B. Sc. (Digital and Forensic Science)

Syllabus

AFFILIATED COLLEGES

Program Code ****

2023– 2026 BATCH

BHARATHIAR UNIVERSITY

(A State University, Accredited with "A" Grade by NAAC,
Ranked 13th 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.

Programme Specific Outcomes (PSOs)	
After the successful completion of B.Sc. Digital and Cyber Forensic Science program the students are expected to	
PSO1	Impart education with domain knowledge effectively and efficiently in par with the expected quality standards for Digital and Cyber Forensic Science professional.
PSO2	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.
PSO3	Ability to engage in life-long learning and adopt fast changing technology to prepare for professional development.
PSO4	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.
PSO5	Inculcate effective communication skills combined with professional & ethical attitude.

Programme Outcomes (POs)	
On successful completion of the B.Sc. Digital and Cyber Forensic Science	
PO1	Exhibit good **domain knowledge** and completes the assigned responsibilities effectively and efficiently in par with the expected quality standards.
PO2	Apply **analytical and critical thinking** to identify, formulate, analyze, and solve complex problems in order to reach authenticated conclusions
PO3	**Design and develop research based solutions** for complex problems with specified needs through appropriate consideration for the public health, safety, cultural, societal, and environmental concerns.
PO4	Establish the ability to **Listen, read, proficiently communicate and articulate complex ideas** with respect to the needs and abilities of diverse audiences.
PO5	**Deliver innovative ideas to instigate new business ventures** and possess the qualities of a good entrepreneur
PO6	Acquire the qualities of a **good leader and engage in efficient decision making.**
PO7	Graduates will be able to undertake any responsibility as an **individual/member of multidisciplinary teams and have an understanding of team leadership**
PO8	Function as s**ocially responsible individual** with ethical values and accountable to ethically validate any actions or decisions before proceeding and actively contribute to the societal concerns.
PO9	Identify and **address own educational needs i**n a changing world in ways sufficient to maintain the competence and to allow them to contribute to the advancement of knowledge
PO10	**Demonstrate knowledge and understanding of management principles a**nd 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 **2023-2024** and onwards*)

Scheme of Examination

Part	Title of the Course	Hours /	Examination				Credits
			Duration in	Maximum Marks			
				CIA	CEE	Total	
	Semester I						
I	Language – I	4	3	25	75	100	4
II	English – I	4	3	25	75	100	4
III	Core1:Programming in C	5	3	25	75	100	4
III	Core Lab 1: Programming Lab – C	5	3	40	60	100	4
	Core 2:Data structures	5	3	25	75	100	4
III	Allied 1:Introduction to Linear algebra	5	3	25	75	100	4
IV	Environmental Studies *	2	3	-	50	50	2
	Total	**30**		**165**	**485**	**650**	**26**
	Semester II						
I	Language – II	4	3	25	75	100	4
II	English – II	4	3	25	25	50	2
	Naan Mudhalvan Courses Effective English & http://kb.naanmudhalvan.in/images/c/c7/Cambridge_Course_Details.pdf	2		25	25	50	2
III	Core3: Programming in C++	5	3	25	75	100	4
III	Core Lab2: Programming Lab –C++	5	3	20	30	50	2
III	Core Lab3: Internet Basics Lab	3	3	20	30	50	2
III	Allied 2:Discrete Mathematics	5	3	25	75	100	4
IV	Value Education – Human Rights*	2	3	-	50	50	2
	Total	**30**		**165**	**385**	**550**	**22**
	Semester III						
I	Language-III	4	3	25	75	100	4
II	English-III &	4	3	25	75	100	4
III	Core 4: Python Programming	4	3	25	75	100	4
III	Core 5: Introduction to cyber crime	4	3	25	75	100	4
III	Core Lab 4: Python Programming Lab	3	3	20	30	50	2
III	Allied 3: Software Security	5	3	25	25	50	2
III	Skill based Subject1 :Cyber Law	4	3	30	45	75	3
IV	Tamil @/ Advanced Tamil (OR)Non-major elective-1 (Yoga for Human Excellence)# / Women's Rights#	2	3	-	50	50	2
	Total	**30**		**175**	**450**	**625**	**25**
	Semester IV						
I	Language-IV	4	3	25	75	100	4
II	English-IV	4	3	25	25	50	2
III	Core 6: Digital Forensics	4	3	25	75	100	4
III	Core 7: Cyber Security	4	3	25	75	100	3
III	Core Lab 5:Forensics Lab	3	3	20	30	50	2

	Naan Mudhalvan Courses Office Fundamentals – Lab*** http://kb.naanmudhalvan.in/Bharathiar_University_(BU)	2	-	25	25	50	2
III	Allied 4:Intellectual Property Rights and Privacy	4	3	25	25	50	2
III	Skill Based Subject 2:Capstone Project Work Phase I	3	3	25	25	50	2
IV	Tamil **/ Advanced Tamil* (OR) Non-major elective – II (General Awareness)*	2	3	-	50	50	2
	Total	**30**		**195**	**405**	**600**	**23**
	Semester V						
III	Core 8:Linux System Administration	6	3	25	75	100	4
III	Core Lab 6:Linux System Administration	6	3	25	75	100	4
III	Core 9 : Mobile and Network forensics	6	3	30	45	75	4
III	Elective - I Network Security and Management/Artificial Neural Network and	6	3	25	75	100	4
III	Skill Based Subject 3: Capstone Project Work	6	3	30	45	75	3
	Total	**30**		**135**	**315**	**450**	**19**
	Semester VI						
III	Core 10 :Cryptography and Network Security	5	3	25	75	100	4
III	Core 11:Project Work Lab	5	3	25	75	100	4
III	Core Lab 7 :Cryptography and Network Security Lab	5	3	30	45	75	3
	Naan Mudhalvan–Skill Course - Cyber Security **@** http://kb.naanmudhalvan.in/images/7/71/Cybersecurity.pdf (or) Machine Learning **#** http://kb.naanmudhalvan.in/images/1/19/PBL_Google.pdf (or) Android APP Development **$** http://kb.naanmudhalvan.in/images/0/08/Android_App_Dev.pdf	2		25	25	50	2
III	Elective - II Cyber Policing / Web Application Security/ Malware Analysis and Cyber Threat Intelligence	5	3	25	75	100	4
III	Elective - III Client Server Computing/Open Source Software/Principles of Source Coding	5	3	25	75	100	4
III	Skill based Subject 4 : Ethical Hacking	3	3	25	25	50	2
V	Extension Activities**	-	-	50	-	50	2
	Total	**30**		**230**	**395**	**625**	**25**
	Grand Total			**1065**	**2435**	**3500**	**140**

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.
# Govt – (Non-Autonomous Colleges), $ Aided – (Non-Autonomous Colleges), @ Self - Financing (Non – Autonomous). **(For theory : CIA – 25, CEE – 25; For Practical : CIA – 25, CEE – 25).**	

First Semester

Course Code		Programming in C	L	T	P	C
Core/elective/Supportive		Core: 1	5	0	0	4
Pre - requisite		Basic knowledge in computers	Syllabus version		2021-22 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	**https://onlinecourses.swayam2.ac.in/aic20_sp06/preview**	
2	**https://onlinecourses.swayam2.ac.in/arp19_ap79/preview**	
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**
CO5	**S**	**M**	**M**	**L**	**L**	**L**	**L**	**L**	**L**	**L**
CO6	**S**	**S**	**S**	**L**	**L**	**L**	**L**	**L**	**L**	**L**

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

Course Code		Programming Lab - C	L	T	P	C
Core/elective/Supportive		Core Lab : 1	0	0	5	4
Pre - requisite		Basic knowledge in computers	Syllabus version		2021-22 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 : 2	5	-	-	4
Pre - requisite		Basic knowledge of Programming Constructs	Syllabus version		2021-22 onwards	

Course Objectives

- To introduce the concept of data structures and the types of data structures
- 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.

UNIT V	INTERNAL - SORTING	12 Hours
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.		
Total Hours		**60 Hours**
Text Book(s)		
1	Ellis Horowitz, Sartaj Shani, Data Structures, Galgotia Publication.	
Reference Book(s)		
1	Ellis Horowitz, Sartaj Shani, Sanguthevar Rajasekaran, Computer Algorithms, Galgotia Publication.	
	Related Online Contents (MOOC, SWAYAM,NPTEL, Websites etc)	
1	**https://onlinecourses.swayam2.ac.in/aic20_sp06/preview**	
2	**https://onlinecourses.swayam2.ac.in/arp19_ap79/preview**	
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**
CO5	**S**	**M**	**M**	**L**	**L**	**L**	**L**	**L**	**L**	**L**

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

Course Code		Introduction to Linear Algebra	L	T	P	C
Core/elective/Supportive		Allied : 1	5	0	0	4
Pre - requisite		None	Syllabus version		2021-22 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.

UNIT V		15
Complex Vectors and Complex Matrices – Complex Numbers – Hermitian and Unitary Matrices – The Fast Fourier Transform – Applications – Numerical Linear Algebra.		
Total Lecture Hours		**75 Hours**
Text Book(s)		
1	Gilbert Strang(2016). Introduction to Linear Algebra, 5th Edition. Wellesley –	
	Reference Books	
1	S.Lang (1997). Introduction to Linear Algebra. Second Edition. Springer.	
2	Gilbert Strang (2006). Linear Algebra and Its Apllications. Fourth Edition. Cengage Learning.	
3	David C. Lay, Steven R. Lay, and Judi J. McDonald (2014). Linear Algebra and Its Applications. 5th Edition. Pearson.	
	Related Online Contents (MOOC, SWAYAM,NPTEL, Websites etc)	
1	**https://onlinecourses.swayam2.ac.in/aic20_sp06/preview**	
2	**https://onlinecourses.swayam2.ac.in/arp19_ap79/preview**	
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**
CO5	**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 : 3	5	0	0	4
Pre - requisite		Basic knowledge of Procedure Oriented Programming concepts Basic knowledge in C Programming	Syllabus version		2021-22 onwards	

Course Objectives

To introduce he 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++	12

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	14

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	16

Operator Overloading: Overloading unary, binary operators – Overloading Friend functions – type conversion – Inheritance: Types of Inheritance – Single, Multilevel, Multiple, Hierarchal, 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.

UNIT V	File and Exception Handling	15
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 .		
	Total Lecture Hours	**75 Hours**
	Text Book(s)	
1	Ashok N Kamthane, Object-Oriented Programming with Ansi And Turbo C++, Pearson Education, 2003.	
	Reference Books	
1	E. Balagurusamy, Object-Oriented Programming with C++, TMH, 1998.	
2	Maria Litvin & Gray Litvin, C++ for you, Vikas publication, 2002.	
3	John R Hubbard, Programming with C, 2nd Edition, TMH publication, 2002	
	Related Online Contents (MOOC, SWAYAM,NPTEL, Websites etc)	
1	**https://onlinecourses.swayam2.ac.in/aic20_sp06/preview**	
2	**https://onlinecourses.swayam2.ac.in/arp19_ap79/preview**	
Course Designed by :		

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	**M**	**M**	**L**	**L**	**L**	**L**	**L**	**L**	**L**	**L**
CO2	**M**	**M**	**M**	**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**
CO5	**S**	**S**	**M**	**L**	**L**	**L**	**L**	**L**	**L**	**L**
CO6	**S**	**S**	**S**	**L**	**L**	**L**	**L**	**L**	**L**	**L**

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

Course Code		Programming Lab – C++	L	T	P	C
Core/elective/Supportive		Core Lab : 2	-	0	5	2
Pre - requisite		Basic knowledge of Procedure Oriented Programming concepts Basic knowledge in C Programming	Syllabus version		2021-22 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	**5**
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	**5**
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	**5**
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	**5**
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	**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	**5**
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.	

PROGRAM -7		**5**
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, TRIANGE from class Shape and Calculate Area and Perimeter of each class separately and display the result.		
PROGRAM -8		**5**
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.		
PROGRAM -9		**5**
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.		
PROGRAM - 10		**5**
Write a C++ Program to check whether the given string is a palindrome or not using Pointers.		
PROGRAM - 11		**5**
Write a C++ Program to create a File and to display the contents of that file with line numbers.		
PROGRAM - 12		**5**
Write a C++ Program to merge two files into a single file.		
Total Lecture Hours		**60 Hours**
Text Book(s)		
1	Ashok N Kamthane, Object-Oriented Programming with Ansi And Turbo C++, Pearson Education, 2003.	
	Reference Books	
1	E. Balagurusamy, Object-Oriented Programming with C++, TMH, 1998.	
2	Maria Litvin & Gray Litvin, C++ for you, Vikas publication, 2002.	
3	John R Hubbard, Programming with C, 2nd Edition, TMH publication, 2002	
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**	**M**	**L**	**L**	**L**	**L**	**L**	**L**	**L**
CO4	**S**	**S**	**S**	**L**	**L**	**L**	**L**	**L**	**L**	**L**

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

Course Code		Internet Basics - Lab	L	T	P	C
Core/elective/Supportive		Core Lab : 3	-	0	3	2
Pre - requisite		Basic knowledge in Computers	Syllabus version		2021-22 onwards	

Course Objectives

1. Introduce the fundamentals of Internet and the Web functions.
2. Impart knowledge and essential skills necessary to use the internet and its various components.
3. Find, evaluate, and use online information resources.
4. Use Google Apps for education effectively.

Expected Course Outcomes

1	Apply the predefined procedures to create Gmail account, check and receive messages	K3
2	Apply the predefined procedures to perform various basic operations on internet	K3
3	Utilize various google applications like docs, google classroom, google drive, google forms, google meet and slides	K3

K1 – Remember K2 – Understand K3 – apply K4- Analyze K5 – Evaluate K6- Create

PROGRAM - 1	**2**
Create an email account in Gmail. Using the account created compose a mail to invite other college students for your college fest, enclose the invitation as attachment and send the mail to at least 50 recipients. Use CC and BCC options accordingly	
PROGRAM - 2	**2**
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	
PROGRAM - 3	**2**
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.	
PROGRAM - 4	**2**
Create a meeting using Google calendar and share meeting id to the attendees. Transfer the ownership to the Manager once the meeting id is generated.	
PROGRAM - 5	**2**
Create a label and upload bulk contacts using import option in Google Contacts	
PROGRAM -6	**4**
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.	
PROGRAM -7	
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.	
PROGRAM -8	
Create one-page story in your mother tongue by using voice recognition facility of Google Docs	

PROGRAM -9	**2**
Create a registration form for your Department Seminar or Conference using Google Forms.	
PROGRAM -10	**2**
Create a question paper with multiple choice types of questions for a subject of your choice, using Google Forms.	
PROGRAM -11	**4**
Create a meet using Google Calendar and record the meet using Google Meet. Create a Google slides for a topic and share the same with your friends.	
PROGRAM -12	**4**
Create template for a seminar certificate using Google Slides.	
PROGRAM -13	
Create a sheet to illustrate simple mathematical calculations using Google Sheets. Create student‟s internal mark statement and share the Google sheets via link.	**4**
Total Lecture Hours	**30 Hours**

Text Book(s)	
1	Ian Lamont, Google Drive & Docs in 30 Minutes, 2nd Edition.
Reference Book(s)	
1	Sherry Kinkoph Gunter, My Google Apps, 2014.

Course Designed by :

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	**M**	**M**	**L**	**L**	**L**	**L**	**L**	**L**	**L**	**L**
CO2	**S**	**M**	**L**	**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		Discrete Mathematics	L	T	P	C
Core/elective/Supportive		Allied : 2	5	0	0	4
Pre - requisite		Basic knowledge in Mathematics	Syllabus version		2021-22 onwards	

Course Objectives

- Introduce students to the techniques, algorithms, and reasoning processes involved in the study of discrete mathematical structures.
- Introduce students to set theory, inductive reasoning, elementary and advanced counting techniques, equivalence relations, recurrence relations, graphs, and trees.
- Introduce students to prove mathematical statements by means of inductive reasoning

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 – Propositonal 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.

UNIT IV	RECURRENCE RELATIONS	15
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.		
UNIT V	**LATTICES**	**15**
Lattices as partially ordered set – Properties of Lattices – Lattices as algebraic system – Sub lattices – Direct Product and Homomorphism – Some special lattices.		
Total Lecture Hours		**75** Hours

Text Book(s)	
1	Kenneth H. Rosen, "Discrete Mathematics and its applications", McGraw Hill, 2011.
2	Judith L.Gersting, "Mathematical Structures for Computer Science", W.H> Freeman and Company, 2014
3	Tremblay J.P. and Manohar R., "Discrete and Combinatorial Mathamatics – An Introduction", Addison Wesley, 2009.
Reference Books	
1	Doerr Alan and Levasseur K., "Applied Discrete Structures for Computer Science", Galgotia Publications, 2002
2	Benard Kolman, Robert C. Busby and Sharan Ross, " Discrete Mathematical Structures", Pearson Education, 2014
Related Online Contents (MOOC, SWAYAM,NPTEL, Websites etc)	
1	**https://onlinecourses.swayam2.ac.in/aic20_sp06/preview**
2	**https://onlinecourses.swayam2.ac.in/arp19_ap79/preview**
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**	**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 : 4	4	0	0	4
Pre - requisite		Knowledge in Basics of Object Oriented Programming	Syllabus Version		2021-22 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	16

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	17

CONTROL STATEMENTS: Control Flow and Syntax - Indenting - if Statement - statements and expressions- string operations- Boolean Expressions -while Loop - break and continue - for Loop.
LISTS: List-list slices - list methods - list loop–mutability–aliasing - cloning lists - list parameters**.**
TUPLES: Tuple assignment, tuple as return value -Sets–Dictionaries.

UNIT III	FUNCTIONS:	20

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:	18

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:	19

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.	
Total Lecture Hours	**90 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	**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 : 4	0	0	3	2
Pre - requisite		Knowledge in basic Programming	Syllabus version		2021-22 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]mxp and [B]pxr	
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 :5	4	0	0	4
Pre - requisite		Basic knowledge in Internet and data crimes.	Syllabus version		2021-22 onwards	

Course Objectives

- To explain the concept of cybercrime and various types of attacks
- 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**	**18**

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**	**18**

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**	**17**

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**	**19**

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**	**18**

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	**90 Hours**

Text Book(s)		
1	Nina Godbole and SunitBelapore; "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	**https://onlinecourses.swayam2.ac.in/aic20_sp06/preview**	
2	**https://onlinecourses.swayam2.ac.in/arp19_ap79/preview**	
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 : 3	5	0	0	2
Pre - requisite		Basic Knowledge about software and hardware	Syllabus Version		2021-22 onwards	

Course Objectives

- To explain the need for software security
- 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	18

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	19

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	17

Risk Management Life Cycle – Risk Profiling – Risk Exposure Factors – Risk Evaluation and Mitigation – Risk Assessment Techniques – Threat and Vulnerability Management.

UNIT IV	Security Testing	18

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	18
Advanced Penetration Testing – Planning And Scoping – DNS Groper – DIG (Domain Information Graph) – Enumeration – Remote Exploitation – Web Application Exploitation - Exploits And Clients ide Attacks – Post Exploitation – Bypassing Firewalls and Avoiding Detection - Tools for Penetration Testing		
Total Lecture Hours		**90 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, 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	**https://onlinecourses.swayam2.ac.in/aic20_sp06/preview**	
2	**https://onlinecourses.swayam2.ac.in/arp19_ap79/preview**	
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**
CO5	**S**	**M**	**L**	**L**	**L**	**L**	**L**	**L**	**L**	**L**

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

Course Code		Cyber Law	L	T	P	C
Core/elective/Supportive		Skill Based Subject : 1	4	0	0	3
Pre - requisite		Basic knowledge in Internet and data crimes.	Syllabus Version			2021-22 onwards

Course Objectives

- To explain about the various types of cybercrimes
- 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**	**16**

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**	**15**

Regulatory Framework of Information and Technology Act 2000 -Information Technology Act 2000, Digital Signature, E-Signature, Electronic Records, Electronic Evidence and Electronic Governance. Controller, CertifyingAuthority 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**	**15**

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**	**15**

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**	**14**

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	**75** Hours

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

Fourth Semester

Course Code		Digital Forensics	L	T	P	C
Core/elective/Supportive		Core : 6	4	0	0	4
Pre - requisite		None	Syllabus Version			2021-22 onwards

Course Objectives

- To introduce the principle and concepts of digital forensic
- 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	18

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	18

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	19

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	18

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	17
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 Analysisof the Registry – Use of registry viewers, Regedit. Extracting USB related artifactsand examination of protected storages. Linux System Artifact: Ownership andPermissions, Hidden files, User Accounts and Logs.		
Total Lecture Hours		**90 Hours**
Text Book(s)		
1	Nina Godbole and SunitBelapore; "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	**https://onlinecourses.swayam2.ac.in/aic20_sp06/preview**	
2	**https://onlinecourses.swayam2.ac.in/arp19_ap79/preview**	
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 : 7	4	0	0	3
Pre - requisite		None	Syllabus Version			2021-22 onwards

Course Objectives

- To introduce the concepts of various cyber security threats and attacks
- To detail about the concepts of network and web security

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	19

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	18

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	20

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	20

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	13

Web Security: SSL Encryption, TLS, SET. Intrusion detection. Securing online payments (OTP).

Total Lecture Hours	90 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	**https://onlinecourses.swayam2.ac.in/aic20_sp06/preview**
2	**https://onlinecourses.swayam2.ac.in/arp19_ap79/preview**
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 : 5	0	0	3	2
Pre - requisite		None	Syllabus Version		2021-22 onwards	

Course Objectives

- To explain the need for software security
- 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	**12**
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	**12**
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	**15**
Use a Web search engine, search for various computer forensics tools.	
ACTIVITY IV	**12**
Preparing and processing of investigations. Try to examine and identify the evidences from the drives. (Project 2-1)	
ACTIVITY V	**15**
Extracting of files that have been deleted.((Project 2-4)	
ACTIVITY VI	**12**
Illustrate the analysis of forensic data.	
ACTIVITY VII	**12**
Illustrate the validating of forensic data.	
Total Lecture Hours	**90** 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	
	Related Online Contents (MOOC, SWAYAM,NPTEL, Websites etc)	
1	**https://onlinecourses.swayam2.ac.in/aic20_sp06/preview**	
2	**https://onlinecourses.swayam2.ac.in/arp19_ap79/preview**	
Course Designed by :		

	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 2	0	0	3	2
Pre - requisite		Students should have a good understanding of software engineering. Student should possess strong analytical skills.	Syllabus version		2021-22 onwards	

Course Objectives

- To understand and select the task based on their core skills.
- To get the knowledge about analytical skill for solving the selected task.
- To get confidence for implementing the task and solving the real time problems.

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

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 50 marks at the last day of the practical session.

2. Out of 50 marks, 20 marks for CIA, 30 marks for CEE (20 marks for project report and 10 Marks for Viva Voce.)

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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Acknowledgement

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1.2 System Specification

1.2.1 Hardware Configuration

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2.1.1 Drawbacks

2.2 Proposed System

2.2.1 Features

3. System Design

3.1 Form Design

3.2 Input Design

3.3 Output Design

3.4 Database Design

Conclusion

Bibliography

Appendices

A. Data Flow Diagram

B. Table Structure

	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 : 4	4	0	0	2
Pre - requisite		None	Syllabus Version			2021-22 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 be 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	17

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	18

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	19

Introduction to Copyright- International Protection of Copyright and Related rights- An Overview (International Convention/Treaties on Copyright).

UNIT IV	Indian Copyright Law	19

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	17

History and Perspective of Privacy Laws- Global Privacy Issue- Legal Tools – The Constitution. Statutes & State Protection.

Total Lecture Hours	**90** 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.

Reference Book(S)	
1	The Copyright Act, 1957
2	The Patent Act, 1970
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
CO5	S	S	S	L	L	L	L	L	L	L

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

Fifth Semester

Course Code		Linux System Administration	L	T	P	C
Core/elective/Supportive		Core : 8	6	0	0	4
Pre - requisite		Basic knowledge about Operating Systems	Syllabus Version			2021-22 onwards

Course Objectives

- To introduce the concepts of Linux operating system
- To explain the various constructs associated with Linux

Expected Course Outcomes

1	Illustrate the various directory and fie 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.
	Related Online Contents (MOOC, SWAYAM,NPTEL, Websites etc)
1	**https://onlinecourses.swayam2.ac.in/aic20_sp06/preview**
2	**https://onlinecourses.swayam2.ac.in/arp19_ap79/preview**
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: 6	0	0	6	4
Pre - requisite		Basic knowledge Linux commands	Syllabus version		2021-22 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		**6**
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		**6**
1. Write an awk script to find the number of characters, words and lines in a file?		
EXERCISE 3		**9**
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		**9**
Write a shell script to sort number in ascending order.		
EXERCISE 5		**12**
Write a shell script (small calculator) that adds, subtracts, multiplies and divides the two given numbers.		
EXERCISE 6		**9**
Write a shell script to determine whether a given number is a prime number or not.		
EXERCISE 7		**12**
Write a shell script to print the first n Fibonacci numbers.		
EXERCISE 8		**9**
Write a shell script to find the GCD of two given numbers.		
EXERCISE 9		**9**
Write a shell script to check whether given string is palindrome or not.		
EXERCISE 10		**9**
Write a shell script to find the factorial of given integer.		
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.
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	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		Mobile and Network Forensics	L	T	P	C
Core/elective/Supportive		Core : 9	6	0	0	4
Pre - requisite		Basic knowledge o Forensics	Syllabus Version			2021-22 onwards

Course Objectives

- To explain the various mobile technologies and mobile eco system security
- 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.

UNIT V		19
Introduction to Network Forensics 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.		
Total Lecture Hours		**90 Hours**
Text Book(s)		
1	William Stallings; "Network Security Essentials", 3rd Edition, Pearson Education, 2006.	
2	AtulKahate; “Cryptography and Network Security” McGraw Hill Education (India), 2008	
3	Beherouz. A Forouzan; “Data Communication and Networking”, 4th Edition, TMH, 2000.	
4	Sherri Davidoff and Jonathan Ham; “Network Forensics – Tracking Hackers through Cyberspace”, Pearson Publications, 2012.	
5	Samir Datt; “Learning Network Forensics – Identify and Safeguard your Networks against both Internal and External Threats, hackers and malware attacks”, PACKT Publishing, 2016	
6	John R. Vacca; “Network and Systems Security”, Syngress Publications.	
ReferenceBook(s)		
1	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.	
2	Iosif I. Androulidakis, “Mobile Phone Security and Forensics – A Practical Approach”, Springer New York Heidelberg, 2012.	
3	Jonathan Zdziarski, “iOS Forensic Investigative Methods”, 2012.	
	Related Online Contents (MOOC, SWAYAM,NPTEL, Websites etc)	
1	**https://onlinecourses.swayam2.ac.in/aic20_sp06/preview**	
2	**https://onlinecourses.swayam2.ac.in/arp19_ap79/preview**	
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**
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 3	0	0	6	3
Pre - requisite		Students should have completed Capstone Project Work Phase – I Strong coding skills in any one programming paper	Syllabus version		2021-22 onwards	

Course Objectives

- To understand and select the task based on their core skills.
- To get the knowledge about analytical skill for solving the selected task.
- To get confidence for implementing the task and solving the real time problems.

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

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 75 marks at the last day of the practical session.

2. Out of 75 marks, 30 marks for CIA, 45 marks for CEE (30 marks for project report and 15 Marks for Viva Voce.)

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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1.2 System Specification

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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 Software Testing and Implementation

Conclusion

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A. Data Flow Diagram

B. Table Structure C. Sample Coding 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			2021-22 onwards

Course Objectives

- To introduce the concepts of network security and qualities of a good network
- 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

Introduction: Why Network Security is needed–Management principles–Securityprinciples - Network management - Security attacks – Qualities of a Good Network. **Organizational Policy and Security:** Security policies, Standards and Guidelines–Information Policy – Security Policy - Physical Security – Social Engineering – Security Procedures – Building a Security Plan. **Security Infrastructure:** Infrastructure Components – Goals of Security Infrastructure – Design Guidelines – Security Models.

UNIT II	Cryptography	19

Cryptography: Terminology and background–Data Encryption Methods–Cryptographic Algorithms-Secret Key Cryptography - Public key cryptography – Message Digest – Security Mechanisms – Speech Cryptography. **Hardware and Software Security:** Hardware security – Smart Card – Biometrics – Virtual Private Networks (VPNs) - Trusted Operating Systems – Pretty Good Privacy (PGP) – Security Protocols. **Database Security:** 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

Intrusion Detection Systems: 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. **Network Security:** Fundamental Concepts – Identification and Authentication – Access Control – A Model for Network Security – Malicious Software – Firewalls.

UNIT IV	Network & Security Management	18

Network Management: Goal of Network Management–Network Management Standards – Network Management Model – Infrastructure for Network Management - Simple Network Management Protocol (SNMP). **Security Management:** 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.

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. **Security of Internet Banking Systems:** 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)	
1	**https://onlinecourses.swayam2.ac.in/aic20_sp06/preview**	
2	**https://onlinecourses.swayam2.ac.in/arp19_ap79/preview**	
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		Artificial Neural Network and Fuzzy Systems	L	T	P	C
Core/elective/Supportive		Elective : I	6	0	0	4
Pre - requisite		None	Syllabus		2021-22	
Course Objectives			Version		onwards	

- To introduce the concepts of artificial neural networks and fuzzy systems
- To explain the basic mathematical elements of the theory of fuzzy sets.

	Expected Course Outcomes	
1	Explain the concepts of neural networks and , fuzzy logic	K2
2	Understanding of the basic mathematical elements of the theory of fuzzy sets. theories	K2 K2
3	Understanding the differences and similarities between fuzzy sets and classical sets	
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	**https://onlinecourses.swayam2.ac.in/aic20_sp06/preview**
2	**https://onlinecourses.swayam2.ac.in/arp19_ap79/preview**
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			2021-22 onwards

Course Objectives

- To explain the fundamentals of agents and agent programming paradigms.
- To explain about agents and security

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.	
	Related Online Contents (MOOC, SWAYAM,NPTEL, Websites etc)	
1	**https://onlinecourses.swayam2.ac.in/aic20_sp06/preview**	
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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
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 : 10	5	0	0	4
Pre - requisite		Basic knowledge on network security	Syllabus		2021-22	
Course Objectives			Version		onwards	

- To explain about the security aspects and types of attacks
- To introduce and explain various cryptographic algorithms

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	18

Security trends - Legal, Ethical and Professional Aspects of Security, Need for Security atMultiple levels, Security Policies - Model of network security – Security attacks, services andmechanisms – 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	18

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	18

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	18

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**	**18**
Electronic Mail security – PGP, S/MIME – IP security – Web Security – SYSTEMSECURITY: Intruders – Malicious software – viruses – Firewalls.		
Total Lecture Hours		**90 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	
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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: 7	0	0	5	3
Pre - requisite		Basic knowledge n computers	Syllabus version		2021-22 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	**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

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 - 11	0	0	5	4
Pre - requisite		Students should have the strong knowledge in any one of the programming languages in this course.	Syllabus version		2021-22 onwards	

Course Objectives

- To understand and select the task based on their core skills.
- To get the knowledge about analytical skill for solving the selected task.
- To get confidence for implementing the task and solving the real time problems.
- Express technical and behavioral ideas and thought in oral settings.
- 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.

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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B. Table Structure C. Sample Coding D. Sample Input E. Sample Output

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CO2	**S**	**S**	**S**	**S**	**M**	**L**	**L**	**L**	**L**	**L**
CO3	**S**	**S**	**S**	**S**	**M**	**M**	**M**	**L**	**L**	**L**
CO4	**S**	**S**	**S**	**S**	**M**	**M**	**M**	**L**	**L**	**L**
CO5	**S**	**S**	**S**	**S**	**M**	**M**	**M**	**L**	**L**	**L**

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

Course Code		Cyber Policing	L	T	P	C
Core/elective/Supportive		Elective : II	5	0	0	4
Pre - requisite		None	Syllabus Version			2021-22 onwards

Course Objectives

- To introduce the concepts of Cyber Policing
- 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	14

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	16

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	16

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	15

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	14

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	75 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). lndianPolice: 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	**https://onlinecourses.swayam2.ac.in/aic20_sp06/preview**
2	**https://onlinecourses.swayam2.ac.in/arp19_ap79/preview**
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	5	0	0	4
Pre - requisite		None	Syllabus Version			2021-22 onwards

Course Objectives

- To introduce the concepts of security in web applications
- 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	14

Data with URL- HTML - DHTML: Cascading Style Sheets, Common GatewayInterface: Programming CG! Scripts - HTML Forms-:- Custom Database Query Scripts - Server Side Includes - Server _security issues.

UNIT II	Introduction to Scripting Languages	14

XHTML: Introduction, CSS- Scripting languages- Java Script: Control statements,Functions, Arrays, Objects - DOM- Aiax enable rich internet applications.

UNIT III	Server Side Programming	15

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	15

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	17

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	75 Hours

	Text Book(s)
1	Deitel, Deitel and Neita, -Internet and World Wide _Web- How to programll, Pearson Educatio n 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 CGIII, 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	**https://onlinecourses.swayam2.ac.in/aic20_sp06/preview**
2	**https://onlinecourses.swayam2.ac.in/arp19_ap79/preview**
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	5	0	0	4
Pre - requisite		None	Syllabus Version			2021-22 onwards

Course Objectives

- To explain about the concept of Malware analysis
- 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	15

INTRODUCTION: Computer Infection Program- Life cycle of malware- Virus nomenclature- Worm nomenclature- Tools used in computer virology.

UNIT II	IMPLEMENTATION OF COVERT CHANNEL	15

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	14

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	16

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	15

VIRUS AND WORM ANALYSYS: Klez Virus- Clone Virus- Doom Virus- Black wolf worm- Sassar worm- Happy worm 99

Total Lecture Hours	5 Hours

Text Book(s)

1	ErciFiliol, "Computer Viruses: from theory to applications", Springer, 1^{5}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	JesseyBullock ,Wireshark for Security Professionals: Using Wireshark and the Metasploit Framework 1st Edition.	
	Related Online Contents (MOOC, SWAYAM,NPTEL, Websites etc)	
1	**https://onlinecourses.swayam2.ac.in/aic20_sp06/preview**	
2	**https://onlinecourses.swayam2.ac.in/arp19_ap79/preview**	
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		Client Server Computing	L	T	P	C
Core/elective/Supportive		Elective : III	5	0	0	4
Pre - requisite		None	Syllabus		2021-22	
Course Objectives			Version		onwards	

- To introduce the concepts of client and server
- 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**	**14**

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**	**16**

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**	**15**

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**	**14**

Components of Client / Server Applications–Software. Components of Client /Server Applications – Hardware.

UNIT V	**Service & Support**	**16**

Components of Client / Server applications–Service and Support: System Administration. The Future of Client / Server Computing: Enabling Technologies – Transformational Systems.

Total Lecture Hours	**5 Hours**

Text Book(s)

1	Client /Server Computing, Patrick Smith, Steve Guenferich, 2nd edition, PHI. *(Chapters1-8 & 10)*

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	https://onlinecourses.swayam2.ac.in/aic20_sp06/preview	
2	https://onlinecourses.swayam2.ac.in/arp19_ap79/preview	
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	5	0	0	4
Pre - requisite		None	Syllabus		2021-22	
Course Objectives			Version		onwards	

- To explain the need and importance of open source software
- 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**	**14**

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**	**16**

MySQL: Introduction–setting up account–starting, terminating and writing yourown 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**	**16**

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**	**14**

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**	**15**

Pearl overview–pearl parsing rules–variables and data–statements and control structures – subroutines -, packages and modules – working with files– data manipulation.

Total Lecture Hours	**75 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, 2nd Edn, Martin C. Brown, TMH , 2009	
4	MySQL: The Complete Reference, 2nd Edn, VikramVaswani, TMH, 2009	
	Related Online Contents (MOOC, SWAYAM,NPTEL, Websites etc)	
1	**https://onlinecourses.swayam2.ac.in/aic20_sp06/preview**	
2	**https://onlinecourses.swayam2.ac.in/arp19_ap79/preview**	
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		Principles of Secure Coding	L	T	P	C
Core/elective/Supportive		Elective : III	5	0	0	4
Pre - requisite		None	Syllabus Version			2021-22 onwards

Course Objectives

- To understand the secure software development life cycle
- To explain about the secure coding techniques

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**	**14**

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**	**14**

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**	**17**

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**	**16**

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**	**14**

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	**75 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, 2nd Edn, Martin C. Brown, TMH , 2009	
4	MySQL: The Complete Reference, 2nd Edn, VikramVaswani, TMH, 2009	
	Related Online Contents (MOOC, SWAYAM,NPTEL, Websites etc)	
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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 : 4	3	0	0	2
Pre - requisite		None	Syllabus Version		2021-22 onwards	

Course Objectives

- To introduce the concepts of security and various kinds of attacks
- 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

Text Book(s)		
1	EC-Council, "Ethical Hacking and Countermeasures: Attack Phases", Cengage Learning,2010.	
2	Jon Erickson, "Hacking, 2nd Edition: The Art of Exploitation", No Starch Press Inc., 2008.	
3	Michael T. Simpson, Kent Backman, James E. Corley, "Hands-On Ethical Hacking andNetwork Defense", Cengage Learning, 2013.	
Reference Book(s)		
1	Patrick Engebretson, "The Basics of Hacking and Penetration Testing – Ethical Hackingand Penetration Testing Made Easy", Second Edition, Elsevier, 2013.	
2	RafayBoloch, "Ethical Hacking and Penetration Testing Guide", CRC Press, 2014	
	Related Online Contents (MOOC, SWAYAM,NPTEL, Websites etc)	
1	**https://onlinecourses.swayam2.ac.in/aic20_sp06/preview**	
2	**https://onlinecourses.swayam2.ac.in/arp19_ap79/preview**	
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		Cyber Security	L	T	P	C
Core/elective/Supportive		Naan Mudhalvan Skill based Course-I	2	0	0	2

Cyber Security course contents

1. **Course 1**: Information Security Fundamentals
2. **Course 2**: Cyber Security Introduction
3. **Course 3**: Technologies in Cybersecurity eco-system
4. **Course 4**: Core Threat Intelligence Engineering
5. **Course 5**: Core Vulnerability Management Engineering
6. **Course 6**: Core Penetration Management Techniques
7. **Course 7**: Core Cyber Exploitations
8. **Course 8**: Global Cyber Attack Trends
9. **Course 9**: Security Operations Management
10. **Course 10**: Incident Management
11. **Course 11**: Web and Mobile security Techniques
12. **Course 12**: Privacy and Online Rights
13. **Course 13**: Best Practices for keeping Systems and Data safe
14. **Course 14**: Cloud Security Engineering
15. **Course 15**: Industry Infosec Governance

Course 1 - Information Security Fundamentals : Broad Overview of Information Security will coverthe following topics:

- 1.1 Information Security, 1.2 Computer Security, 1.3 CIA Triad/Principles, 1.4 Non-repudiation, 1.5 Risk Management
- 1.6 Cryptography Basics, 1.7 Authentication, 1.8 Authorization, 1.9 Access Control, 1.10Security Policies
- 1.11 Security Auditing, 1.12 Security Laws and Regulations, 1.13 Defense, 1.14 SecurityMonitoring, 1.15 ISO 27000 framework
- 1.16 Information Security use case demonstration as per industry verticals, 1.17 Policy,Process, Procedures, Standards, Guidelines, Baselines

Case Study / Demo / Role Play / Discussion / Quiz will cover the following topics:

- Case structure – Objectives, Target audience, Executive summary, Background, Yourevaluation, Proposed solution, Conclusion

- **Case Study #1:** List Foundations of HealthCare Industries
  - Patient medical records contain sensitive information that must be protected fromunauthorized access.
- **Case Study #2:** List Strong Foundations of Fintech Industries
  - Financial institutions handle large amounts of sensitive financial data, such as accountnumbers and transaction history, which must be protected from cyber threats
- Demo
- Scenario based role play (Cybersecurity strategy development, Incident response plan)
- Group discussion
- Quiz

Course 2 - Cyber Security Introduction : Broad Overview of Cyber Security will cover the followingtopics:

- 2.1 Cybersecurity, 2.2 Cybers attacks, 2.3 Social Engineering, 2.4 Cybersecurity Defences (Firewall, AV, SIEM, Patch, Password etc), 2.5 Cloud security, 2.6 Endpoint security, 2.7 Mobile security, 2.8 Zero trust, 2.9 IOT, 2.10 Layers of cybersecurity, 2.11 Hacking, 2.12 Incident management, 2.13 Security operations

Case Study / Demo / Role Play / Discussion / Quiz will cover the following topics:

- **Case Study #3: Define cyber security governance structure for CISO in bank**
- **Case Study #4: Define cyber security structure for CISO in Auto manufacturing**
- Scenario based role play (Cybersecurity strategy development, Incident response plan)
- Group discussion
- Quiz

Course 3 - Technologies in Cybersecurity eco-system: Broad Overview of Technologies will cover thefollowing topics:

- 3.1 Network security – Architecture and Standards, Wireless security, Network Vulnerabilities, Threats – Password cracking, Spoofing, Packet sniffing, Port scanning, Poisoning
- 3.2 System security - Asset classification, Asset accountability, Configuration management, Privilege access control, Virtualization security, System hardening, End-point security, System upgrades and patches, Backup and recovery, Systems Auditing, Threats – Denial of Service (DOS), DHCP spoofing, Dictionary attack, Email spoofing
- 3.3 Software security – Secure Design, Secure Coding, Static Security, Dynamic Security, Open source governance, Software composition analysis, Log and audit trail ,OWASP Top10 Threats

- SQL Injection, Cross Site Scripting (XSS), Cross Site Request Forgery (CSRF)

- 3.4 Cryptography Basics – Security by Obscurity, Cryptographic Keys, Asymmetric, Symmetric,Hashing, Public Key Infrastructure (PKI), Challenges in cryptography
- 3.5 Application of Cryptography – Virtual Private Network (VPN), Secure Socket Layer (SSL), Digital Signature
- 3.6 Cloud security – Identity and Access management (IAM), Key management, Governance, Risk and Compliance (GRC), Legal, Data sovereignty, Business continuity, Disaster recovery,Cloud security models
- 3.7 Block chain security, 3.8 Zero Trust, 3.9 XDR, 3.10 AI, 3.11 MUD, 3.12 Context aware

Case Study / Demo / Role Play / Discussion / Quiz will cover the following topics:

- **Case Study #5:** What are the Fundamental Network protections used in Any Industry
  - Firewalls, IDS, IPS, VPN, Antivirus, SIEM
- **Case Study #6:** List methods to Secure Data in transit and Data at rest
  - Encryption, Hashing,
- **Case Study #7:** How many ways can you protect any user account in applications
  - 2FA, MFA, Password Management
- Demo
- Scenario based role play (Cybersecurity strategy development, Incident response plan)
- Group discussion
- Quiz

Course 4 - Core Threat Intelligence Engineering: Broad Overview of threat intelligence will cover the following topics:

- 4.1 Threat model, 4.2 Tactical, operations and strategic threat intelligence, 4.3 How to detect, respond and defeat threats, 4.4 Adversary data, 4.5 Reactive and proactive threat approach , 4.6 IOC, 4.7 Cyber kill chain,. 4.8 MITRE ATT@ACK

Case Study / Demo / Role Play / Discussion / Quiz will cover the following topics:

- **Case Study #8: How many Levels of User expertise are involved to form an Threat Intelteam**
- **Case Study #9: What are the roles included in Threat Intelligence at Industry level**
- Demo
- Scenario based role play (Cybersecurity strategy development, Incident response plan)
- Group discussion
- Quiz

Course 5 - Core Vulnerability Management Engineering: Broad Overview of Vulnerability managementwill cover the following topics:

- 5.1 what is vulnerability, Threats, Risks, Exploitation, 5.2 Computer ports / protocols, 5.3 Ethical hack, Recon, Enumeration, Port Scanning, 5.4 Tools, 5.5 Attack Toolset – Metasploit, Nessus, nmap, Burpsuite, 5.6 Basic defence measures - Antivirus, Intrusion Detection / Prevention systems

Case Study / Demo / Role Play / Discussion / Quiz will cover the following topics:

- **Case Study #10: What are few examples of an Vulnerability as per Industry orientedapplications**
- **Case Study #11: Explain RACI Matrix in banking environment**
- Demo
- Scenario based role play (Cybersecurity strategy development, Incident response plan)
- Group discussion
- Quiz

Course 6 - Core Penetration test techniques: Broad Overview of penetration test techniques will cover the following topics:

- 6.1 what is penetration testing, vulnerability, Threats, Risks, Exploitation, 6.2 Computer ports / protocols, 6.3 Port Scanning, 6.4 Tools, 6.5 Attack Toolset – Metasploit, Nessus, nmap, Burpsuite, 6.6 Basic defence measures - Antivirus, Intrusion Detection / Prevention systems,

6.7 Penetration test approach, tools, 6.8 Pen test reporting, 6.9 Pen test rules, 6.10 Gray box, White box, Black box , 6.11 Sniffing, 6.12 DOS, 6.12 Social engineering, 6.13 Session hijacking, SQL Injection

Case Study / Demo / Role Play / Discussion / Quiz will cover the following topics:

- **Case Study #12: How to do network scanning in banking industry**
- **Case Study #13: How to do social engineering (email phishing) in auto manufacturing**
- Demo
- Scenario based role play (Cybersecurity strategy development, Incident response plan)
- Group discussion
- Quiz

Course 7 - Core Cyber Exploitations: Broad Overview of cyber exploitation will cover the following topics:

- 7.1 Exploitation, 7.2 Types of exploits, 7.3 Identify, Protect, Detect, Respond, Recover, 7.3 Honey pot, 7.4

Data collection, analytics 7.5 Proactive and reactive exploitation, 7.6 Red , blue team, and purple team, 7.7 Incident management, 7.8 Data breach, 7.9 Ransomware,

7.10 Zero day attack, 7.11 Man in the middle

Case Study / Demo / Role Play / Discussion / Quiz will cover the following topics:

- **Case Study #14: Difference between Vulnerability and Exploitations. How to identifyexploitation in banking industry**
- **Case Study #15: What Network vectors are considered for exploitation. How to implementin healthcare**
- Demo
- Scenario based role play (Cybersecurity strategy development, Incident response plan)
- Group discussion
- Quiz

Course 8 – Global attack trends: Broad Overview of cyber-attack trends will cover the followingtopics:

- 8.1 Past, present & future trends of cyber threat landscape (Worldwide)
- 8.2 Cybercrime landscape in Asia Pacific
- 8.3 Organizational processes, Security roles and responsibilities, Due care and Due diligence
- 8.4 Cybersecurity threats – Malware, Viruses and Worms, Trojan horses, Botnets, Zero-dayexploits, Phishing, Spear phishing, Whaling, Social engineering, etc.
- 8.5 Risk management concepts, Personnel security policies, Information security training andawareness
- 8.6 Critical infrastructure protection, Privacy by design

Case Study / Demo / Role Play / Discussion / Quiz will cover the following topics:

- **Case Study #16: Explain Ransomware behaviour and impact within the industries.**
- **Case Study #17: What is a Malware and how to setup malware protection in hospital**
- **Case Study #18: Will Linux and Mac have any Attacks and Malware. Consider ecommerceservices**
- Demo
- Scenario based role play (Cybersecurity strategy development, Incident response plan)
- Group discussion
- Quiz

Course 9 – Security Operations Management : Broad Overview of SOC will cover the following topics:

- 9.1 SOC security operations centre concept, 9.2 Logging, Attack methodology and monitoring, 9.3 Incident detection and Reporting, 9.4 SIEM, 9.5 Threat intelligence feed , 9.6 24x7 monitoring

Case Study / Demo / Role Play / Discussion / Quiz will cover the following topics:

- Case Study #19: **What is Security posture for any healthcare industry**
- **Case Study #20: What is SOC in food chain industry**
- Demo
- Scenario based role play (Cybersecurity strategy development, Incident response plan)
- Group discussion
- Quiz

Course 10 – Security Incident Management : Broad Overview of incident management will cover the following topics:

- 10.1 Incident handling and response, 10.2 Incident RACI, 10.3 Forensic package , critical incident package, 10.4 Malware incidents, 10.5 Email security and phishing incidents , 10.6 Threat reporting, 10.7 Third party incidents, 10.8 Feedback process, 10.9 TTX

Case Study / Demo / Role Play / Discussion / Quiz will cover the following topics:

- **Case Study #21: What is Zero Day? Does it have any impact on any industry applications.Define process framework**
- **Case Study #22: How are Incidents managed for HealthCare , FinTech, SCADA andAutomotive industries**
- Demo
- Scenario based role play (Cybersecurity strategy development, Incident response plan)
- Group discussion
- Quiz

Course 11 – Web and Mobile security Techniques: Broad Overview of web and mobile securitytechniques will cover the following topics:

- 11.1 Web environment setup for scan and tools, 11.2 Scan web application, 11.3 Exploit vulnerabilities, 11.4 Deep analysis, 11.5 Reporting
- 11.6 Mobile environment setup for scan and tools, 11.7 Scan mobile application, 11.8 Exploitvulnerabilities, 11.9 Deep analysis, 11.10 Reporting

Case Study / Demo / Role Play / Discussion / Quiz will cover the following topics:

- Cyber breach case study (Equifax, Uber, Target, Stuxnet, SWIFT)
- **Case Study #23: What's the Top standard followed in Web Applications**
- **Case Study #24: What the Top standard followed in Mobile Applications**
- **Case Study #25: List secure frameworks used in Mobile App Development**
- Demo
- Scenario based role play (Cybersecurity strategy development, Incident response plan)
- Group discussion
- Quiz

Course 12 – Privacy and online rights: Broad Overview of privacy techniques will cover the followingtopics:

- 12.1 Privacy concept, 12.2 Privacy regulations, 12.3 GDPR, 12.4 Online privacy challenges

12.5 Online marketing/ sales privacy challenges, 12.6 Privacy protection and penalties

Case Study / Demo / Role Play / Discussion / Quiz will cover the following topics:

- Cyber breach case study (Equifax, Uber, Target, Stuxnet, SWIFT)
- **Case Study #26: What data is considered as Privacy issue in online ecommerce**
- **Case Study #27: Whats the impact if your company related data is available online?**
- Demo
- Scenario based role play (Cybersecurity strategy development, Incident response plan)
- Group discussion
- Quiz

Course 13 – Best Practices for keeping Systems and Data safe: Broad overview of Security best practices will cover the following topics:

- 13.1 Understand your data and risk, 13.2 Protect your systems, 13.3 Cyber Insurance, 13.4 AV, 13.5 Data leakage , 13.6 Security guidelines – NIST, ISO 27001, GDPR, 13.7 Risk Management Frameworks and Security Standards
  - NIST SP800-30: Evaluating security risks
  - ISO 27000 - Information Security Management Standards (ISMS)
  - DO-178C - Software Considerations in Airborne Systems and Equipment Certification
  - ISO/IEC 27034 – Application security guidelines
  - SS 584 : Singapore Standard for Multi Tier Cloud Security

Case Study / Demo / Role Play / Discussion / Quiz will cover the following topics:

- **Case Study #28: How can you assure your data is safe in Public network and corporatenetwork**
- **Case Study #29: List 3 simple methods to keep your system safe from malware**
- Demo
- Scenario based role play (Cybersecurity strategy development, Incident response plan)
- Group discussion
- Quiz

Course 14 – Cloud security engineering: Broad Overview of cloud security will cover the followingtopics:

- 14.1 Cloud security fundamentals, 14.2 Cloud providers, 14.3 Tools for cloud security, 14.4 Cloud recovery, 14.5 Cloud Monitoring, 14.6 Cloud compliance, certification, audit and compliance, Pen test

Case Study / Demo / Role Play / Discussion / Quiz will cover the following topics:

- **Case Study #30: How the Cloud services or applications can be targeted to hackers**
- **Case Study #31: What are the Different methods to store data safe**
- Demo
- Scenario based role play (Cybersecurity strategy development, Incident response plan)
- Group discussion
- Quiz

Course 15 – Industry Infosec Governance: Broad Overview of Industry security governance will coverthe following topics:

- 15.1 Industry roles and student skill identification, 15.2 Industry training, certification, 15.3Industry career path, 15.4 How to become industry cybersecurity expert, 15.5 Job application process, 15.6 Salary / perks, 15.7 Working in healthcare industry

Case Study / Demo / Role Play / Discussion / Quiz will cover the following topics:

- Cyber breach case study (Equifax, Uber, Target, Stuxnet, SWIFT)
- **Case Study #32: Abbreviated CIA and give one example for Healthcare industry**
- **Case Study #33: Are Policies, procedures and standards important to protect CIA for anIndustry**
- Demo
- Scenario based role play (Cybersecurity strategy development, Incident response plan)

- Group discussion
- Quiz

Annexure

B.Sc. Digital and Cyber Forensic Science

Syllabus
(With effect from 2021 -22)

Program Code: 26E

DEPARTMENT OF CATERING SCENCE AND HOTEL MANAGEMENT
Bharathiar University
(A State University Accredited with "a" by NAAAC and 13th 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.