<input type="checkbox"/> To explain the need for software security						
<input type="checkbox"/> To explain the various types of security attacks and the risks associated.						
Expected Course Outcomes						
1	Will learn the Police science its role in criminal investigation and Prevention of crime					K2
2	Will help to know about the working and functioning of Forensic science laboratories.					K3
3	The detail study will help to understand about the basics and different branches of Forensic Sciences.					K3
K1 – Remember K2 – Understand K3 – apply K4- Analyze K5 – evaluate K6- Create						
ACTIVITY I						
Use a Web search engine, such as Google or Yahoo!, and search for companies specializing in computer forensics. Select three and write a two-to three-page paper comparing what each company does.(Project 1-1)						
ACTIVITY II						
Search the Internet for articles on computer crime prosecutions. Find at least two. Write one to two pages summarizing the two articles and identify key features of the decisions you find in your search. (Project 1-5)						
ACTIVITY III						
Use a Web search engine, search for various computer forensics tools.						
ACTIVITY IV						
Preparing and processing of investigations. Try to examine and identify the evidences from the drives. (Project 2-1)						
ACTIVITY V						
Extracting of files that have been deleted.( (Project 2-4)						
ACTIVITY VI						
Illustrate the analysis of forensic data.						
ACTIVITY VII						
Illustrate the validating of forensic data.						
Total Lecture Hours						45 Hours
Text Book(s)						
1	Robert C. Seacord, “Secure Coding in C and C++ (SEI Series in Software Engineering)”,Addison-Wesley Professional, 2005.					
2	Jon Erickson , “Hacking: The Art of Exploitation”, 2nd Edition, No Starch Press,					
3	Mike Shema, “Hacking Web Apps: Detecting and Preventing Web Application SecurityProblems”, First edition, Syngress Publishing, 2012					

Reference Book(s)		
1	Bryan Sullivan and Vincent Liu, “Web Application Security, A Beginner's Guide”, KindleEdition, McGraw Hill, 2012	
2	Evan Wheeler, “Security Risk Management: Building an Information Security RiskManagement Program from the Ground Up”, First edition, Syngress Publishing, 2011	
3	Chris Wysopal, Lucas Nelson, Dino Dai Zovi, and Elfriede Dustin, “The Art of SoftwareSecurity Testing: Identifying Software Security Flaws (Symantec Press)”, Addison-Wesley Professional, 2006	
4	Lee Allen, “Advanced Penetration Testing for Highly-Secured Environments: The UltimateSecurity Guide (Open Source: Community Experience Distilled)”, Kindle Edition, PacktPublishing, 2012	
<b>Related Online Contents (MOOC, SWAYAM,NPTEL, Websites etc)</b>		
1	<a href="https://onlinecourses.swayam2.ac.in/aic20_sp06/preview">https://onlinecourses.swayam2.ac.in/aic20_sp06/preview</a>	
2	<a href="https://onlinecourses.swayam2.ac.in/arp19_ap79/preview">https://onlinecourses.swayam2.ac.in/arp19_ap79/preview</a>	
<b>Course Designed by :</b>		

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	M	M	L	L	L	L	L	L	L	L
CO2	S	S	M	L	L	L	L	L	L	L
CO3	S	S	S	L	L	L	L	L	L	L

\*S-Strong; M-Medium; L-Low

Course Code		Capstone Project Work Phase I	L	T	P	C
Core/elective/Supportive		Skill Based Subject II	0	0	3	2
Pre - requisite		<div><input type="checkbox"/> Students should have a good understanding of software engineering.</div> <div><input type="checkbox"/> Student should possess strong analytical skills.</div>	Syllabus version		2025-26 onwards	
Course Objectives						
<div><input type="checkbox"/> To understand and select the task based on their core skills.</div> <div><input type="checkbox"/> To get the knowledge about analytical skill for solving the selected task.</div> <div><input type="checkbox"/> To get confidence for implementing the task and solving the real time problems.</div>						
Expected Course Outcomes						
On the successful completion of the course, student will be able to:						
1	Illustrate a real-world problem and identify the list of project requirements					K3
2	Compare existing system with the proposed system and extract the innovative ideas					K4
3	Judge the features of the project including forms, databases and reports					K5
K1 – Remember K2 – Understand K3 – apply K4- Analyze K5 – evaluate K6- Create						
Aim of the project work						
<div>1. The aim of the project work is to acquire practical knowledge on the implementation of the programming concepts studied.</div> <div>2. Each student should carry out individually one project work and it may be a work using the software packages that they have learned or the implementation of concepts from the papers studied or implementation of any innovative idea focusing on application oriented concepts.</div> <div>3. The project work should be compulsorily done in the college only under the supervision of the department staff concerned.</div>						
Viva Voce						
<div>1. Viva-Voce will be conducted at the end of the year by both Internal (Respective Guides) and External Examiners, after duly verifying the Annexure Report available in the College, for a total of 50 marks at the last day of the practical session.</div> <div>2. Out of 50 marks, 20 marks for CIA, 30 marks for CEE (20 marks for project report and 10 Marks for Viva Voce.)</div>						

**Project Work Format**

**PROJECT WORK**

**TITLE OF THE DISSERTATION**

Bonafide Work Done by

STUDENT NAME

REG. NO.

Dis:

ard of



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)

Internal Examiner

External Examiner

Month – Year

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2.2.1 Features

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	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	M	L	L	L	L	L	L
CO2	S	S	S	M	L	L	L	L	L	L
CO3	S	S	S	M	M	L	L	L	L	L

\*S-Strong; M-Medium; L-Low



Course Code		Intellectual Property Rights and Privacy Laws	L	T	P	C
Core/elective/Supportive		Allied : IV	4	0	0	2
Pre - requisite		None	Syllabus Version		2025-26 onwards	
Course Objectives						
☐ To introduce the concepts of Intellectual Property rights and privacy laws						
Expected Course Outcomes						
1	Define that various laws associated with intellectual property rights					K2
2	Explain the concept of commercialization of IPR by licensing					K2
3	Outline the concepts of copyrights and international protection of copyrights					K2
4	Recall the history and perspective of privacy laws.					K2
5	Classify the compare the various types of privacy laws					K4
K1 – Remember K2 – Understand K3 – apply K4- Analyze K5 – evaluate K6- Create						
UNIT I	Intellectual property overview					12
Concept of Property vis-à-vis Intellectual Property. Types of Intellectual Property- Origin and Development- An Overview. Intellectual Property Rights as Human Right. Role of International Institutions.						
UNIT II	Intellectual property Rights					12
Commercialization of Intellectual Property Rights by Licensing. Determining Financial Value of Intellectual Property Rights. Negotiating Payments Terms in Intellectual Property Transaction. Intellectual Property Rights in the Cyber World						
UNIT III	Copyright					12
Introduction to Copyright- International Protection of Copyright and Related rights- An Overview (International Convention/Treaties on Copyright).						
UNIT IV	Indian Copyright Law					12
Indian Copyright Law- The Copyright Act, 1957 with its amendments, Copyright works, Ownership, transfer and duration of Copyright, Renewal and Termination of Copyright, Infringement of copyrights and remedies.						
UNIT V	Privacy Laws					12
History and Perspective of Privacy Laws- Global Privacy Issue- Legal Tools – The Constitution. Statutes & State Protection.						
Total Lecture Hours					60 Hours	
Text Book(s)						
1	VikasVashishth.; “Law and practice of intellectual property in India”					
2	Sreenivasulu N.S; “Law Relating to Intellectual Property”, Patridge Publishing, 2013					
3	Vakul Sharma; “Information Technology: Law and Practice”, Universal Law Publishing Co., India, 2011.					

<b>Reference Book(S)</b>	
<b>1</b>	The Copyright Act, 1957
<b>2</b>	The Patent Act, 1970
<b>Course Designed by :</b>	

	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PO8</b>	<b>PO9</b>	<b>PO10</b>
<b>CO1</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>
<b>CO2</b>	<b>M</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>
<b>CO3</b>	<b>S</b>	<b>M</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>
<b>CO4</b>	<b>S</b>	<b>M</b>	<b>M</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>
<b>CO5</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>

\*S-Strong; M-Medium; L-Low





# Fifth Semester

Course Code		Linux System Administration	L	T	P	C
Core/elective/Supportive		Core : VIII	6	0	0	4
Pre - requisite		Basic knowledge about Operating Systems	Syllabus Version		2025-26 onwards	
Course Objectives						
<div><input type="checkbox"/> To introduce the concepts of Linux operating system</div> <div><input type="checkbox"/> To explain the various constructs associated with Linux</div>						
Expected Course Outcomes						
1	Illustrate the various directory and file commands in LINUX					K2
2	Explain the methods of securing files in Linux					K2
3	Explain the various kernel components of Linux					K2
4	Apply the various commands of Linux to perform several operations					K3
5	Solve various network administrative issues by writing Linux shell scripts					K3
K1 – Remember K2 – Understand K3 – apply K4- Analyze K5 – evaluate K6- Create						
UNIT I	Introduction to Linux					15
UNIT I: Introduction to LINUX Operating System: Introduction - The LINUX Operating System - Basic commands in Linux						
UNIT II	Managing Files & Directories					18
Managing Files and Directories: Introduction – Directory Commands in LINUX – File Commands in LINUX. Creating files using the vi editor: Text editors – The vi editor. Managing Documents: Locating files in LINUX – Standard files – Redirection – Filters – Pipes.						
UNIT III	Shell script					20
Securing files in LINUX: File access permissions – viewing File access permissions – Changing File access permissions. Automating Tasks using Shell Scripts: Introduction – Variables- Local and Global Shell variables – Command Substitution.						
UNIT IV	Conditional & Looping Statements					19
Using Conditional Execution in Shell Scripts: Conditional Execution – The case...esac Construct. Managing repetitive tasks using Shell Scripts: Using Iteration in Shell Scripts – The while construct – until construct – for construct – break and continue commands – Simple Programs using Shell Scripts.						
UNIT V	Kernel & System Recovery					18
Linux Kernel- Kernel Components- compiling a kernel- Customizing a kernel – system startup- Customizing the boot process-System Recovery						
Total Lecture Hours						90 Hours



Text Book(s)	
1	Operating System LINUX, NIIT, PHI, 2006, Eastern Economy Edition.
Reference Book(S)	
1	Richard Petersen, Linux: The Complete Reference, Sixth Edition, Tata McGraw-Hill Publishing Company Limited, New Delhi, Edition 2008.
	<b>Related Online Contents (MOOC, SWAYAM, NPTEL, Websites etc)</b>
1	<a href="https://onlinecourses.swayam2.ac.in/aic20_sp06/preview">https://onlinecourses.swayam2.ac.in/aic20_sp06/preview</a>
2	<a href="https://onlinecourses.swayam2.ac.in/arp19_ap79/preview">https://onlinecourses.swayam2.ac.in/arp19_ap79/preview</a>
Course Designed by :	

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	L	L	L	L	L	L	L	L	L	L
CO2	M	L	L	L	L	L	L	L	L	L
CO3	S	M	L	L	L	L	L	L	L	L
CO4	S	S	M	L	L	L	L	L	L	L
CO5	S	S	S	L	L	L	L	L	L	L

\*S-Strong; M-Medium; L-Low

Course Code		Linux System and Administration Lab	L	T	P	C
Core/elective/Supportive		Core Lab: VI	0	0	6	2
Pre - requisite		<input type="checkbox"/> Basic knowledge Linux commands	Syllabus version		2025-26 onwards	
Course Objectives						
To introduce he concepts of Linux operating system commands execution and various programming construction in Linux shell script.						
Expected Course Outcomes						
1	To create the directory, how to change and remove the directory.					K1
2	To evaluate the concept of shell scripting programs by using an AWK and SED commands					K2
3	To demonstrate the basic knowledge of Linux commands and file handling utilities by using Linux shell environment.					K3
K1 – Remember K2 – Understand K3 – apply K4- Analyze K5 – evaluate K6- Create						
EXERCISE 1						
1. Write a Shell script that displays list of all the files in the current directory to which the user has read, write and execute permissions.						
EXERCISE 2						
1. Write an awk script to find the number of characters, words and lines in a file?						
EXERCISE 3						
Write a Shell script that accepts a filename, starting and ending line numbers as arguments and displays all the lines between the given line numbers?						
EXERCISE 4						
Write a shell script to sort number in ascending order.						
EXERCISE 5						
Write a shell script (small calculator) that adds, subtracts, multiplies and divides the two given numbers.						
EXERCISE 6						
Write a shell script to determine whether a given number is a prime number or not.						
EXERCISE 7						
Write a shell script to print the first n Fibonacci numbers.						
EXERCISE 8						
Write a shell script to find the GCD of two given numbers.						
EXERCISE 9						
Write a shell script to check whether given string is palindrome or not.						
EXERCISE 10						
Write a shell script to find the factorial of given integer.						

<b>Text Book(s)</b>	
<b>1</b>	Operating System LINUX, NIIT, PHI, 2006, Eastern Economy Edition.
<b>Reference Book(S)</b>	
<b>1</b>	Richard Petersen, Linux: The Complete Reference, Sixth Edition, Tata McGraw-Hill Publishing Company Limited, New Delhi, Edition 2008.
<b>Course Designed by :</b>	

	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PO8</b>	<b>PO9</b>	<b>PO10</b>
<b>CO1</b>	<b>S</b>	<b>M</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>
<b>CO2</b>	<b>S</b>	<b>S</b>	<b>M</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>
<b>CO3</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>

\*S-Strong; M-Medium; L-Low



Course Code		Mobile and Network Forensics	L	T	P	C
Core/elective/Supportive		Core : IX	6	0	0	4
Pre - requisite		Basic knowledge o Forensics	Syllabus Version		2025-26 onwards	
Course Objectives						
<input type="checkbox"/> To explain the various mobile technologies and mobile eco system security						
<input type="checkbox"/> To introduce the concepts of mobile and network forensics						
Expected Course Outcomes						
1	Explain about the various mobile technologies					K2
2	Illustrate the concepts of mobile eco system security					K2
3	Apply the various techniques of mobile forensics to solve problems					K3
4	Organize various operations like mobile tracking and analyzing of mobile data					K3
5	Appraise the various forensic tools and techniques					K5
K1 – Remember K2 – Understand K3 – apply K4- Analyze K5 – evaluate K6- Create						
UNIT I	Introduction to Mobile Technologies					17
Asynchronous Transfer Mode (ATM), Wireless Application Protocol (WAP). Cellular technologies including Advanced Mobile Phone System (AMPS), Imode, Time Division Multiple Access (TDMA), Code Division Multiple Access (CDMA) and Global System for Mobile Communications (GSM) including features and relative strengths. Functions of Subscriber Identity Module (SIM), International Mobile Equipment Identity (IMEI), Bluetooth and Mobile Payment Gateways. Understanding of the mobile phone operating systems – Android, iOS, Windows. Basics of Rooting Jailbreaking.						
UNIT II	Introduction to Mobile Eco-System Security					19
Mobile Security Model, Enterprise Mobile Environment, Mobile Crypto Algorithm. Mobile phones including SIM cloning and other Bluetooth vulnerabilities. Attacks - Denial of Service (DOS), Packet Spoofing & Masquerading, Eavesdropping etc. Wireless Public Key Infrastructure. Securing WLAN, WEP Decryption script, Understanding of SQLite Databases. Voice, SMS and Identification Data Interception in GSM. SMS security issues – Availability, Confidentiality and Integrity issues.						
UNIT III	Introduction to Mobile Forensics					17
Mobile Forensic, Types of Evidence present in mobile phones - Files present in SIM card, phone memory dump, and evidences in memory card. Seizure and Preservation of mobile phones and PDA. Mobile phone evidence extraction process, Data Acquisition Methods – Physical, Logical and File System\Manual Acquisition. Good Forensic Practices, Mobile Forensic Investigation Toolkit.						
UNIT IV	Tracking					18
Tracking of mobile phone location. Analysis of mobile data like SMS, call logs, contacts, media files, recordings and important mobile application data (IM Chats like whatsapp, telegram, iMessage, Email clients, Calendar, Reminder and Note apps). Challenges to Mobile forensics. CDR and IPDR analysis.						

<b>UNIT V</b>	<b>19</b>
<b>Introduction to Network Forensics</b> Monitoring of computer network and activities, Live Packet Capturing and Analysis. Searching and collection of evidences from the network. Network Intrusion Detection and Analysis. Event Log Aggregation – role of logs in forensic analysis, tools and techniques. Investigating network attacks. Evidence collection from Routers & CCTV DVRs. Forensic analysis of online browsing activity and related artifacts.	
<b>Total Lecture Hours</b>	
<b>90 Hours</b>	
<b>Text Book(s)</b>	
<b>1</b>	William Stallings; "Network Security Essentials", 3rd Edition, Pearson Education, 2006.
<b>2</b>	AtulKahate; "Cryptography and Network Security" McGraw Hill Education (India), 2008
<b>3</b>	Behrouz. A Forouzan; "Data Communication and Networking", 4th Edition, TMH, 2000.
<b>4</b>	Sherri Davidoff and Jonathan Ham; "Network Forensics – Tracking Hackers through Cyberspace", Pearson Publications, 2012.
<b>5</b>	Samir Datt; "Learning Network Forensics – Identify and Safeguard your Networks against both Internal and External Threats, hackers and malware attacks", PACKT Publishing, 2016
<b>6</b>	John R. Vacca; "Network and Systems Security", Syngress Publications.
<b>ReferenceBook(s)</b>	
<b>1</b>	Satish Bommisetty, RohitTamma and Heather Mahalik, "Practical Mobile Forensics – Dive into mobile Forensics on iOS, Android, Windows and Blackberry Devices with action-packed, practical guide", PACKT Publishing, 2015.
<b>2</b>	Iosif I. Androulidakis, "Mobile Phone Security and Forensics – A Practical Approach", Springer New York Heidelberg, 2012.
<b>3</b>	Jonathan Zdziarski, "iOS Forensic Investigative Methods", 2012.
<b>Related Online Contents (MOOC, SWAYAM,NPTEL, Websites etc)</b>	
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<b>Course Designed by :</b>	

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	L	L	L	L	L	L	L	L	L	L
CO2	M	L	L	L	L	L	L	L	L	L
CO3	S	M	L	L	L	L	L	L	L	L
CO4	S	M	L	L	L	L	L	L	L	L
CO5	S	M	L	L	L	L	L	L	L	L

\*S-Strong; M-Medium; L-Low



Course Code		Capstone Project Work Phase II	L	T	P	C
Core/elective/Supportive		Skill Based Subject III	0	0	6	2
Pre - requisite		<div><input type="checkbox"/> Students should have completed Capstone Project Work Phase – I</div> <div><input type="checkbox"/> Strong coding skills in any one programming paper</div>	Syllabus version		2025-26 onwards	
Course Objectives						
<div><input type="checkbox"/> To understand and select the task based on their core skills.</div> <div><input type="checkbox"/> To get the knowledge about analytical skill for solving the selected task.</div> <div><input type="checkbox"/> To get confidence for implementing the task and solving the real time problems.</div>						
Expected Course Outcomes						
On the successful completion of the course, student will be able to:						
1	Select appropriate input, output, form and table design					K3
2	Design code to meet the input requirements and to achieve the required output					K6
3	Compose a project report incorporating the features of the project					K6
K1 – Remember K2 – Understand K3 – apply K4- Analyze K5 – evaluate K6- Create						
Aim of the project work						
<div>1. The aim of the project work is to acquire practical knowledge on the implementation of the programming concepts studied.</div> <div>2. Each student should carry out individually one project work and it may be a work using the software packages that they have learned or the implementation of concepts from the papers studied or implementation of any innovative idea focusing on application oriented concepts.</div> <div>3. The project work should be compulsorily done in the college only under the supervision of the department staff concerned.</div>						
Viva Voce						
<div>1. Viva-Voce will be conducted at the end of the year by both Internal (Respective Guides) and External Examiners, after duly verifying the Annexure Report available in the College, for a total of 50 marks at the last day of the practical session.</div> <div>2. Out of 50 marks, 20 marks for CIA, 30 marks for CEE (20 marks for project report and 10 Marks for Viva Voce.)</div>						

**Project Work Format**

**PROJECT WORK**

**TITLE OF THE DISSERTATION**

Bonafide Work Done by

STUDENT NAME

REG. NO.

Dissertation submitted in partial fulfillment of the requirements for the award of

<Name of the Degree>

of Bharathiar University, Coimbatore-46.

College Logo

Signature of the Guide

Signature of the HOD

Submitted for the Viva-Voce Examination held on

Internal Examiner

External Examiner

Month – Year

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3.3 Output Design

3.4 Database Design

3.5 System Development

3.5.1 Description of Modules (Detailed explanation about the project work)

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D. Sample Input
E. Sample Output

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	S	S	L	L	L	L	L
CO2	S	S	S	S	S	M	M	L	L	L
CO3	S	S	S	S	S	M	M	L	L	L

\*S-Strong; M-Medium; L-Low



Course Code		Network Security and Management	L	T	P	C
Core/elective/Supportive		Elective : I	6	0	0	4
Pre - requisite		None	Syllabus Version		2025-26 onwards	
Course Objectives						
<input type="checkbox"/> To introduce the concepts of network security and qualities of a good network						
<input type="checkbox"/> To explain the various network security policies						
Expected Course Outcomes						
1	Explain about the qualities of good network and various network security policies					K2
2	Understand the various types of security like software/ hardware security and database security					K2
3	Apply the concepts of intrusion detection in network					K3
4	Determine the network management and security management standards					K5
K1 – Remember K2 – Understand K3 – apply K4- Analyze K5 – evaluate K6- Create						
UNIT I	Introduction					19
<b>Introduction:</b> Why Network Security is needed–Management principles–Securityprinciples - Network management - Security attacks – Qualities of a Good Network. <b>Organizational Policy and Security:</b> Security policies, Standards and Guidelines–Information Policy – Security Policy - Physical Security – Social Engineering – Security Procedures – Building a Security Plan. <b>Security Infrastructure:</b> Infrastructure Components – Goals of Security Infrastructure – Design Guidelines – Security Models.						
UNIT II	Cryptography					19
<b>Cryptography:</b> Terminology and background–Data Encryption Methods–Cryptographic Algorithms–Secret Key Cryptography - Public key cryptography – Message Digest – Security Mechanisms – Speech Cryptography. <b>Hardware and Software Security:</b> Hardware security – Smart Card – Biometrics – Virtual Private Networks (VPNs) - Trusted Operating Systems – Pretty Good Privacy (PGP) – Security Protocols. <b>Database Security:</b> Introduction to Database – Characteristics of a Database Approach – Database Security Issues - Database Security – Vendor-Specific Security – Data Warehouse Control and Security						
UNIT III	Intrusion Detection Systems					17
<b>Intrusion Detection Systems:</b> What is not ad IDS–Infrastructure of IDS–Classification of Intrusion Detection Systems – Host-Based IDS – Network-Based IDS - Anomaly Vs Signature Detection – Manage an IDS – Intrusion Detection Tools – IDS Products and Vendors. <b>Network Security:</b> Fundamental Concepts – Identification and Authentication – Access Control – A Model for Network Security – Malicious Software – Firewalls.						
UNIT IV	Network & Security Management					18
<b>Network Management:</b> Goal of Network Management–Network Management Standards – Network Management Model – Infrastructure for Network Management - Simple Network Management Protocol (SNMP). <b>Security Management:</b> Security Plan - Security Analysis - Change Management - Disaster Recovery - Systems Security Management - Protecting Storage Media- Protection of System Documentation -Exchanges of Information and Software – Security Requirements of Systems.						

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UNIT V	Security of Internet Banking Systems	17
Electronic Mail–What is the E-mail threats that organization“s face - Why do you need an E-mail Policy - How do you create an E-mail Policy - Publishing the E-mail Policy - University E-mail Policy. <b>Security of Internet Banking Systems:</b> Introduction Banking System–Security Problem–Methodology for Security Problem – Schematic flow of Internet Banking – A layered approach to security.		
Total Lecture Hours		90 Hours
Text Book(s)		
1	Network Security and Management, Brijendra Singh, PHI 2007.	
	Reference Book(s)	
1	Network Security: The Complete Reference by Bragg, Tata Mcgraw Hill Education Private Limited	
2	Applied Network Security Monitoring: Collection, Detection, and Analysis 1st Edition by Chris Sanders, Jason smith	
	Related Online Contents (MOOC, SWAYAM,NPTEL, Websites etc)	
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2	<a href="https://onlinecourses.swayam2.ac.in/arp19_ap79/preview">https://onlinecourses.swayam2.ac.in/arp19_ap79/preview</a>	
Course Designed by :		

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
<b>CO1</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>
<b>CO2</b>	<b>M</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>
<b>CO3</b>	<b>S</b>	<b>M</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>
<b>CO4</b>	<b>S</b>	<b>M</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>

\*S-Strong; M-Medium; L-Low



Course Code		Artificial Neural Network and Fuzzy Systems	L	T	P	C
Core/elective/Supportive		Elective : I	6	0	0	4
Pre - requisite		None	Syllabus Version		2025-26 onwards	
Course Objectives						
<div><input type="checkbox"/> To introduce the concepts of artificial neural networks and fuzzy systems</div> <div><input type="checkbox"/> To explain the basic mathematical elements of the theory of fuzzy sets.</div>						
Expected Course Outcomes						
1	Explain the concepts of neural networks and fuzzy logic					K2
2	Understanding the basic mathematical elements of the theory of fuzzy sets.					K2
3	Understanding the differences and similarities between fuzzy sets and classical sets					K3
4	Solve problems that are appropriately solved by neural networks and fuzzy logic					K3
K1 – Remember K2 – Understand K3 – apply K4- Analyze K5 – evaluate K6- Create						
UNIT I	Basic Concepts					17
Basic concepts-single layer perceptron-Multi layer perceptron-Adaline-Madaline- Learning rules-Supervised learning-Back propagation networks-Training algorithm, Advanced algorithms-Adaptive network- Radial basis network modular network-Applications						
UNIT II	Unsupervised Learning					19
Introduction- unsupervised learning –Competitive learning networks-Kohonen self uantizati networks-Learning vector uantization – Hebbian learning – Hopfield network-Content addressable nature, Binary Hopfield network, Continuous Hopfield network Travelling Salesperson problem – Adaptive resonance theory –Bidirectional Associative Memory-Principle component Analysis						
UNIT III	Fuzzy Logic					18
Introduction – crisp sets an overview – the notion of fuzzy sets – Basic concepts of fuzzy sets – classical logic an overview – Fuzzy logic. Operations on fuzzy sets - fuzzy complement – fuzzy union – fuzzy intersection – combinations of operations – general aggregation operations						
UNIT IV	Fuzzy Logic Contd..					17
Crisp and fuzzy relations – binary relations – binary relations on a single set– equivalence and similarity relations – Compatibility or tolerance relations– orderings – Membership functions – methods of generation – defuzzification methods						
UNIT V	Neuro Fuzzy Systems					19
Adaptive Neuro Fuzzy based inference systems – classification and regression trees: decision tress, Cart algorithm – Data clustering algorithms: K means clustering, Fuzzy C means clustering, Mountain clustering, Subtractive clustering – rule base structure identification – Neuro fuzzy control: Feedback Control Systems, Expert Control, Inverse Learning, Specialized Learning, Back propagation through Real –Time Recurrent Learning.						
Total Lecture Hours						90 Hours

Text Book(s)	
1	“Neuro Fuzzy and Soft computing”, Jang J.S.R.,Sun C.T and Mizutani E – Pearson education, 2004
2	”Fundamentals of Neural Networks”, Laurene Fauseett, Prentice Hall India, New Delhi,1994.
Reference Book(s)	
1	”Fuzzy Logic Engineering Applications”, Timothy J.Ross, McGrawHill,NewYork, 1997.
2	“Neural networks, Fuzzy logics, and Genetic algorithms”, S.Rajasekaran and G.A.Vijayalakshmi Pai Prentice Hall of India,2003
3	”Fuzzy Sets and Fuzzy Logic”, George J.Klir and Bo Yuan, Prentice Hall Inc., New Jersey,1995
4	“Principles of Soft Computing” S.N.Sivanandam, S.N.Deepa Wiley India Pvt Ltd.
Related Online Contents (MOOC, SWAYAM,NPTEL, Websites etc)	
1	<a href="https://onlinecourses.swayam2.ac.in/aic20_sp06/preview">https://onlinecourses.swayam2.ac.in/aic20_sp06/preview</a>
2	<a href="https://onlinecourses.swayam2.ac.in/arp19_ap79/preview">https://onlinecourses.swayam2.ac.in/arp19_ap79/preview</a>
Course Designed by :	

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	L	L	L	L	L	L	L	L	L	L
CO2	M	L	L	L	L	L	L	L	L	L
CO3	S	M	L	L	L	L	L	L	L	L
CO4	S	M	L	L	L	L	L	L	L	L

\*S-Strong; M-Medium; L-Low

Course Code		Software Agents	L	T	P	C
Core/elective/Supportive		Elective : I	6	0	0	4
Pre - requisite		None	Syllabus Version		2025-26 onwards	
Course Objectives						
<div><input type="checkbox"/> To explain the fundamentals of agents and agent programming paradigms.</div> <div><input type="checkbox"/> To explain about agents and security</div>						
Expected Course Outcomes						
1	Understanding the fundamentals of agents and agent programming paradigms.					K2
2	Discussing the basics of java agents.					K2
3	Learning the concepts of multivalent systems.					K2
4	Understanding the concepts of intelligent software agents.					K2
5	Understanding the agents and security.					K2
K1 – Remember K2 – Understand K3 – apply K4- Analyze K5 – evaluate K6- Create						
UNIT I	AGENTS – OVERVIEW					17
UNIT I Agent Definition – Agent Programming Paradigms – Agent Vs Object – Aglet – Mobile Agents –Agent Frameworks – Agent Reasoning						
UNIT II	JAVA AGENTS					18
UNIT II Processes – Threads – Daemons – Components – Java Beans – ActiveX – Sockets – RPCs – Distributed Computing –Aglets Programming – Jini Architecture – Actors and Agents – Typed and Proactive Messages						
UNIT III	MULTIAGENT SYSTEMS					19
Interaction between Agents – Reactive Agents – Cognitive Agents – Interaction Protocols – Agent Coordination – Agent negotiation – Agent Cooperation – Agent Organization – Self-Interested Agents in Electronic Commerce Applications						
UNIT IV	INTELLIGENT SOFTWARE AGENTS					18
Interface Agents – Agent Communication Languages – Agent Knowledge Representation – Agent Adaptability – Belief Desire Intension – Mobile Agent Applications						
UNIT V	AGENTS AND SECURITY					18
Agent Security Issues – Mobile Agents Security – Protecting Agents against Malicious Hosts – Untrusted Agent – Black Box Security – Authentication for Agents – Security Issues for Aglets						
Total Lecture Hours						90 Hours
Text Book(s)						
1	Bigus & Bigus, “Constructing Intelligent agents with Java”, Wiley, 2010.					
2	Bradshaw, “Software Agents”, MIT Press, 2012.					
Reference Book(s)						
1	Russel & Norvig, “Artificial Intelligence a modern approach”, Prentice Hall, 1994.					
2	Richard Murch and Tony Johnson, “Intelligent Software Agents”, Prentice Hall, 2000.					

3	Michael Wooldridge, “An Introduction to Multi Agent Systems”, John Wiley, 2002.	
	<b>Related Online Contents (MOOC, SWAYAM, NPTEL, Websites etc)</b>	
1	<a href="https://onlinecourses.swayam2.ac.in/aic20_sp06/preview">https://onlinecourses.swayam2.ac.in/aic20_sp06/preview</a>	
2	<a href="https://onlinecourses.swayam2.ac.in/arp19_ap79/preview">https://onlinecourses.swayam2.ac.in/arp19_ap79/preview</a>	
<b>Course Designed by :</b>		

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	L	L	L	L	L	L	L	L	L	L
CO2	M	L	L	L	L	L	L	L	L	L
CO3	S	M	L	L	L	L	L	L	L	L
CO4	S	M	L	L	L	L	L	L	L	L
CO5	S	M	L	L	L	L	L	L	L	L

\*S-Strong; M-Medium; L-Low





# Sixth Semester

Course Code		Cryptography and Network Security	L	T	P	C
Core/elective/Supportive		Core : X	5	0	0	4
Pre - requisite		Basic knowledge on network security	Syllabus Version		2025-26 onwards	
Course Objectives						
<div><input type="checkbox"/> To explain about the security aspects and types of attacks</div> <div><input type="checkbox"/> To introduce and explain various cryptographic algorithms</div>						
Expected Course Outcomes						
1	Explain the various security aspects and its importance					K2
2	Outline the several types of security attacks and various cryptographic algorithms					K2
3	Summarize about message authentication and security practices.					K2
4	Apply symmetric key and public key cryptographic algorithms to perform the process of cryptography.					K3
5	Analyze the various cryptographic algorithms and apply them accordingly					K4
K1 – Remember K2 – Understand K3 – apply K4- Analyze K5 – evaluate K6- Create						
UNIT I	INTRODUCTION					15
Security trends - Legal, Ethical and Professional Aspects of Security, Need for Security at Multiple levels, Security Policies - Model of network security – Security attacks, services and mechanisms – OSI security architecture – Classical encryption techniques: substitution techniques, transposition techniques, steganography- Foundations of modern cryptography: perfect security – information theory – product cryptosystem – cryptanalysis.						
UNIT II	SYMMETRIC KEY CRYPTOGRAPHY					15
MATHEMATICS OF SYMMETRIC KEY CRYPTOGRAPHY: Algebraic structures – Modular arithmetic-Euclid’s algorithm- Congruence and matrices - Groups, Rings, Fields- Finite fields- SYMMETRIC KEY CIPHERS: SDES – Block cipher Principles of DES – Strength of DES – Differential and linear cryptanalysis - Block cipher design principles – Block cipher mode of operation – Evaluation criteria for AES – Advanced Encryption Standard - RC4 –Key distribution.						
UNIT III	PUBLIC KEY CRYPTOGRAPHY					15
MATHEMATICS OF ASYMMETRIC KEY CRYPTOGRAPHY: Primes – Primality Testing – Factorization – Euler,,s totient function, Fermat,,s and Euler,,s Theorem - Chinese Remainder Theorem – Exponentiation and logarithm - ASYMMETRIC KEY CIPHERS: RSA cryptosystem – Key distribution – Key management – Diffie Hellman key exchange -ElGamal cryptosystem – Elliptic curve arithmetic-Elliptic curve cryptography.						
UNIT IV	MESSAGE AUTHENTICATION AND INTEGRITY					15
Authentication requirement – Authentication function – MAC – Hash function – Security of hash function and MAC – SHA –Digital signature and authentication protocols – DSS- Entity						



Authentication: Biometrics, Passwords, Challenge Response protocols- Authentication applications - Kerberos, X.509		
UNIT V	SECURITY PRACTICE AND SYSTEM SECURITY	15
Electronic Mail security – PGP, S/MIME – IP security – Web Security – SYSTEMSECURITY: Intruders – Malicious software – viruses – Firewalls.		
Total Lecture Hours		75 Hours
Text Book(s)		
1	William Stallings, Cryptography and Network Security: Principles and Practice, PHI3rd Edition, 2006.	
Reference Book(S)		
1	C K Shyamala, N Harini and Dr. T R Padmanabhan: Cryptography and NetworkSecurity, Wiley India Pvt.Ltd	
2	BehrouzA.Foruzan, Cryptography and Network Security, Tata McGraw Hill 2007.	
3	Charlie Kaufman, Radia Perlman, and Mike Speciner, Network Security: PRIVATECommunication in a PUBLIC World, Prentice Hall, ISBN 0-13-046019-2	
	Related Online Contents (MOOC, SWAYAM,NPTEL, Websites etc)	
1	<a href="https://onlinecourses.swayam2.ac.in/aic20_sp06/preview">https://onlinecourses.swayam2.ac.in/aic20_sp06/preview</a>	
2	<a href="https://onlinecourses.swayam2.ac.in/arp19_ap79/preview">https://onlinecourses.swayam2.ac.in/arp19_ap79/preview</a>	
Course Designed by :		

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	M	L	L	L	L	L	L	L	L	L
CO2	M	M	L	L	L	L	L	L	L	L
CO3	S	M	L	L	L	L	L	L	L	L
CO4	S	M	M	L	L	L	L	L	L	L
CO5	S	S	M	L	L	L	L	L	L	L

\*S-Strong; M-Medium; L-Low

Course Code		Cryptography and Network Security Lab	L	T	P	C
Core/elective/Supportive		Core Lab: VII	0	0	5	2
Pre - requisite		<input type="checkbox"/> Basic knowledge n computers	Syllabus version		2025-26 onwards	
Course Objectives						
To introduce he concepts of Procedure Oriented Programming and the various programming constructs of C programming						
Expected Course Outcomes						
1	Develop encryption, decryption using the substitution techniques					K3
2	Apply DES and AES algorithms for various practical applications					K3
3	Applut RSA and Diffie- Hellman algorithms					K3
K1 – Remember K2 – Understand K3 – apply K4- Analyze K5 – evaluate K6- Create						
EXERCISE I						
						15
Language to be used : C/C++						
1. Perform encryption, decryption using the following substitution techniques						
(i) Ceaser cipher,						
(ii) playfair cipher						
iii) Hill Cipher						
iv) Vigenere cipher						
2. Perform encryption and decryption using following transposition techniques						
i) Rail fence						
ii) row & Column Transformation						
Apply DES algorithm for practical applications.						
Apply AES algorithm for practical applications.						
Implement RSA Algorithm using HTML and JavaScript						
6. Implement the Diffie-Hellman Key Exchange algorithm for a given problem.						
Total Lecture Hours						
Text Book(s)						
1	William Stallings, Cryptography and Network Security: Principles and Practice, PHI3rd Edition, 2006.					
Reference Book(s)						
1	C K Shyamala, N Harini and Dr. T R Padmanabhan: Cryptography and NetworkSecurity, Wiley India Pvt.Ltd					
Course Designed by :						

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	M	L	L	L	L	L	L	L
CO2	S	S	M	L	L	L	L	L	L	L
CO3	S	S	S	L	L	L	L	L	L	L

\*S-Strong; M-Medium; L-Low



Course Code		Project Work Lab	L	T	P	C
Core/elective/Supportive		Core - XI	0	0	5	4
Pre - requisite		<input type="checkbox"/> Students should have the strong knowledge in any one of the programming languages in this course.	Syllabus version		2025-26 onwards	
Course Objectives						
<input type="checkbox"/> To understand and select the task based on their core skills. <input type="checkbox"/> To get the knowledge about analytical skill for solving the selected task. <input type="checkbox"/> To get confidence for implementing the task and solving the real time problems. <input type="checkbox"/> Express technical and behavioral ideas and thought in oral settings. <input type="checkbox"/> Prepare and conduct oral presentations						
Expected Course Outcomes						
On the successful completion of the course, student will be able to:						
1	Formulate a real world problem and develop its requirements develop a design solution for a set of requirements					K3
2	Test and validate the conformance of the developed prototype against the original requirements of the problem					K5
3	Work as a responsible member and possibly a leader of a team in developing software solutions					K3
4	Express technical ideas, strategies and methodologies in written form. Self-learn new tools, algorithms and techniques that contribute to the software solution of the project					K1- K4
5	Generate alternative solutions, compare them and select the optimum one					K6
K1 – Remember K2 – Understand K3 – apply K4- Analyze K5 – evaluate K6- Create						
Aim of the project work						
1. The aim of the project work is to acquire practical knowledge on the implementation of the programming concepts studied.						
2. Each student should carry out individually one project work and it may be a work using the software packages that they have learned or the implementation of concepts from the papers studied or implementation of any innovative idea focusing on application oriented concepts.						
3. The project work should be compulsorily done in the college only under the supervision of the department staff concerned.						
Viva Voce						
1. Viva-Voce will be conducted at the end of the year by both Internal (Respective Guides) and External Examiners, after duly verifying the Annexure Report available in the College, for a total of 100 marks at the last day of the practical session.						
2. Out of 100 marks, 25 marks for CIA and 75 for CEE (45 evaluation of project report + 30 Viva Voce).						

**Project Work Format**

**PROJECT WORK**

**TITLE OF THE DISSERTATION**

Bonafide Work Done by

STUDENT NAME

REG. NO.

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Internal Examiner

External Examiner

Month – Year

**CONTENTS**

**Acknowledgement**

**Contents**

## **Synopsis**

### **1. Introduction**

1.1 Organization Profile

1.2 System Specification

1.2.1 Hardware Configuration

1.2.2 Software Specification

### **2. System Study**

2.1 Existing System

2.1.1 Drawbacks

2.2 Proposed System

2.2.1 Features

### **3. System Design and Development**

3.1 File Design

3.2 Input Design

3.3 Output Design

3.4 Database Design

3.5 System Development

3.5.1 Description of Modules (Detailed explanation about the project work)

### **4. Testing and Implementation**

### **5. Conclusion Bibliography Appendices**

A. Data Flow Diagram



<p>B. Table Structure</p> <p>C. Sample Coding</p> <p>D. Sample Input</p> <p>E. Sample Output</p>

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
<b>CO1</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>M</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>
<b>CO2</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>M</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>	<b>L</b>
<b>CO3</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>M</b>	<b>M</b>	<b>M</b>	<b>L</b>	<b>L</b>	<b>L</b>
<b>CO4</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>M</b>	<b>M</b>	<b>M</b>	<b>L</b>	<b>L</b>	<b>L</b>
<b>CO5</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>M</b>	<b>M</b>	<b>M</b>	<b>L</b>	<b>L</b>	<b>L</b>

\*S-Strong; M-Medium; L-Low

Course Code		Cyber Policing	L	T	P	C
Core/elective/Supportive		Elective : II	6	0	0	3
Pre - requisite		None	Syllabus Version		2025-26 onwards	
Course Objectives						
<input type="checkbox"/> To introduce the concepts of Cyber Policing <input type="checkbox"/> To explain about crime prevention and routine duties in a police station						
Expected Course Outcomes						
1	Explain about the history of Indian police					K2
2	Illustrate the organizational structure and routine activities of a police station					K2
3	Analyze the public perception of police					K3
4	List the measures to improvise the public perception of police					K4
K1 – Remember K2 – Understand K3 – apply K4- Analyze K5 – evaluate K6- Create						
UNIT I						
History of Indian Police		18				
History of Indian Police: Ancient period, Medieval period and British period- Modern policing- Community policing- Police Act, 1861- Police Commission Reforms and Recommendations- National Police Commission recommendations (NPC), 1979						
UNIT II						
Police organization and structure		18				
State police organization and structure - Urban and rural policing- Hierarchy in city police, district police and police battalion- Functioning of State Police: Law and Order, Intelligence and Special Unit- Central police organizations: RAW, 18, NIA, CBI, CISF, CRPF, RPF- Police research and Crime Statistics Organizations: BPR&D, NCRB.						
UNIT III						
Crime prevention		18				
Crime prevention: Patrolling, beat, surveillance, traffic regulation and maintenance of law & order- Collection of intelligence and its use- Use of scientific methods to tackle crime- Examination of crime scene and investigation- Methods of Investigation: Information, Modus Operandi and Interrogation, Recording of FIR, Case Diary, NC register, Collection of Evidence, Examination of Witnesses and Suspects, Confession of the accused and filing of charge Sheet.						
UNIT IV						
Police Station Routine		18				
Police Station Routine: Roll Call, Duties of Prevention of Crime, Station Guards, Weekly routine duties of police men in cities and villages- Records maintained in police stations: General Diary, KO register, Prisoners Search Register, Duty Roaster, Sentry Relief Book, Duty Roster, Gun license register, Tapal register, arrest card and bail bond- New challenges faced by police: Cybercrime, financial frauds, terrorists, coastline security and organized						
UNIT V						
Public perception of police		18				
Public perception of police - Measures to improve police image in urban and rural areas- Measurements to improve police-public relationship through community policing- Measures to tackle corruption - Treatment of victims and offender by the police- Camoalun to prevent drug abuse and to ensure safety of women in cities						
Total Lecture Hours						90 Hours

Text Book(s)	
1	Aleem, S. (1991). Women in Indian police (15th ed.). Chicago: Sterling Publishers Private Limited.
2	Barker, M., &Petley, J. (2001 ). Ill effects: The media/violence (2nd Ed.). London: RoutledgeBelson.
3	Fisher, Barry A. J. (2000). Techniques of crime scene investigation (6th Ed .. ). New York: CRC Press.
Reference Book(s)	
1	Diaz, S. M. (1976). New dimensions to the oolice role and functions in India. Hyderabad: National Police Academy.
2	Gautam, D. N. (1993). The Indian police: A study in fundamentals. New Delhi: Mittal Publications.
3	Krishna Mohan Mathur. (1994). IndianPolice: Roles and Challenges. Gyan Publishing House, New Delhi
4	Krishna Mohan Mathur.(1989). Internal Security Challenges and Police in a Developing Society.RBSA Publishers.
Related Online Contents (MOOC, SWAYAM,NPTEL, Websites etc)	
1	<a href="https://onlinecourses.swayam2.ac.in/aic20_sp06/preview">https://onlinecourses.swayam2.ac.in/aic20_sp06/preview</a>
2	<a href="https://onlinecourses.swayam2.ac.in/arp19_ap79/preview">https://onlinecourses.swayam2.ac.in/arp19_ap79/preview</a>
Course Designed by :	

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	L	L	L	L	L	L	L	L	L	L
CO2	M	L	L	L	L	L	L	L	L	L
CO3	S	M	L	L	L	L	L	L	L	L
CO4	S	M	L	L	L	L	L	L	L	L

\*S-Strong; M-Medium; L-Low

Course Code		Web Application Security	L	T	P	C
Core/elective/Supportive		Elective : II	6	0	0	3
Pre - requisite		None	Syllabus Version		2025-26 onwards	
Course Objectives						
<input type="checkbox"/> To introduce the concepts of security in web applications <input type="checkbox"/> To explain about crime prevention and routine duties in a police station						
Expected Course Outcomes						
1	Illustrate about the concept of HTML,DHTML, CSS and Java Script					K2
2	Explain the history, characteristics, technologies, concepts, usage in web2.0 and web 3.0					K2
3	Apply the core concepts of web applications to create web pages					K3
4	Apply the concepts of servers side programming					K3
K1 – Remember K2 – Understand K3 – apply K4- Analyze K5 – evaluate K6- Create						
UNIT I	Introduction to web applications					18
Data with URL- HTML - DHTML: Cascading Style Sheets, Common Gateway Interface: Programming CG! Scripts - HTML Forms:- Custom Database Query Scripts - Server Side Includes - Server _security issues.						
UNIT II	Introduction to Scripting Languages					18
XHTML: Introduction, CSS- Scripting languages- Java Script: Control statements, Functions, Arrays, Objects - DOM- Ajax enable rich internet applications.						
UNIT III	Server Side Programming					18
Server side Programming - Active server pages - Java server pages - Java Servlets: Servlet container- Exceptions - Sessions and Session Tracking_ - Using Servlet context - Dynamic Content Generation - Servlet Chaining and Communications.						
UNIT IV	HTML 5 & CSS 3					18
HTML review, Feature detection , The HTML5 new Elements, Canvas, Video and audio, Web storage, Geo location, Offline Web pages , Micro data, HTML5 APLS, Migrating from HTML4 to HTML5, CSS3 .						
UNIT V	Web 2.0					18
WEB 2.0- HISTORY, characteristics, technologies, concepts, usage, web2.0 in education, philanthropy, social work. Web 3.0- Theory-and history understanding. Basic web artifacts and applications, implementation. MS share point - Share point 2013 overview, share (Put social to work ,Share your stuff, Take share point on the go), Discover (find experts, discover answers, find what you are looking for), Manage (cost, risk, time)						
Total Lecture Hours						90 Hours

Text Book(s)	
1	Deitel, Deitel and Neita, -Internet and World Wide _Web- How to program, Pearson Education,Asia 4th Edition, 2009.
2	Elliotte Rusty Herold, -Java Network Programming II, O'Reilly Publications, 3rd Edition, 2004.
Reference Book(s)	
1	Jeffy Dwight, Michael Erwin and Robert Nikes -USING CGI, PH.I Publications, 1997
2	Jason Hunter, William Crawford -Java Servlet Programming O'Reilly Publications, 2nd Edition, 2001.
3	Eric Ladd and Jim O'Donnell, etal, -USING HTML4, XML, and JAVA1.2, Prentice Hall, 2003
4	Jeremy Keith, -Html5 for web designers
Related Online Contents (MOOC, SWAYAM,NPTEL, Websites etc)	
1	<a href="https://onlinecourses.swayam2.ac.in/aic20_sp06/preview">https://onlinecourses.swayam2.ac.in/aic20_sp06/preview</a>
2	<a href="https://onlinecourses.swayam2.ac.in/arp19_ap79/preview">https://onlinecourses.swayam2.ac.in/arp19_ap79/preview</a>
Course Designed by :	

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	L	L	L	L	L	L	L	L	L	L
CO2	M	L	L	L	L	L	L	L	L	L
CO3	S	M	L	L	L	L	L	L	L	L
CO4	S	M	L	L	L	L	L	L	L	L

\*S-Strong; M-Medium; L-Low



Course Code		Malware Analysis and Cyber Threat Intelligence	L	T	P	C
Core/elective/Supportive		Elective : II	6	0	0	3
Pre - requisite		None	Syllabus Version		2025-26 onwards	
Course Objectives						
<input type="checkbox"/> To explain about the concept of Malware analysis						
<input type="checkbox"/> To describe the concepts associated with cyber threat intelligence						
Expected Course Outcomes						
1	Explain about the lifecycle of malware and virus nomenclature					K2
2	Understand the working principle of viruses and worms					K2
3	Choose the virus and malware designs to perform case studies					K3
4	Analyze the various types of worms and viruses					K3
K1 – Remember K2 – Understand K3 – apply K4- Analyze K5 – evaluate K6- Create						
UNIT I	INTRODUCTION					18
INTRODUCTION: Computer Infection Program- Life cycle of malware- Virus nomenclature- Worm nomenclature- Tools used in computer virology.						
UNIT II	IMPLEMENTATION OF COVERT CHANNEL					18
IMPLEMENTATION OF COVERT CHANNEL: Non self-reproducing Malware- Working principle of Trojan Horse- implementation of Remote access and file transfer- Working principle of Logical Bomb: CaseStudy: Conflicker C worm.						
UNIT III	VIRUS DESIGN AND ITS IMPLICATIONS					18
VIRUS DESIGN AND ITS IMPLICATIONS: Virus components- Function of replicator, concealer and dispatcher- Trigger -Mechanisms- Testing virus codes- Case Study: Brute force logical bomb.						
UNIT IV	MALWARE DESIGN USING OPEN SOURCE					18
MALWARE DESIGN USING OPEN SOURCE: Computer Virus in Interpreted programming language- Designing Shell bash virus - under Linux- Fighting over infection- Anti -antiviral fighting - Polymorphism- Casestudy: Companion virus.						
UNIT V	VIRUS AND WORM ANALYSYS					18
VIRUS AND WORM ANALYSYS: Klez Virus- Clone Virus- Doom Virus- Black wolf worm- Sassar worm- Happy worm 99						
Total Lecture Hours						90 Hours
Text Book(s)						
1	ErciFiliol, "Computer Viruses: from theory to applications", Springer, 1 tedition, ISBN 1 O: 2-287-23939-1, 2005.					
2	Mark.A .Ludwig, "The Giant black book of computer viruses, Create Space Independent Publishing Platform, 2nd edition, ISBN 10: 144140712X, 2009.					



	Reference Book(s)	
1	Monnappa KA by Learning Malware Analysis: Explore the concepts, tools, and techniques to analyze and investigate Windows malware.	
2	Jessey Bullock, Wireshark for Security Professionals: Using Wireshark and the Metasploit Framework 1st Edition.	
	<b>Related Online Contents (MOOC, SWAYAM, NPTEL, Websites etc)</b>	
1	<a href="https://onlinecourses.swayam2.ac.in/aic20_sp06/preview">https://onlinecourses.swayam2.ac.in/aic20_sp06/preview</a>	
2	<a href="https://onlinecourses.swayam2.ac.in/arp19_ap79/preview">https://onlinecourses.swayam2.ac.in/arp19_ap79/preview</a>	
<b>Course Designed by :</b>		

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	L	L	L	L	L	L	L	L	L	L
CO2	M	L	L	L	L	L	L	L	L	L
CO3	S	M	L	L	L	L	L	L	L	L
CO4	S	M	L	L	L	L	L	L	L	L

\*S-Strong; M-Medium; L-Low



Course Code		Client Server Computing	L	T	P	C
Core/elective/Supportive		Elective : III	6	0	0	3
Pre - requisite		None	Syllabus Version		2025-26 onwards	
Course Objectives						
<input type="checkbox"/> To introduce the concepts of client and server <input type="checkbox"/> To describe the various components of client server computing						
Expected Course Outcomes						
1	Explain about the various components of client server computing					K2
2	Understand the roles of client and server in a network					K2
3	Analyze the components of Client Server computing in terms of connectivity, hardware/software and service and support					K3
4	Analyze the various types of worms and viruses					K3
K1 – Remember K2 – Understand K3 – apply K4- Analyze K5 – evaluate K6- Create						
UNIT I	Introduction					18
Client / Server Computing–Advantages of Client / Server Computing–Technology Revolution – Connectivity – Ways to improve Performance – How to reduce network Traffic.						
UNIT II	Components of Client / Server Applications					18
Components of Client / Server Applications–The Client: Role of a Client–Client Services – Request for Service. Components of Client / Server Applications – The Server: The Role of a Server – Server Functionality in Detail – The Network Operating System – What are the Available Platforms – The Server Operating system.						
UNIT III	Connectivity & IPC					18
Components of Client / Server Applications–Connectivity: Open System Interconnect – Communications Interface Technology – Inter-process communication – WAN Technologies.						
UNIT IV	Components of C/S application H/W & S/W					18
Components of Client / Server Applications–Software. Components of Client /Server Applications – Hardware.						
UNIT V	Service & Support					18
Components of Client / Server applications–Service and Support: System Administration. The Future of Client / Server Computing: Enabling Technologies – Transformational Systems.						
Total Lecture Hours						90 Hours
Text Book(s)						
1	Client /Server Computing, Patrick Smith, Steve Guenferich, 2 <sup>nd</sup> edition, PHI. ( <i>Chapters1-8 &amp; 10</i> )					
Reference Book(s)						
1	RobertOrfali, Dan Harkey, Jeri Edwards: The Essential Client/Server Survival Guide, 2nd edition, Galgotia Publications.					
2	Dewire and Dawana Travis, Client/ Server Computing, TMH					

	Related Online Contents (MOOC, SWAYAM, NPTEL, Websites etc)	
1	<a href="https://onlinecourses.swayam2.ac.in/aic20_sp06/preview">https://onlinecourses.swayam2.ac.in/aic20_sp06/preview</a>	
2	<a href="https://onlinecourses.swayam2.ac.in/arp19_ap79/preview">https://onlinecourses.swayam2.ac.in/arp19_ap79/preview</a>	
Course Designed by :		

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	L	L	L	L	L	L	L	L	L	L
CO2	M	L	L	L	L	L	L	L	L	L
CO3	S	M	M	L	L	L	L	L	L	L
CO4	S	S	M	L	L	L	L	L	L	L

\*S-Strong; M-Medium; L-Low



Course Code		Open Source Software	L	T	P	C
Core/elective/Supportive		Elective : III	6	0	0	3
Pre - requisite		None	Syllabus Version		2025-26 onwards	
Course Objectives						
<input type="checkbox"/> To explain the need and importance of open source software						
<input type="checkbox"/> To introduce the various open source softwares like Linux, MySql, PHP and Python						
Expected Course Outcomes						
1	Explain about the need and importance of open source software					K2
2	Demonstrate the concepts of open source softwares					K2
3	Apply the programming constructs of MYSQL, PHP, Python and PERL to create programs					K3
4	Develop small programs using open source softwares					K3
K1 – Remember K2 – Understand K3 – apply K4- Analyze K5 – evaluate K6- Create						
UNIT I	Introduction to open sources					18
Introduction to open sources–Need of open sources–advantages of open sources–application of open sources. Open source operating systems: LINUX: Introduction – general overview –Kernel mode and user mode –process – advanced concepts –scheduling – personalities – cloning – signals – development with Linux.						
UNIT II	MySQL					18
MySQL: Introduction–setting up account–starting, terminating and writing your own SQL programs–record selection Technology – working with strings – Date and Time – sorting Query results – generating summary –working with meta data –using sequences – MySQL and Web.						
UNIT III	PHP					18
PHP: Introduction–programming in web environment–variables- constants–data types –operators – statements – functions – arrays – OOP – string manipulations and regular expression – file handling and data storage – PHP and SQL database – PHP andLDAP – PHP connectivity – sending and receiving E-mails – debugging and error handling – security –templates						
UNIT IV	Python					18
Syntax and style–python objects–numbers–sequences–strings–lists and tuples – dictionaries – conditional loops –files – input and output – errors and exceptions – functions – modules – classes and OOP – execution environment						
UNIT V	Pearl					18
Pearl overview–pearl parsing rules–variables and data–statements and control structures – subroutines -, packages and modules – working with files– data manipulation.						
Total Lecture Hours						90 Hours
Text Book(s)						
1	The Linux Kernel Book, Remy Card, Eric and Frank Mevel, Wiley Publications 2003					
2	MySQL Bible, Steve Suchring, John Wiley 2002.					

	Reference Book(s)	
1	Programming PHP, RasmusLerdorf and Levin Tatroe, O_Reilly, 2002	
2	Core Python Programming, Wesley J. Chun, Prentice Hall, 2001	
3	Perl: The Complete Reference, 2 <sup>nd</sup> Edn, Martin C. Brown, TMH, 2009	
4	MySQL: The Complete Reference, 2 <sup>nd</sup> Edn, VikramVaswani, TMH, 2009	
	<b>Related Online Contents (MOOC, SWAYAM, NPTEL, Websites etc)</b>	
1	<a href="https://onlinecourses.swayam2.ac.in/aic20_sp06/preview">https://onlinecourses.swayam2.ac.in/aic20_sp06/preview</a>	
2	<a href="https://onlinecourses.swayam2.ac.in/arp19_ap79/preview">https://onlinecourses.swayam2.ac.in/arp19_ap79/preview</a>	
<b>Course Designed by :</b>		

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	L	L	L	L	L	L	L	L	L	L
CO2	M	L	L	L	L	L	L	L	L	L
CO3	S	M	M	L	L	L	L	L	L	L
CO4	S	S	M	L	L	L	L	L	L	L

\*S-Strong; M-Medium; L-Low



Course Code		Principles of Secure Coding	L	T	P	C
Core/elective/Supportive		Elective : III	6	0	0	3
Pre - requisite		None	Syllabus Version		2025-26 onwards	
Course Objectives						
<div><input type="checkbox"/> To understand the secure software development life cycle</div> <div><input type="checkbox"/> To explain about the secure coding techniques</div>						
Expected Course Outcomes						
1	Explain about the secure software development life cycle					K2
2	Understand the secure coding techniques					K2
3	Demonstrate the threat modeling process and benefits					K2
4	Explain about the database and web specific issues					K2
K1 – Remember K2 – Understand K3 – apply K4- Analyze K5 – evaluate K6- Create						
UNIT I	Need for secure systems					18
Need for secure systems: Proactive Security development process, Secure Software Development Cycle (S-SDLC) , Security issues while writing SRS, Design phase security, Development Phase, Test Phase, Maintenance Phase, Writing Secure Code - Best Practices SD3 (Secure by design, default and deployment), Security principles and Secure Product Development Timeline						
UNIT II	Threat modelling process and its benefits					18
Threat modelling process and its benefits: Identifying the Threats by Using Attack Trees and rating threats using DREAD, Risk Mitigation Techniques and Security Best Practices. Security techniques, authentication, authorization. Defense in Depth and Principle of Least Privilege .						
UNIT III	Secure Coding Techniques					18
Secure Coding Techniques: Protection against DoS attacks, Application Failure Attacks, CPU Starvation Attacks, Insecure Coding Practices In Java Technology. ARP Spoofing and its countermeasures. Buffer Overrun- Stack overrun, Heap Overrun, Array Indexing Errors, Format String Bugs. Security Issues in C Language: String Handling, Avoiding Integer Overflows and Underflows and Type Conversion Issues- Memory Management Issues, Code Injection Attacks, Canary based counter measures using Stack Guard and Pro police. Socket Security, Avoiding Server Hijacking, Securing RPC.						
UNIT IV	Database and Web-specific issues					18
Database and Web-specific issues: SOL Injection Techniques and Remedies, Race conditions, Time of Check Versus Time of Use and its protection mechanisms. Validating Input and Inter process Communication, Securing Signal Handlers and File Operations. XSS scripting attack and its types - Persistent and Non persistent attack XSS Countermeasures and Bypassing the XSS Filters.						
UNIT V	Testing Secure Applications					18
Testing Secure Applications: Security code overview, secure software installation. The Role of the Security Tester, Building the Security Test Plan. Testing HTTP- Based Applications, Testing File-Based Applications, Testing Clients with Rogue Servers						
Total Lecture Hours						90 Hours



Text Book(s)	
1	Writing Secure Code, Michael Howard and David LeBlanc, Microsoft Press, 2nd Edition, 2004
Reference Book(s)	
1	Programming PHP, RasmusLerdorf and Levin Tatroe, O Reilly, 2002
2	Core Python Programming, Wesley J. Chun, Prentice Hall, 2001
3	Perl: The Complete Reference, 2 <sup>nd</sup> Edn, Martin C. Brown, TMH, 2009
4	MySQL: The Complete Reference, 2 <sup>nd</sup> Edn, VikramVaswani, TMH, 2009
Related Online Contents (MOOC, SWAYAM, NPTEL, Websites etc)	
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2	<a href="https://onlinecourses.swayam2.ac.in/arp19_ap79/preview">https://onlinecourses.swayam2.ac.in/arp19_ap79/preview</a>
Course Designed by :	

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	L	L	L	L	L	L	L	L	L	L
CO2	M	L	L	L	L	L	L	L	L	L
CO3	S	M	L	L	L	L	L	L	L	L
CO4	S	M	M	L	L	L	L	L	L	L

\*S-Strong; M-Medium; L-Low

Course Code		Ethical Hacking	L	T	P	C
Core/elective/Supportive		Skill Based Subject : IV	3	0	0	2
Pre - requisite		None	Syllabus Version		2025-26 onwards	
Course Objectives						
<input type="checkbox"/> To introduce the concepts of security and various kinds of attacks						
<input type="checkbox"/> To explain about system hacking and penetration testing						
Expected Course Outcomes						
1	Explain the importance of security and various types of attacks					K2
2	Understand the concepts of scanning and system hacking					K2
3	Explain about penetration testing and its methodology					K2
4	Identify the various programming languages used by security professional					K4
K1 – Remember K2 – Understand K3 – apply K4- Analyze K5 – evaluate K6- Create						
UNIT I	Introduction To Hacking					12
Introduction to Hacking – Importance of Security – Elements of Security – Phases of an Attack – Types of Hacker Attacks – Hacktivism – Vulnerability Research – Introduction to Foot printing – Information Gathering Methodology – Foot printing Tools – WHOIS Tools – DNS Information Tools– Locating the Network Range – Meta Search Engines						
UNIT II	Scanning And Enumeration					10
Introduction to Scanning – Objectives – Scanning Methodology – Tools – Introduction to Enumeration – Enumeration Techniques – Enumeration Procedure – Tools						
UNIT III	System Hacking					14
Introduction – Cracking Passwords – Password Cracking Websites – Password Guessing –Password Cracking Tools – Password Cracking Countermeasures – Escalating Privileges –Executing Applications – Key loggers and Spyware						
UNIT IV	Programming For Security Professionals					12
Programming Fundamentals – C language – HTML – Perl – Windows OS Vulnerabilities – Toolsfor Identifying Vulnerabilities – Countermeasures – Linux OS Vulnerabilities – Tools for IdentifyingVulnerabilities – Countermeasures						
UNIT V	Penetration Testing					12
Introduction – Security Assessments – Types of Penetration Testing- Phases of PenetrationTesting– Tools – Choosing Different Types of Pen-Test Tools – Penetration Testing Tools						
Total Lecture Hours						60 Hours

<b>Text Book(s)</b>	
<b>1</b>	EC-Council, “Ethical Hacking and Countermeasures: Attack Phases”, Cengage Learning, 2010.
<b>2</b>	Jon Erickson, “Hacking, 2nd Edition: The Art of Exploitation”, No Starch Press Inc., 2008.
<b>3</b>	Michael T. Simpson, Kent Backman, James E. Corley, “Hands-On Ethical Hacking and Network Defense”, Cengage Learning, 2013.
<b>Reference Book(s)</b>	
<b>1</b>	Patrick Engebretson, “The Basics of Hacking and Penetration Testing – Ethical Hacking and Penetration Testing Made Easy”, Second Edition, Elsevier, 2013.
<b>2</b>	Rafay Boloch, “Ethical Hacking and Penetration Testing Guide”, CRC Press, 2014
<b>Related Online Contents (MOOC, SWAYAM, NPTEL, Websites etc)</b>	
<b>1</b>	<a href="https://onlinecourses.swayam2.ac.in/aic20_sp06/preview">https://onlinecourses.swayam2.ac.in/aic20_sp06/preview</a>
<b>2</b>	<a href="https://onlinecourses.swayam2.ac.in/arp19_ap79/preview">https://onlinecourses.swayam2.ac.in/arp19_ap79/preview</a>
<b>Course Designed by :</b>	

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	L	L	L	L	L	L	L	L	L	L
CO2	M	L	L	L	L	L	L	L	L	L
CO3	S	M	L	L	L	L	L	L	L	L
CO4	S	M	L	L	L	L	L	L	L	L

\*S-Strong; M-Medium; L-Low

<b>Course Code</b>		<b>Cyber Security</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>Core/elective/Supportive</b>		<b>Naan Mudhalvan Skill based Course-I</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>2</b>

# Annexure

## B.Sc. Digital and Cyber Forensic Science

### Syllabus

(With effect from 2025 -26)

Program Code: 26E



**DEPARTMENT OF CATERING SCENCE AND HOTEL MANAGEMENT**

**Bharathiar University**

**(A State University Accredited with “a” by NAAAC and  
13<sup>th</sup> Rank among Indian Universities by MHRD-  
NIRF) Coimbatore 641046, INDIA**



### MISSION

- ☐ To develop IT professionals with ethical and human values.
- ☐ To organize, connect, create and communicate mathematical ideas effectively, through industry 4.0.
- ☐ To provide a learning environment to enhance innovations, problem solving abilities, leadership potentials, team-spirit and moral tasks.
- ☐ To nurture the research values in the developing areas of Computer Science and interdisciplinary fields.
- ☐ Promote inter-disciplinary research among the faculty and the students to create state of art research facilities.
- ☐ To promote quality and ethics among the students.
- ☐ Motivate the students to acquire entrepreneurial skills to become global leaders.

