DEPARTMENT OF COMPUTER SCIENCE WITH CYBER SECURITY

CHOICE BASED CREDIT SYSTEM
&
LEARNING OUTCOME BASED CURRICULUM FRAMEWORK (LOCF)

B.Sc. COMPUTER SCIENCE WITH CYBER SECURITY

2023-2026 BATCH

After Completion of the programme, the student will be able to

PLO1: Design, implement, and evaluate a computer network and information security needs of an organization.

PLO2: Analyze and evaluate the cyber security needs of an organization and society.

PLO3: Explore Current and emerging techniques and technologies to formulate solutions for systems and organizations.

PLO4: Pursue higher studies in the specialized area and also promote life-long learning for professional development.

PLO5: Recognize as world class professionals in IT and in cybercrime and produce women entrepreneurs to increase more employability.

PROGRAMME SPECIFIC OUTCOMES (PSO's)

The students at the time of graduation will

PSO1: Professionally be equipped in the areas of cyber security tools and cyber/computerforensics software/tools.

PSO2: Apply the knowledge of technology and characterize privacy, legal and ethical issues of information security.

PSO3: Analyze modern cyber security tools and applications for their successful Career, to create platforms to become an entrepreneur and a relish for higher studies.

Department of Computer Science With Cyber Security
Choice Based Credit System & Learning Outcomes Based Curricular Framework
B.Sc. Computer Science with Cyber Security - 2023 -2026 Batch

Semester	Part	Subject Code	Title of Paper	Category	Instruction Hours / Week	Contact Hours	Tutorial Hours	Duration of Examination	Examination Marks CA	ESE	Total	Credits
I	I	TAM2301A/ HIN2301A/ FRE2301A	Language I	Language	4	58	2	3	25	75	100	3
	II	ENG2301A	English Paper I	English	4	58	2	3	25	75	100	3
	III	IN23C01	Core 1: Computer Programming	CC	4	58	2	3	25	75	100	3
	III	PP22C02	Core 2: Computational and Algorithmic Thinking for Problem Solving	CC	3	45	-	-	100#	-	100	3
	III	CY23CP1	Lab 1: Computer Programming Lab	CC	3	45	-	3	15	35	50	2
	III	AP23C03	Core 3: Operating Systems Fundamentals - Linux	CC	4	58	2	3	25	75	100	3
	III	TH23A03	Allied A1: Numerical and Statistical Techniques	GE	6	88	2	3	25	75	100	5
	IV	NME23ES / NME23A1/ NME23B1	Introduction to Entrepreneurship / Advance Tamil/ Basic Tamil	AEC	2	30 / 28	- / 2	- / 2	100		100	2
II	I	TAM2302A / HIN2302A/ FRE2302A	Language II	Language	4	58	2	3	25	75	100	3
	II	ENG2302A	English Paper II	English	4	58	2	3	25	75	100	3
	III	IN23C04	Core 4: Computer Programming-II	CC	5	73	2	3	25	75	100	3

		Code	Title	Cat	Cr	Hrs			Int	Ext	Total	Gr
III	III	IN23C05	Core 5: Data Structures and Algorithms.	CC	4	58	2	3	25	75	100	3
	III	CY23CP2	**Lab2:** Computer Programming Lab-II	CC	5	75	-	3	15*	35*	50	3
	III	TH23A32	**Allied A2:** Number Theory and Algebra	GE	6	88	2	3	25	75	100	5
	IV		Open Course: (Self study - Online Course)	AEC	-	-	-	-	-	-	-	Grade
		NME23A2/ NME23B2	**Advance Tamil/Basic Tamil-II	AEC	2	-	-	-	100	-	100	Grade
	V	23PEPS1	Professional English for Physical Sciences	AEC	2	25	5	-	100	-	100	2
	VI	NM23GAW	General Awareness	AEC	Self Study	-	-	OT	100	-	100	Grade
III	I	TAM2303A / HIN2303A/ FRE2303A	Language III-Tamil III/ Hindi III/ French III	L	4	58	2	3	25	75	100	3
	II	ENG2303A	English Paper III	E	4	58	2	3	25	75	100	3
	III	CY23C06	**Core 6**: Computer Networks and Security	CC	4	58	2	3	25	75	100	3
	III	CY23C07	**Core 7**:Fundamentals for Cyber Security and Cryptography	CC	4	58	2	3	25	75	100	3
III/IV	III	CY23SCE1/ CS23SBGP	**Coursera**:Foundations of Cyber Security/ **SBS I**:Gen-A1	SEC	3	45/44	-/1	-	100	-	100	3
III	III	TH23A13	**Allied 3**:Optimization Techniques	GE	4	58	2	3	25	75	100	3
	III	CY23CP3	**Lab 3:** Cyber Security Tools Lab-I	CC	5	75	-	3	15*	35*	50*	3
	IV	NM23DTG	Design Thinking	AEC	2	30	-	-	100	-	100	2
	IV	NM22UHR	Universal Human Values and Human Rights #	AECC	-	-	-	-	100	-	100	Grade
I-V	VI	16BONL1 16BONL2	Online Course I Online Course II	ACC	-	-	-	-	-	-	-	-
III	IV		Job Oriented course : Security +	-	-	-	-	-	-	-	-	-
IV	I	TAM2304A/ HIN2304A/ FRE2304A	Tamil Paper IV/ Hindi Paper IV/ French Paper IV	L	4	58	2	3	25	75	100	3
IV	II	ENG2304A	English Paper IV	E	4	58	2	3	25	75	100	3

Sem	Part	Course Code	Course Title	Category								
IV	III	CY23C08	Vulnerability Assessment and Penetration Testing	CC	4	58	2	3	25	75	100	3
IV	III	CY23CP4	VAPT and DBMS Lab	CC	5	75	-	3	15*	35*	50*	2
IV	III	CY23C09	Database Management System	CC	4	58	2	3	25	75	100	3
IV	III	CY23A01 / CY23A02	Cyber Security and Cyber Law / Cyber Threats and Modeling	GE	4	58	2	3	25	75	100	3
III/IV	III	CS23SBGP/ CY23SCE1	Gen AI/ Foundations of Cyber Security	SEC	3	45	-	-	100	-	100	3
IV	IV	NM23EII	Entrepreneurship and Innovation(IgniteX)	AECC	2	30	-	-	100	-	100	2
I-IV	VI	COM15SER	Community Services 30 Hrs	GC	-	-	-	-	-	-	-	-
IV	V	COCOACT	Co-Curricular Activity	GC	-	-	-	-	100	-	100	1
IV	IV	NM23EVS	Environmental Studies	AECC	SS	-	-	-	100	-	100	Gr
IV	VI	16BONL1 / 16BONL2	Online Course-I / Online Course-II	ACC	-	-	-	-	-	-	-	-
V	III	AI23C10	Machine Learning	CC	5	73	2	3	25	75	100	4
V	III	CY23C11	Software Engineering and Testing	CC	5	73	2	3	25	75	100	4
V	III	CY23C12	Ethical Hacking	CC	5	73	2	3	25	75	100	4
V	III	CY23E01 / CY23E02	Cloud Security / Web Application and Security	DSE	5	73	2	3	25	75	100	5
V	III	CY23CP5	Ethical Hacking Lab	CC	5	75	-	3	15*	35*	50	3
V	III	CY23SBP1	Mobile app development	SEC	3	41	4	-	100	-	100	3
V	III	CY23AC1 / CY23AC2	Data Security / Artificial Intelligence	ACC	SS	-	-	3	25	75	100	5**
V	IV	NM21CS1	Cyber Security I	AECC	2	30	-	-	100	-	100	Gr
V	IV	CY23INST	Field work/Institutional Training	DSE	-	-	-	-	100	-	100	2
V	VI	CY23COM	Comprehensive Examination	GC	-	-	-	-	100	-	100	Gr
I-V	VI	16BONL1 / 16BONL2	Online Course / Online Course	ACC	-	-	-	-	-	-	-	-

Semester	Part	Course Code	Title of Course	Course Type	Instruction hours / week	Contact Hours	Tutorial Hours	Duration of Examination	Examination Marks			Credits
									CA	ESE	Total	
VI	III	CY23C13	Malware Analysis	CC	5	73	2	3	25	75	100	5
VI	III	CY23C14	Digital Forensics	CC	5	73	2	3	25	75	100	5
VI	III	CY23E03 CY23E04	IoT and Security Blockchain and Cryptography	DSE	5	73	2	3	25	75	100	4
VI	III	CY23CP6	Malware Analysis Lab	CC	5	75	-	3	15#	35#	50	2
VI	III	CY23PROJ	Project and Viva-Voce	DSE	7	105	-	1	25	75	100	5
VI	III	CY23SBP2	Digital Forensics Lab	SEC	3	41	4	-	100	-	100	3
VI	III	CY23AC3 CY23AC4	Big Data Analytics IPv6	ACC	SS	-	-	3	25	75	100	5
I - V	VI	16BONL1 16BONL2	Online Course I Online Course II	ACC	-	-	-	-	-	-	-	-

*CA conducted for 25 and converted in to 15, ESE conducted for 75 and converted in to 35

CC: Core Courses   CA: Continuous Assessment

GE: Generic Elective   ESE : End Semester Examination

AEC: Ability Enhancement Course   SEC: Skill Enhancement Course

AECC: Ability Enhancement Compulsory Course

#-Self Study

ACC-Additional Credit Course

Question Paper Pattern

Evaluation Pattern 23-24 Batch onwards

CA Question Paper Pattern and distribution of marks UG

UG & PG- Core and Allied - (First 3 Units)

CA Question from each unit comprising of

One question with a weightage of 2 Marks :2 x 3 = 6

One question with a weightage of 5 Marks (Internal Choice at the same CLO level) :5 x 3 =15 One

question with a weightage of 8 Marks (Internal Choice at the same CLO level) :8 x 3 =24

Total :45 Marks

ALC

Section A (Paragraph answer) (4 out of 6) 4 x 4 : 16 Marks

Section B (Essay type) 1 out of 2 : 9 Marks

Total : 25 Marks

End Semester Examination – Question Paper Pattern and Distribution of Marks

UG & PG - Core and Allied courses:

ESE Question Paper Pattern: 5 x 15 = 75 Marks

Question from each unit comprising of

One question with a weightage of 2 Marks : 2 x 5=10

One question with a weightage of 5 Marks (Internal Choice at the same CLO level): 5 x 5 =25 One

question with a weightage of 8 Marks (Internal Choice at the same CLO level): 8 x 5 =40

End Semester for UG / PG - Advance Learner Courses

Section A -5 questions out of 8 - open choice 5x5 :25 marks

Section B 5 questions out of 8-open choice 5x10 :50 marks

Total :75 marks

Continuous Internal Assessment Pattern

Theory

I Year UG / PG (23 Batch)

CIA Test	:	5 marks **(conducted for 45 marks after 50 days)**
Model Exam	:	7 marks **(Conducted for 75 marks after 85 days (Each Unit 15 Marks))**
Seminar/Assignment/Quiz	:	5 marks
Class Participation	:	5 marks
Attendance	:	3 marks
Total	**:**	**25 Marks**

Practical

Lab Performance	:	7 marks
Regularity	:	5 marks
Model Exam	:	10 marks

| Attendance | : | 3 marks |
| **Total** | **:** | **25 marks** |

ESE Practical Pattern

The End Semester Examination will be conducted for a maximum of 75 marks respectively with a maximum 15 marks for the record and other submissions if any.

Question paper pattern for Skill Based courses

Skill Based Practical courses

Test I	30 Marks (Conducted for 50 marks and converted to 30 Marks)
Test II	50 Marks
Lab Performance	10 Marks
Regularity	10 Marks
Total	100 Marks

Students securing very low marks in internal assessment, only ESE marks will be considered as passing criteria from the third attempt and onwards.

Cyber Security I

Quiz	:	60 Marks
Case Study	:	20 Marks
Poster	:	20 Marks

COURSE	PROGRAMME OUTCOMES				
	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5
IN23C01					
CLOs	PLO1	PLO2	PLO3	PLO4	PLO5
CLO1	S	S	S	M	S
CLO2	S	S	M	S	M
CLO3	M	S	S	S	S
CLO4	S	M	S	S	S
PP22C02					
CLO1	M	S	S	S	S
CLO2	S	S	S	M	S
CLO3	S	M	S	S	S
CLO4	S	S	M	S	S
CY23CP1					
CLO1	S	S	M	S	M
CLO2	S	S	S	S	S
CLO3	S	S	S	S	M
CLO4	S	S	M	S	S
AP23C03					
CLO1	M	M	S	S	S
CLO2	S	S	S	S	S
CLO3	S	S	S	S	S
CLO4	S	S	M	S	S
IN23C04					
CLO1	S	S	S	S	M
CLO2	S	S	S	M	S
CLO3	S	M	S	S	M

CLO4	S	S	S	S	S

		IN23C05			
CLO1	S	M	M	S	S
CLO2	S	M	S	M	M
CLO3	M	M	S	M	S
CLO4	S	S	S	M	S

		CY23CP2			
CLO1	S	S	M	S	M
CLO2	S	S	S	M	S
CLO3	S	M	S	S	M
CLO4	S	S	M	S	S

		CY23C06			
CLO1	M	S	M	S	M
CLO2	S	M	M	S	M
CLO3	M	S	S	S	S
CLO4	S	S	S	S	S

		CY23C07			
CLO1	S	M	S	S	M
CLO2	S	S	S	S	M
CLO3	S	M	M	S	S
CLO4	S	M	S	S	S

		CS23SBGP			
CLO1	S	S	S	S	M
CLO2	S	S	S	S	S

CLO3	S	S	M	S	S
CLO4	S	M	S	M	S
CY23CP3					
CLO1	S	S	M	S	M
CLO2	S	S	S	S	M
CLO3	S	S	M	S	S
CLO4	S	S	S	S	S
CY23C08					
CLO1	S	S	M	M	S
CLO2	M	M	S	S	M
CLO3	S	S	S	M	S
CLO4	M	S	S	M	M
CY23CP4					
CLO1	M	M	S	S	S
CLO2	M	M	S	S	S
CLO3	S	S	S	S	S
CLO4	S	S	S	S	S
CY23C09					
CLO1	M	S	M	S	M
CLO2	S	M	M	S	M
CLO3	M	S	S	S	S
CLO4	S	S	S	S	S
CY23A01					
CLO1	S	M	S	S	S
CLO2	S	S	M	S	M

CLO3	S	S	S	M	M
CLO4	S	S	S	M	S
CY23A02					
CLO1	S	M	S	S	S
CLO2	S	S	M	S	M
CLO3	S	S	S	M	M
CLO4	S	S	S	M	S
AI23C10					
CLO1	S	M	S	M	S
CLO2	S	S	S	M	S
CLO3	S	S	M	S	S
CLO4	S	S	M	M	S
CY23C11					
CLO1	S	M	S	M	S
CLO2	S	M	S	M	M
CLO3	S	S	M	S	S
CLO4	S	S	M	M	S
CY23C12					
CLO1	S	M	S	M	S
CLO2	S	M	S	M	M
CLO3	S	S	M	S	S
CLO4	S	S	M	M	S
CY23E01					
CLO1	S	M	S	M	S

CLO2	S	M	S	M	M
CLO3	S	S	M	S	S
CLO4	S	S	M	M	S
CY23E02					
CLO1	S	M	S	M	S
CLO2	S	M	S	M	M
CLO3	S	S	M	S	S
CLO4	S	S	M	M	S
CY23CP5					
CLO1	S	S	M	S	M
CLO2	S	S	S	S	S
CLO3	S	S	M	M	M
CLO4	S	S	S	S	S
CY23SBP1					
CLO1	M	M	S	S	M
CLO2	M	S	S	S	M
CLO3	S	S	S	S	S
CLO4	S	S	S	S	S

CY23C13

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5
CLO1	S	M	S	S	S
CLO2	S	S	M	S	M
CLO3	S	S	S	M	M
CLO4	S	S	S	M	S

CY23C14

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5
CLO1	S	S	S	M	S
CLO2	S	S	M	S	M
CLO3	M	S	S	S	S
CLO4	S	M	S	S	S

CY23E03

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5
CLO1	S	M	S	M	S
CLO2	S	S	S	M	S
CLO3	S	S	M	S	S
CLO4	S	S	M	M	S

CY23E04

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5
CLO1	S	M	S	M	S
CLO2	S	S	S	M	S
CLO3	S	S	M	S	S
CLO4	S	S	M	M	S

CY23CP6

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5
CLO1	S	M	S	S	S
CLO2	S	S	M	S	M
CLO3	S	S	S	M	M
CLO4	S	S	S	M	S

CY23SBP2

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5
CLO1	S	M	S	S	S
CLO2	S	S	M	S	M
CLO3	S	S	S	M	M
CLO4	S	S	S	M	S

COURSE NUMBER	COURSE NAME	CATEGORY	L	T	P	CREDIT
IN23C01	COMPUTER PROGRAMMING	Theory	58	2	-	3

Preamble

The course covers basic knowledge of Python Programming. It defines the Conditional Statements &Loops, Functions, Tuples, Python data structures and Exception & its tools.

Course Learning Outcomes

On the successful completion of the course, students will be able to

CLO Number	CLO Statement	Knowledge Level
CLO1	Recall the technical strengths, Python Interpreter and the program execution.	K1
CLO2	Understand the purpose of operations, strings, lists, tuples to solve problems	K2
CLO3	Apply functions to solve problems using procedure-oriented approach	K3
CLO4	Analyze the problems and solve it by applying appropriate logic	K4

Mapping with Programme Learning Outcomes

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5
CLO1	S	S	S	M	S
CLO2	S	S	M	S	M
CLO3	M	S	S	S	S
CLO4	S	M	S	S	S

S- Strong; M-Medium; L-Low

Computer Programming- IN23C01   **58 Hrs**

Syllabus
UNIT I   **(10 Hrs)**

Introduction: Why do people use python- Python a scripting language- **Users of Python- Need of Python- Python's Technical Strengths**- How Python runs programs: Introducing the Python Interpreter- Program Execution-Execution Model Variation: Python Implementation Alternatives.

UNIT II   **(12 Hrs)**

Types & Operations: Numbers Types: Numeric type basics, Numbers in action, Other numeric types-Strings Fundamentals: String Basics, String Literals, Strings in action, String Methods – Lists and Dictionaries-Tuples- Files.

UNIT III   **(12 Hrs)**

Control Flow: Statements& Syntax: Assignment-Expressions & Print- if tests-While& for loops. Functions: Function Basics: Why use functions- Coding Functions- Definition & Calls. Scopes: Python basics-Global Statement-Scopes Nested functions -Arguments: Arguments passing Basics- Special Arguments Matching Modes.

UNIT IV   **(14 Hrs)**

Classes &OOP: OOP: Introduction-Class Coding Basics- Class Coding details: Class statement- **Methods-Inheritance**. Designing with classes: Python and OOP-OOP Inheritance, **Composition, Delegation-Methods and Classes act as Objects**-Multiple Inheritance- Exception &Tools: Exception Basics-Exception Coding Details.

UNIT V   **(10 Hrs)**

Introduction to Industry 4.0 - Need - Reasons for Adopting Industry 4.0 - Definition - Goals and Design Principles - Technologies of Industry 4.0 - Skills required for Industry 4.0 - Advancements in Industry - Impact of Industry 4.0 on Society, Business, Government and People - Introduction to 5.0.

Text Book

Sno	Author	Title of the Book	Publisher	Year of Publication
1	Mark Lutz	Learning python(Unit I-IV)	O'Reilly Publication	5th edition, 2013
2	P.Kaliraj , T.Devi	Higher Eduaction for Industry 4.0 and Transformation to Education 5.0(unit-V)	CRC Press Taylor and Francis Group	1st Edition 2021

Reference Books

S. No	Author	Title of the Book	Publisher	Year of Publication
1	Mark Summerfield	Programming in python 3	Pearson Education	2009.
2	Mark Pilgrim	Dive into python 3	Apress publication	2011
3	Richard L. Halterman	Fundamentals of Python Programming	Southern Adventist University	2017

Pedagogy
- Lectures, Group discussions, Demonstrations

Course Designer
   Dr . R. Divya

COURSE NUMBER	COURSE NAME	CATEGORY	L	T	P	CREDIT
PP22C02	COMPUTATIONAL AND ALGORITHMIC THINKING FOR PROBLEM SOLVING	Theory	45	-	-	3

Preamble
- *This course aims to kindle the young minds to think like a computer scientist, with the idea that Computing and computers will enable the spread of computational thinking.*
- *Computational thinking is thinking recursively, reformulating a seemingly difficult problem into one which we know how to solve and taking an approach to solving problems, designing systems, and understanding human behavior that draws on concepts fundamental to computer science.*

Course Learning Outcomes
On the successful completion of the course, students will be able to

CLO Number	CLO Statement	Knowledge Level
CLO1	Define the basic principles of logical reasoning, problem solving in computational thinking	K1
CLO2	Understanding the applications of propositional logic, problem representation and techniques	K2
CLO3	Apply algorithmic thinking to problem solving using tools	K3
CLO4	Apply and analyze to solve domain specific problems using computational thinking concepts	K4

Mapping with Programme Learning Outcomes

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5
CLO1	M	S	S	S	S
CLO2	S	S	S	M	S
CLO3	S	M	S	S	S
CLO4	S	S	M	S	S

S - Strong; M - Medium; L – Low

COMPUTATIONAL AND ALGORITHMIC THINKING FOR PROBLEM SOLVING - PP22C02

45 Hrs

Syllabus

Unit I   **(7 Hrs)**
Basics: Introduction to Computational Thinking- Data Logic - History of Computational Thinking- Applications of Computational Thinking.

Unit II   **(8 Hrs)**
Data- Information and Data - Data Encoding - Logic - Boolean logic - Applications of simple Propositional Logic. Tool: Flowgorithm and Scratch.

Unit III   **(10 Hrs)**

Problem Solving and Algorithmic Thinking: Problem definition- Logical reasoning- Problem decomposition- Abstraction- Problem representation via Algorithmic thinking: Name binding- Selection- Repetition and Control Abstraction- Simple Algorithms – Comparison of performance of Algorithms.

Unit IV   **(8 Hrs)**

Activities in Class: Sudoku-Towers of Hanoi- Graph Coloring-Geographical Map reading- Poem reading-Novel reading- Data analysis on news.

Unit V   **(12 Hrs)**

Problem Solving Techniques- Factoring and Recursion Techniques- Greedy Techniques-Divide and Conquer- Search and Sort Algorithms- Text Processing and Pattern matching. Tool: iPython

Text Book

S. No	Author	Title of the Book	Publisher	Year of Publication
1	David Riley and Kenny Hunt	Computational Thinking for Modern Solver	Chapman & Hall/CRC	2014
2	Paolo Ferragina, Fabrizio Luccio	Computational Thinking First Algorithms	Springer	2018
3	Karl Beecher	Computational Thinking – A beginner's guide to problem solving	BSC publication	2017

Pedagogy

- Lectures, Group discussions, Demonstrations, Case studies

Course Designer
Mrs. V. Deepa

Evaluation Pattern:

Assessment	Number	Marks
Quiz (online or offline)	5	50
Class Activity	5	25
Group Project (Domain Specific)	1	25
Total		100

COURSE NUMBER	COURSE NAME	CATEGORY	L	T	P	CREDIT
CY23CP1	COMPUTER PROGRAMMING LAB	PRACTICAL	-	-	45	2

Preamble

The course gives hands-on experience on Python Programming and improves the practical skill set. The learner will be able to develop the logic for the given problem, recognize and understand the syntax and construction of Python code. The course involved in compiling, linking and debugging Python code and developing some complex programs.

Course Learning Outcomes

On the successful completion of the course, students will be able to

CLO Number	CLO Statement	Knowledge Level
CLO1	Identify the basic terminologies of Python programming such as data types, conditional statement, looping statements and functions.	K1
CLO2	Develop programs with implementation of operators & I/O operations	K2
CLO3	Construct programs with features of Lists, Strings.	K3
CLO4	Develop readable programs with files for Exception handling concepts.	K4

Mapping with Programme Outcomes

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5
CLO1	S	S	M	S	M
CLO2	S	S	S	S	S
CLO3	S	S	S	S	M
CLO4	S	S	M	S	S

S- Strong; M-Medium; L-Low

PYTHON PROGRAMMING LAB- CY23CP1   **45 Hrs**

Program List

- Exercise programs on basic control structures & loops.

- Exercise programs on operators & I/O operations.

- Exercise programs on Python Script.

- Exercise programs on Lists.

- Exercise programs on Strings.

- Exercise programs on functions.

- Exercise programs on recursion & parameter passing techniques.

- Exercise programs on Tuples.

- Exercise programs on file.

- Exercise programs on Exception handling concepts.

- Exercise program to ping two Network Machine using TCP code.

- Exercise program to Hash Encryption and Decryption giving data.

Pedagogy
- Demonstration of working environment/Tools/Software/Program

Course Designer
  Dr. R. DIVYA

COURSE NUMBER	COURSE NAME	CATEGORY	L	T	P	CREDIT
AP23C03	**OPERATING SYSTEMS FUNDAMENTALS - LINUX**	**Theory**	58	2	-	3

Preamble

This subject is designed to provide the students with a thorough discussion of the fundamentals of operating   system.To explore the various memory management scheme and to perform administrative task on LINUX servers.

Course Learning Outcomes

CLOs Number	CLO Statement	Knowledge Level
CLO1	Recall the basic concepts with functions of operating systems and Linux system.	K1
CLO2	Understand the operating systems objectives and functionality along with system programs and system calls.	K2
CLO3	Compare and contrast various memory management schemes.	K2
CLO4	Demonstrate deadlock, prevention and avoidance algorithms, storage management, various scheduling algorithms and shell programming.	K3

Mapping with Programme Learning Outcomes

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5
CLO1	M	M	S	S	S
CLO2	S	S	S	S	S
CLO3	S	S	S	S	S
CLO4	S	S	M	S	S

S- Strong; M-Medium; L-Low

OPERATING SYSTEMS FUNDAMENTALS - LINUX – AP23C03 (58 hours)

SYLLABUS

UNIT I   **(12 Hrs)**

Introduction: What is operating systems do ? - **Computer System Architecture**- **Operating-System Operations.** Process Management: **Process Concept**-Process Scheduling- Operations on Processes-Interprocess communication.

UNIT II   (12 Hrs)

Process Scheduling: **Basic Concepts- Preemptive and Nonpreemptive Scheduling**-Scheduling Criteria-SchedulingAlgorithms (FCFS, SJF & Round Robin only)

Synchronization: **Back ground**-The Critical Section Problem-Peterson's Solution-Semaphores-The Dining Philosopher's Problem.

Deadlock: **Deadlock Characterization**-Methods Handling Deadlocks-Recovery from Deadlock.

UNIT III   (11 Hrs)

Memory Management Strategies: **Background-Contiguous Memory Allocation**-Paging- Basic Method. Virtual Memory Management: Demand Paging-Page Replacement - Basic Page Replacement, **FIFO Page Replacement**, Optimal Page Replacement, LRU Page Replacement, Counting-Based Page Replacement.

UNIT IV   (11 Hrs)

What Linux Is – Becoming a Linux Power User: About Shells and Terminal Windows- Choosing your shell - **Running Commands-Recalling Commands Using Command History**-Connecting and Expanding Commands-Using Shell Variables.

UNIT V   (12 Hrs)

Moving Around the File system: Using Basic File System Commands - Using Meta characters and Operators-**Listing Files and Directories**-Understanding File Permissions and Ownership-Moving, Copying, and Removing Files.

Text Books

S.no	Author	Title of book	Publisher	Year of publication
1	Abraham Silberschatz, Peter Baer Galvin, G Gagne	Operating Systems Concepts	Wiley Publishers, 10th Edition	2018
2	Christopher Negus	Linux Bible	Wiley,10th Edition	2020

Reference Books

S.no	Author	Title of book	Publisher	Year of publication
1	Archer J harries	Operating System	Tata Mc Graw Hill 2nd Edition	2011
2	Williams E. Shotts	The Linux Command Line: A Complete Introduction	John Wiley & Sons,, 2nd Edition	2019
3	Jason Cannon	Linux for Beginners	Createspace Independent Pub	2014

Pedagogy

- Lectures, Group discussions, Demonstrations, Case studies

Course Designer

Mrs. G. Sangeetha

COURSE NUMBER	COURSE NAME	CATEGORY	L	T	P	CREDIT
IN23C04	**COMPUTER PROGRAMMING -II**	**THEORY**	73	2	-	3

Preamble

- *This course introduces fundamental programming constructs in C.*

- *It covers the concepts such as arrays, functions, structures, pointers and file handling.*

Course Learning Outcomes

On the successful completion of the course, students will be able to

CLO Number	CLO Statement	Knowledge Level
CLO1	Recall the programming constructs and structure of C programming	K1
CLO2	Understand the concept and techniques of arrays, strings, structures, pointers and files to solve problems.	K2
CLO3	Apply functions to solve problems using procedure-oriented approach.	K3
CLO4	Analyze the problems and solve it by applying appropriate logic.	K4

Mapping with Programme Learning Outcomes

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5
CLO1	S	S	S	S	M
CLO2	S	S	S	M	S
CLO3	S	M	S	S	M
CLO4	S	S	S	S	S

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

Computer Programming-II- IN23C04 (73 Hrs)

Syllabus

Unit I **15 Hrs**

Overview of C - Constants –Variables - Keywords and Data types – Structure of C program, Compilation and Execution - Operators and Expressions - Managing Input and Output Operations - Decision Making and Branching: Decision Making , Looping and Case Control Structure

Unit II **15 Hrs**

Arrays: One-Dimensional - Two Dimensional - Multidimensional Arrays. Character String Handling - Declaring and Initializing String Variables - Reading Strings from Terminal - Writing Strings to Screen - String Handling Functions

Unit III   **14 Hrs**

User-Defined Functions: Need - Types: Calling a Function - Category of Functions - No Arguments and No Return Values - Arguments but No Return Values - Arguments with Return Values – Nesting of Functions - Recursion – Scope Visibility and Life time of Variables.

Structure Definition: Structure Initialization - Comparison of Structure Variables - Arrays of Structures - Arrays within Structures.

Unit IV   **15 Hrs**

Pointers: Understanding Pointers - Accessing the Address of a Variable - Declaring and Initializing Pointers - Accessing a Variable through its Pointers - Pointers and Arrays - Pointers and Character Strings - Pointers and Functions.

Unit V   **14 Hrs**

File Management in C: Defining and Opening a File - Closing File - I/O Operations on Files - Error Handling during I/O Operations –Random Access to files - Command Line Arguments.

Text Book

S. No	Author	Title of the Book	Publisher	Year of Publication
1	E. Balagurusamy	Programming in ANSI C (Unit I – V)	McGraw Hill Education	8th Edition, 2019

Reference Books

S. No	Author	Title of the Book	Publisher	Year of Publication
1	Byron Gottfried	Programming with C	Tata McGraw Hill	3rd Edition, 2013
2	Yashavant Kanetkar	Let us C	BPB Publications	13th Edition, 2014
3	Martin J. Gentile	An Easy Guide to Programming in C	Create Space Independent Publishing Platform	2nd Edition, 2012

Pedagogy

- Chalk and talk, PPT, Discussion, Assignment, Demo, Quiz, Seminar.

Course Designer

Dr. S. Nithya

COURSE NUMBER	COURSE NAME	CATEGORY	L	T	P	CREDIT
IN23C05	DATA STRUCTURES AND ALGORITHMS	THEORY	58	2	-	3

Preamble
To provide an overview of data structures and algorithm design methods for programming and problem-solving process

Course Learning Outcomes
On the successful completion of the course, students will be able to

CLO Number	CLO Statement	Knowledge Level
CLO1	Recall about the concepts of Arrays, Stack, Queue, Link List, Trees and Graph.	K1
CLO2	Understand sorting, searching and hashing algorithm	K2
CLO3	Apply the data structures to solve various computing algorithms and sorting algorithms.	K3
CLO4	Analyze lists, queues, stacks, trees and graph according to the needs of different applications	K4

Mapping with Programme Learning Outcomes

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5
CLO1	S	M	M	S	S
CLO2	S	M	S	M	M
CLO3	M	M	S	M	S
CLO4	S	S	S	M	S

S- Strong; M-Medium; L-Low

DATA STRUCTURES AND ALGORITHMS- IN23C05   58 Hrs
Syllabus

UNIT-I   12 Hrs
Introduction to Data Structure: Definition, Basic Terminology, Elementary Data Organization - Types of Data Structures- Linear & Non-Linear Data Structures-Data Structure Operations. Algorithm Specifications: Performance Analysis and Measurement (Time and space analysis). **Abstract Data Types-Advantages of ADT.** Array: Representation of arrays, Types of arrays, Applications of arrays, Sparse matrix and its representation**.**

UNIT-II   12 Hrs

Stacks and Queues: Stack-Stack Representation & Implementation-Stack Operations-**Applications of Stack.** Queue-Queue Representation & Implementation-Queue Operations-**Types of Queues**.

UNIT-III   11 Hrs

Linked List: Linked List as Data Structures- Representation of Linked List-Operations on Linked List-Stack as Linked List-Queue as Linked List-**Doubly Linked List-Circular List**

UNIT-IV   13 Hrs

Trees: Preliminaries-Binary Trees-**B-Trees**. Graph: Graph Terminologies-**Types of Graphs**-Graph Representation. **Hashing: Hash Functions.** Sorting: Bubble Sort-Selection Sort-QuickSort-Heap Sort-Merge Sort

UNIT-V   10 Hrs

Algorithm Design Techniques: Greedy Algorithms - Prim's Algorithm, Kruskal's Algorithm. **Divide and Conquer: Running Time of Divide and conquer algorithms.** Decrease and Conquer- Depth First Search and Breadth First Search. Backtracking Algorithms - n Queens Problem, **Branch and Bound – Traveling Salesman Problem**

Text Books

S.No.	Authors	Title	Publishers	Year of Publication
1.	Rajesh K. Shukla	Data Structures using C & C++	Wiley India	2009
2.	Seymour Lipschutz, G A Vijayalakshmi Pai	Data Structures	Tata McGraw-Hill	2014

Reference Books

S.No.	Authors	Title	Publishers	Year of Publication
1.	Anany Levitin	Introduction to Design and Analysis of Algorithms	Pearson Education	2009
2.	Wisnu Anggoro	C++ Data Structures and Algorithms	Packt Publishing	2018
3.	YedidyahLangsam, Moshe J.Augentein, aron M.Tenenbaum	Data Structures using C & C++	PHI Learning, 2nd Edition	2009

Pedagogy

      Chalk & talk, PPT, Group Discussion, Assignment, Demo, Quiz, Role play

Course Designer

      Dr. R. Jeevitha

COURSE NUMBER	COURSE NAME	CATEGORY	L	T	P	CREDIT
CY23CP2	COMPUTER PROGRAMMING LAB-II	PRACTICAL	-	-	75	3

Preamble

The course gives hands-on experience on C Programming and improves the practical skill set. The learner will be able to develop the logic for the given problem, recognize and understand the syntax andconstruction of C code. The course involved in compiling, linking and debugging C code and developing some complex programs.

Course Outcomes

On the successful completion of the course, students will be able to

CLO Number	CLO Statement	Knowledge Level
CLO1	Outline the logic using flowchart for a given problem and develop programs using conditional and looping statements.	K1
CLO2	Develop programs with concepts of arrays, functions, string handling functions and parameter passing techniques.	K2
CLO3	Construct programs with features of Structure and Pointers.	K3
CLO4	Develop readable programs with files for reading input and storing the output with perform operations.	K4

Mapping with Programme Outcomes

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5
CLO1	S	S	M	S	M
CLO2	S	S	S	M	S
CLO3	S	M	S	S	M
CLO4	S	S	M	S	S

S- Strong; M-Medium; L-Low

Computer Programming Lab-II- CY23CP2   **75 Hrs**

Program List

- Exercise in basics Operations Statement.

- Exercise in Control Structures.

- Exercise in arrays.

- Exercise in String handling functions.

- Exercise in User defined functions.

- Exercise in Recursion function.

- Exercise in Structure.

- Exercise in Pointers.

- Exercise in file operations.

- Exercise in Command Line Arguments

- Exercise of implementing queue.

- Exercise of implementing Linked List

- Create a C program to prevent buffer overflow attacks

- Create a C program to perform File Security System.

COURSE NUMBER	COURSE NAME	CATEGORY	L	T	P	CREDIT
CY23C06	Computer Networks and Security	Theory	58	2	-	3

Preamble

To provide security of the data over the network and to compare OSI and TCP/IP architectures

Course Learning Outcomes

On the successful completion of the course, students will be able to

CLO Number	CLO Statement	Knowledge Level
CLO1	Recall the concepts and terminologies of OSI model, network security and cryptography	K1
CLO2	Understand the OSI and TCP/IP models.	K2
CLO3	Apply various cryptographic algorithms	K3
CLO4	Analyze how the protocols and services work.	K4

Mapping with Programme Learning Outcomes

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5
CLO1	M	S	M	S	M
CLO2	S	M	M	S	M
CLO3	M	S	S	S	S
CLO4	S	S	S	S	S

S- Strong; M-Medium

Computer Networks and Security-CY23CO6   **58 Hrs**

Syllabus

UNIT I   (11 Hrs)

Introduction: Network, Uses of Networks, Types of Networks, **Reference Models: TCP/IP Model, The OSI Model, Comparison of the OSI and TCP/IP reference model. Architecture of Internet. Physical Layer:** Guided transmission media, Wireless transmission media, Switching

UNIT II   (13 Hrs)

Data Link Layer: Design issues, **Error Detection & Correction**, Elementary Data Link Layer Protocols, Sliding window protocols, Multiple Access Protocols, Data link layer switching. Network Layer: Network Layer Design issues, store and forward packet switching, connection less and connection-oriented networks-routing algorithms, IP addresses, IPv4 and IPv6 Protocol, ARP, RAR

UNIT III   (12 Hrs)

Transport Layer: connection establishment, Connection release, Error Control & Flow Control, Crash Recovery. **The Internet Transport Protocols: UDP, TCP.** Application Layer: providing services, Applications layer paradigms: Client server model, HTTP, E-mail, WWW, TELNET

UNIT IV   (11 Hrs)

Network security- Examples of security violations - **Computer security concepts**-confidentiality-Integrity-Availability-Accountability, Challenges of computer security Hacking-Vulnerability-threats-attacks- **Active attacks and passive attacks-types**- **Denial of service attacks**-Model for network security

UNIT V   (11 Hrs)

Internet Security-Transport Layer Security-Web Security Considerations-**HTTPs-Secure Shell-Wireless Network Security-Mobile Device Security**-Electronic Mail Security-Internet Mail Architecture-Email Formats-Email Threats and Comprehensive Email Security-DNS-Based Authentication of Named Entities.

Text Book

S. No	Author	Title of the Book	Publisher	Year and Edition
1.	Andrew S. Tanenbaum, David J. Wetherall	Computer Networks	Prentice Hall Press	2018,2nd Edition
2.	William Stallings	Network Security Essentials Applications and Standards	Pearson Education	2018,6th Edition
3	William Stallings	Cryptography & Network Security	Pearson Education	2018,7th Edition

Reference Books

S. No	Author	Title of the Book	Publisher	Year and Edition
1	Atul Kahate	Cryptography and Network Security	McGraw Hill	2011 ,3rd Edition
2	C K Shyamala, N Harini, Dr T R Padmanabhan	Cryptography and Network Security	Wiley India	2011,1st Edition

Pedagogy
- Chalk and talk PPT, Discussion, Assignment, Demo, Quiz, Flipped mode.

Course Designers
Dr.Sabitha Banu

COURSE NUMBER	COURSE NAME	CATEGORY	L	T	P	CREDIT
CY23C07	**Fundamentals for Cyber Security and Cryptography**	THEORY	58	2	-	3

Preamble

This course provides the fundamentals of computers and understanding the key issues associated with protecting information assets. The purpose of the course is to provide an overview of the field of cyber security, cybercrime and information assurance.

Course Learning Outcomes

On the successful completion of the course, students will be able to

CLO Number	CLO Statement	Knowledge Level
CLO1	Recall the concepts of cyber security and Information Security	K1
CLO2	Understand the concepts of cyber security threats, importance and challenges in Cyber Security.	K2
CLO3	Develop the applications by cyber security tools.	K3
CLO4	Analyze & implement the real- time applications by Cyber Security tools.	K4

Mapping with Programme Learning Outcomes

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5
CLO1	S	M	S	S	M
CLO2	S	S	S	S	M
CLO3	S	M	M	S	S
CLO4	S	M	S	S	S

s- Strong, M-Medium

Fundamentals for Cyber Security and Cryptography   -CY23C07

Syllabus   **58 Hrs.**

UNIT I   **(11 Hrs)**

Information security: History of IS-What is security -characteristic of IS-**components of an Information system** –**Security System Development Life Cycle model**. **–** Information Security for technical Administrators: server security**- network security**

UNIT II   **(13Hrs)**

Introduction to Cyber Security: Basic Cyber Security Concepts, **layers of security**, Vulnerability, threat, Harmful acts, Internet Governance – Challenges and Constraints, Computer Criminals -Assets and Threat, motive of attackers, active attacks, passive attacks, **Software attacks, hardware attacks, Spectrum of attacks-** CIA Triad -Taxonomy of various attacks, IP spoofing, Methods of defense, Security Models, risk management, **Cyber Threats- Cyber Warfare, Cyber Crime, Cyber terrorism, Cyber Espionage.**

UNIT III   **(12 Hrs)**

Cyber Security Tools-Kali Linux-**Nmap-Wireshark**-Metasploit-Burpsuite-Sql Injection-Password Cracking Tool-CUPP Tool.

UNIT IV   **(11 Hrs)**

Cryptography: Concepts and techniques-**Plain text and cipher text**- Encryption Principles-Cryptanalysis. Authentication methods-passwords-**keys versus passwords**-Attacking Systems via passwords-**Password verification**

UNIT V   **(11 Hrs)**

Applications of cryptographic Hash Functions: Message authentication- **Digital Signatures**-Other Applications-**Two simple Hash Functions**—Steganography tools and techniques.

Text Book

S.No	Author	Title of the Book	Publishers	Year and Edition
1	Donaldson, S., Siegel, S., Williams, C.K., Aslam, A	"Enterprise Cyber security -How to Build a Successful Cyber defense Program against Advanced Threats	A Press	2015,1st Edition
2	Nina Godbole, Sumit Belapure	Cyber Security: Understanding Cyber Crimes,Computer Forensics and Legal Perspectives	Willey	2018,1st Edition
3	William Stallings	Cryptography and Network Security: Principles and Practices	PHI	2020,7th Edition

Reference Books

S.No	Author	Title of the Book	Publishers	Year and Edition
1	Devan N. Shah	Information Security Principles and Practice	Wiley India	2009,1st Edition
2	George K.Kostopoulous	Cyber Space and Cyber Security	CRC Press	2013,1st Edition

Pedagogy

- Chalk and talk PPT, Discussion, Assignment, Demo, Quiz, Case study.

Course Designer
Mrs P.Yashodha

Course Number	Course Name	Category	L	T	P	Credit
CS23SBGP	SBS I - Gen-AI	Practical	44	1	-	3

Preamble

The objective of this course is to understand the breadth and depth of Generative Artificial Intelligence (Gen AI) and to impart knowledge on its ethical implications, practical applications, and emerging trends

Course Learning Outcomes

On the successful completion of the course, students will be able to

CLO Number	CLO Statement	Knowledge Level
CLO1	Understand the fundamental concepts and ethical considerations of Generative AI.	K2
CLO2	Apply AI principles in practical settings using basic AI tools and platforms	K3
CLO3	Develop advanced skills in specialized AI applications such as text analysis, natural language processing, and image recognition.	K3
CLO4	Explore emerging trends in AI, integrating advanced AI tools into diverse professional practices.	K4

Mapping with Programme Outcomes

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5
CLO1	S	S	S	S	M
CLO2	S	S	S	S	S
CLO3	S	S	M	S	S
CLO4	S	M	S	M	S

S- Strong; M-Medium

SBS I: Gen-AI - CS23SBGP   (45 Hrs)

Unit 1: Introduction to Gen AI   (9 hours)

Understanding Gen AI: Definition and scope of Gen AI - Overview of its applications in various fields - Introduction to essential skills needed for Gen AI. Ethical Considerations: Discussion on ethical guidelines and responsible use of AI - Understanding the impact of AI on society and individuals.

Hands-on Activity: Exploring AI Tools

• Working with appropriate content creation Gen-AI tools to engage with ChatGPT to explore various subjects, simulate interviews, or create imaginative written content.
• Working with appropriate writing and rephrasing Gen-AI tools to drafting essays on designated topics and refining the content with improved clarity, coherence, and correctness.

Unit 2: Basic AI Concepts   (8 hours)

Introduction to AI: Basic concepts and terminology of artificial intelligence - Examples of AI in everyday life - Real-world examples of AI applications in different domains. Machine Learning Basics: Understanding the principles of machine learning - Overview of supervised and unsupervised learning.

Hands-on Activity: Simple AI Projects

• Working with appropriate educational content creation Gen-AI tools to generate quizzes and flashcards based on classroom material.
• Working with appropriate language learning Gen-AI tools to practice and enhance language skills through interactive exercises and games across multiple languages.

Unit 3: AI in Practice (9 hours)

Text Analysis and Natural Language Processing (NLP): Introduction to NLP concepts and techniques - Hands-on exercises analyzing text data and extracting insights. Image Recognition and Processing: Basics of image recognition algorithms and techniques - AI Tools for Text and Image Processing

Hands-on Activity: Text and Image Projects

- Working with appropriate image processing Gen-AI tools to experiment with AI-generated images.
- Working with appropriate object recognition Gen-AI tools to identify various objects such as text, images, products, plants, animals, artworks, barcodes, and QR codes

Unit 4: AI for Productivity and Creativity (9 hours)

AI-enhanced Productivity and creativity Tools: Overview of productivity and creativity tools enhanced with AI capabilities - Tips for integrating AI into daily tasks and workflows. AI and Jobs: Exploring how AI impacts jobs and industries - Discussion on opportunities and challenges - Exploration of AI-powered creative tools and applications.

Hands-on Activity: Productivity and Creativity

- Working with appropriate content creation Gen-AI tools to generate interactive videos / blog posts / art / drawing / music and storytelling experience.
- Working with appropriate resume generation Gen-AI tools to create professional resumes efficiently

Unit 5: Future of Gen AI and Final Project (9 hours)

Emerging Trends in Gen AI - Applications of Generative AI - Ethical and Societal Impact of Gen AI - Future Directions and Challenges - Case Studies in Generative AI.

Hands-on Activity: Trends in Gen AI

- Working with appropriate speech generation Gen-AI tools to customize synthetic speech for virtual assistance across different applications.
- Working with appropriate data analysis Gen-AI tools to perform data analysis, visualization, and predictive modeling tasks.
- Working with appropriate Gen-AI design tools to simplify the creation of visually appealing presentations.
- Working with appropriate website builder Gen-AI tools to develop professional websites with AI assistance

Pedagogy

    Demonstration of AI Tools, Lectures and Case studies.

Course Designer

 Mrs. S. Ponmalar

Evaluation pattern for Gen-AI

 Quiz   : 50 Marks (5 quizzes with each 10 marks)
 Case study   : 25 Marks
 Online Exam   : 25 Marks (Departments to plan and conduct the exam)
 Total   : 100 Marks

Course Number	Course Name	Category	L	T	P	Credit
CY23SCE1	**Coursera: Foundations of Cyber Security**	Practical	45	-	-	3

Coursera: Foundations of Cyber Security

Course Contents   **45 Hrs**

Foundations of Cyber Security (8 Hrs)

Introduction to Cyber Security Essentials (12 Hrs)

Introduction to Cyber Security Foundations (3 Hrs)

Network Security (8 Hrs)

Operating Systems & Security (14 Hrs)

Course Number	Course Name	Category	L	T	P	Credit
CY23CP3	Cyber Security Tools Lab-I	PRACTICAL	-	-	75	3

Preamble

The course is designed to identify threats using Cyber Security tools. It helps to apply the concepts of Cyber Security tools in different applications.

Course Learning Outcomes

On the Successful Completion of the course, students will be able to

CLO Number	CLO Statement	Knowledge Level
CLO1	Recall the concepts of cyber security tools	K1
CLO2	Develop programs with implementation of cyber security tools.	K2
CLO3	Analyze threats and attacks	K3
CLO4	Implement the real-time applications by cyber security tools.	K4

Mapping with Programme Learning Outcomes

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5
CLO1	S	S	M	S	M
CLO2	S	S	S	S	M
CLO3	S	S	M	S	S
CLO4	S	S	S	S	S

S- Strong; M-Medium

Cyber Security tools Lab-I CY23CP3   75 Hrs

Programs List

- Set up Kali Linux in a virtual machine and set up a network Adapter.
- Scan the network for Kali Linux and Windows target machines in local network and virtual network.
- Identify the open ports using NMAP.
- Sniffing using Wireshark Tool.
- Use password guessing tools to guess a ZIP file password.
- Extract password hashes from Windows machines.
- Experiments on metasploit framework.
- Website Information Gathering techniques
- Prevention against cross site scripting attacks.
- Experiments on SQL injections.
- Experiments on CUPP Tool.

Pedagogy

- Demonstration of working environment/Tools/Software/Program

  Course Designer

  Dr.R.Divya

JOB ORIENTED COURSE
Course Name:
Security +Duration:
60 Hrs

Introduction – Explore Microsoft Entra Features – Self managed ADDS, Microsoft Entra ID, managed Microsoft Entra Domain Services – Investigate role in Microsoft Entra ID – Entra Build in roles – Deployment of Entra Domain Services
– Create and manage Entra users – Managing Users with Entra groups – Configure Microsoft Entra Units – ImplementPasswordless Authentication

 Deployment of Microsoft Entra Connect – Exploring Authentication – Configuring PHS – Implementing PTA – DeployFederation with Microsoft Entra ID – Authentication Decision Tree – Configure Password Writeback .

Microsoft Entra ID Protection – Configure Risk event Detections – Implementing user risk policy – Sign-in policy –Multifactor Authentication in Azure – Multifactor Authentication Settings – Explore Entra Conditional access – Configure Conditional Access Conditions
Configure Privileged Identity Management – Exploring Zero Trust model – Evolution of IM – Configure privilegemanagement Scope – privileged management on boarding – Implementing privilege management Workflow

Design an enterprise governance Strategy – Analyse the shared responsibility model – Exploring cloud security advantages – Review Azure hierarchy of systems – Configuring Azure policies – Enabling RBAC – Compare RBAC withAzure policies – Configure build in roles – Azure Blueprints – Design an Subscription management plan.

COURSE CODE	COURSE NAME	CATEGORY	L	T	P	CREDIT
CY23C08	**Vulnerability Assessment and Penetration Testing (VAPT)**	THEORY	58	2	-	3

Preamble

To create an overview about the security assessment risks, vulnerability and Penetration Testing

Course Learning Outcomes

On the successful completion of the course, students will be able to

CLO Number	CLO Statement	Knowledge Level
CLO1	Recall the concepts of Networking Security, Vulnerability and Penetration testing .	K1
CLO2	Understand vulnerability and its implications	K2
CLO3	Applying the various techniques of Security, testing methods	K3
CLO4	Analyze the concept of Threats and Hacking methods	K4

Mapping with Programme Learning Outcomes

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5
CLO1	S	S	M	M	S
CLO2	M	M	S	S	M
CLO3	S	S	S	M	S
CLO4	M	S	S	M	M

S- Strong; M-Medium

Vulnerability Assessment and Penetration Testing-CY23C08   58 HRS

UNIT 1   (12 Hrs)

Vulnerability Management Governance- Security basics- Understanding the need for security assessments- Types of security tests- **Security testing- Vulnerability assessment versus penetration testing- Security assessment-** Security audit- Penetration testing standards- Penetration testing lifecycle- OWASP- Benefits of the framework- Setting up a Kali virtual machine - List of tools to be used during assessment.

UNIT II   (12 Hrs)

Security Assessment Prerequisites-Gathering Requirements-**Types of vulnerability assessment-Information Gathering-Passive information gathering**-Active information gathering-Enumeration and Vulnerability Assessment-Enumerating Services-Using Nmap scripts-Gaining Network Access-Cracking passwords- Identifying hashes-Cracking Windows passwords-Password profiling-**Password cracking with Hydra-Burpsuite.**

UNIT III   (12 Hrs)

Vulnerability Scoring-Requirements for vulnerability scoring-Vulnerability scoring using CVSS-Threat Modeling-**Threat modeling techniques**-Threat modeling tools-Patching and Security Hardening-Patch Enumeration-**Security hardening and secure configuration reviews**- Vulnerability Reporting and Metrics-**Type of reports-Reporting tools**

UNIT IV   (11 Hrs)

Penetration Testing - **Using Kali Linux** - Using the Metasploit Framework - Finding Vulnerabilities - **Capturing Traffic** - Attacks: exploitation – **Password attacks**.

UNIT V   (11 Hrs)

Client-side exploitation – **Social engineering** – Bypassing Antivirus Applications - **Web application Testing** – Wireless Attacks.

TEXT BOOKS

S.No.	Authors	Title	Publishers	Year and Edition
1	Sagar Rahalkar	NetworkVulnerability Assessment	Packt Publishing Ltd	August 2018 (UNIT 1,2,3), 1st Edition
2	Georgia Weidman	"Penetration testing a Hands-on introduction to Hacking",	No starch press	2014(UNIT 4,5),1st Edition

REFERENCE BOOK

S.No.	Authors	Title	Publishers	Year and Edition
1	Steve Manzuik, Ken Pfeil, Andrew Gold	Network Vulnerability Assessment from Vulnerability	Syngress Media,U.S,	November 2020,1ˢᵗ edition

Pedagogy

Chalk and talk, PPT, Discussion, Assignment, Demo, Quiz, Case Study

Course Designer

Dr. R. Divya

COURSE CODE	COURSE NAME	CATEGORY	L	T	P	CREDIT
CY23CP4	**VAPT and DBMS Lab**	**PRACTICAL**	-	-	75	2

Preamble

The subject is intended to provide the student with the in-depth knowledge of security and testing concepts

Course Learning Outcomes

On the successful completion of the course, students will be able to

CLO Number	CLO Statement	Knowledge Level
CLO1	Design the Fundamental concepts of Security methods and concepts of data base management.	K1
CLO2	Understand by designing various types of network security techniques and DDL, DML SQL statements and PL/SQL programming	K2
CLO3	Apply the networking concepts and Penetration testing methods and, PL/SQL program to store and retrieve datafrom databases	K3
CLO4	Implement and configure different types of vulnerability scanning methods	K4

Mapping with Programme Learning Outcomes

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5
CLO1	M	M	S	S	S
CLO2	M	M	S	S	S
CLO3	S	S	S	S	S
CLO4	S	S	S	S	S

S- Strong; M-Medium

VAPT and DBMS Lab -CY23CP4 75 HRS

- Network Discovery with Nmap

- Vulnerability Scanning with OpenVAS

- DOS Attack

- OSINT and Target Profiling

- Burpsuite

- Social Engineering Awareness Exercise

- Different data types and operators.

- ER diagram with entities, attribute, keys and relations.

- Perform Data Definition Language statements (Create, Alter, Drop, Truncate, Rename)

- Perform Data Manipulation Language statements (Select, Insert, Update, Delete)

- Draw tables with Normalization

- Implement PL/SQL Block

Pedagogy

Demonstration of working environment/Tools/Software/Program

Course Designer

Dr.R.Divya

COURSE CODE	COURSE NAME	CATEGORY	L	T	P	CREDIT
CY23C09	DATABASE MANAGEMENT SYSTEM	Theory	58	2	-	3

Preamble

This course provides an insight on the basics of database, database design, relational model and querying a database. It also gives an overview of NoSQL databases and storing andaccessing data in a key/value database MongoDB.

Course Learning Outcomes

On the successful completion of the course, students will be able to

CLO Number	CLO Statement	Knowledge Level
CLO1	Recall the basic concepts of database management and NoSQL Databases	K1
CLO2	Understand DDL, DML SQL statements and PL/SQL programming	K2
CLO3	Apply various queries, PL/SQL program to store and retrieve data from databases	K3
CLO4	Analyze the working of SQL, PL/SQL program, NoSQL database to solve real-world problems	K4

Mapping with Programme Learning outcomes

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5
CLO1	M	S	M	S	M
CLO2	S	M	M	S	M
CLO3	M	S	S	S	S
CLO4	S	S	S	S	S

S-**Strong; M-Medium**

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DATABASE MANAGEMENT SYSTEM – CY23C09 58 Hrs

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Syllabus

Unit – I   **(12 Hrs)**

Database Concepts: Introduction -Relationships - **DBMS** -Relational data model - Integrity rules - **Theoretical relational languages**. Database Design: Data modeling -**Dependency** -Database design - Normal forms - **Dependency diagrams – De normalization**.

Unit – II   **(12 Hrs)**

Structured Query Language (SQL): Introduction – DDL - Naming rules and conventions – Data types **Constraints** - Creating table- Displaying table information - **Altering an existing table**– **Dropping, renaming, and truncating table** - Table type. Working with tables: DML - adding a newrow/record – updating and deleting existing rows/records - Retrieving data from table.

Unit-III   **(12Hrs)**

Functions and Grouping: Built-in functions - Grouping data. Joins and Views: **Join -Join types.** Views: Views - **Creating a view - Removing a view** - **Altering a view**. PL/SQL: Fundamentals - Block structure - comments - Data types – Other data types - Variable declaration – Assignment operation.

Unit – IV   **(12 Hrs)**

Control Structures and Embedded SQL: Control structures - Nested blocks - SQL in PL/SQL - Data manipulation - **Transaction control statements**. PL/SQL Cursors: **Cursors -Implicit & explicit cursors and attributes** - Records - Tables - **Procedures -Functions –Triggers**

Unit – V   **(10 Hrs)**

An overview of NoSQL **– NoSQL storage types** - Advantages and Drawbacks - Mongo DB Introduction – **Creating database and Dropping database** - **Creating collection and Dropping collection** – Insert, query and update document.

Text Books

S. No	Author	Title of the Book	Publisher	Year and Edition
1.	Nilesh Shah	Database Systems UsingOracle	PHI	2016, 2nd Edition,
2.	Gaur av Vaish	Getting Started with NoSQL	Packt	2013,1 st Edition

Reference Books

S. No	Author	Title of the Book	Publisher	Year and Edition
1	Rajesh Narang	Database Management Systems	Prentice Hall of India,	2011, 2nd Edition,
3	Kristina Chodoro w	MongoDB: DefinitiveGuide	Oreilly	2015,2nd Edition,

Pedagogy

- Chalk and talk PPT, Discussion, Assignment, Demo, Quiz, Flipped mode.

Course Designer

Dr.S.Angel

Course CODE	Course Name	Category	L	T	P	Credit
CY23SCE1	**Coursera: Foundations of Cyber Security**	Practical	-	-	45	3

Coursera: Foundations of Cyber Security

Course Contents   **45 Hrs**

Foundations of Cyber Security (8 Hrs)

Introduction to Cyber Security Essentials (12 Hrs)

Introduction to Cyber Security Foundations (3 Hrs)

Network Security (8 Hrs)

Operating Systems & Security (14 Hrs)

COURSE CODE	COURSE NAME	CATEGORY	L	T	P	CREDIT
CY23A01	**Cyber Security and Cyber Law**	**THEORY**	58	2	-	3

Preamble

The course is designed to impact the knowledge on the concepts of Cyber Law and Security techniques

Course Learning Outcomes

On the successful completion of the course, students will be able to

CLO Number	CLO Statement	Knowledge Level
CLO1	Recall the concepts of Security, Cyber Space and Cyber Law	K1
CLO2	Understand the cyber law acts, cyber-crimes and e-security methods	K2
CLO3	Understand the cyber law acts, cyber-crimes and e-security methods	K3
CLO4	Analyze the techniques of Cyber Acts, Cyber Laws, and Security problems	K4

Mapping with Programme Outcomes

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5
CLO1	S	M	S	S	S
CLO2	S	S	M	S	M
CLO3	S	S	S	M	M
CLO4	S	S	S	M	S

S- Strong; M-Medium

Cyber Security and Cyber Law - CY23A01　　　　　　　　　**[58 Hrs]**

Syllabus

UNIT I　　　　　　　　　　　　　　　　　　　　　　　　**(11 Hrs)**

Introduction to Cybercrime – Cybercrime definition and origins of Cybercrime of the world – Cybercrime and Information Security – **Classifications of Cybercrime** – Cybercrime and the Indian IT Act, 2000 – **A Global perspective on Cybercrimes**.

UNIT II　　　　　　　　　　　　　　　　　　　　　　　　**(12 Hrs)**

Cyber Offences and Cybercrime – Introduction – Strategic attacks - Types of Attacks – Proliferation of Mobile and Wireless Devices – Trends in Mobility and Wireless devices – Security Challenges faced by Mobile devices – Registry Setting for Mobile devices – Authentication Service Security – **Attacks on Mobile Phones – Security implications for Organizations – Organizational Measures for handling Mobile Phones: Device Related security issues – Security policies and Measure in Mobile Computing era and Laptops**.

UNIT III (11 Hrs)
Methods and tools used in Cyber Line – Introduction – **Password Cracking – Malwares – DoS and DDos Attacks** – SQL injection and Buffer overflow – Phishing and Identity Theft – Enumeration – Attacks on Wireless Networks.

UNIT IV (12 Hrs)
Cyberspace and Cyber Law – Introduction to e-commerce **– Contract aspects in Cyber Law – Security aspects of Cyber Law** – Intellectual property aspect in Cyber Law and evidence aspect in Cyber Law – Criminal Aspects in Cyber Law – Global trends in Cyber Law - Legal framework for electronic Data Interchange Law relating to electronic ranking – Need for Indian Cyber Law.

UNIT V (12 Hrs)
Information technology Act – Introduction of Cybercrime and Cyber Security – Information Technology Act 2000 – Penalties, Adjudication and Appeals under the Information Technology Act, 2000 – Offences under Information Technology Act, 2000 - Information Technology Act, 2008 and its Amendments - **Importance of Information Security Standards – Information Security Challenges.**

Text Books

S.No	Authors	Title	Publishers	Year and Edition
1.	Nilakshi Jain, Ramesh Menon	Cyber Security and Cyber Laws	Wiley India Pvt Ltd	2021, 1st Edition

Reference Books

S.No	Authors	Title	Publishers	Year and Edition
1.	D. P. Mittal	Law of Information Technology (Cyber Law	TAXMANN'S.	2018, 1st Edition
2.	Faiyaz Ahamad	Cyber Law and Information Security	Dreamtech Press	2013, 2nd Edition

Pedagogy
●   Chalk and Talk PPT, Discussion, Assignment, Demo, Quiz, Case study.

Course Designer
Mrs. M Selvanayaki

COURSE CODE	COURSE NAME	CATEGORY	L	T	P	CREDIT
CY23A02	**Cyber Threats and Modeling**	THEORY	58	2	-	3

Preamble

The learner understands the basic concepts of cyber security threats and modeling and also can learn about email threats, web threats and cyber threat management.

Course Learning Outcomes

On the successful completion of the course, students will be able to

CLO Number	CLO Statement	Knowledge Level
CLO1	Recall about the Ethical Hacking Concepts, Hacking Tools, OS Concepts, Networks Tools.	K1
CLO2	Understand Intrusion Detection, Social Engineering, Buffer Overflows and different types of Attacks and their protection mechanisms.	K2
CLO3	Apply the various tools to identifying the vulnerabilities.	K3
CLO4	Analyze the Intruders attacks on Networks, OS Vulnerabilities, Wireless Networks.	K4

Mapping with Programme Outcomes

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5
CLO1	S	M	S	S	S
CLO2	S	S	M	S	M
CLO3	S	S	S	M	M
CLO4	S	S	S	M	S

S- Strong; M-Medium

Cyber Threats and Modeling - CY23A02 **[58 Hrs]**

Syllabus

UNIT I **(11 Hrs)**
Getting started: Dive In and Threat Model - Learning to Threat Model – Checklists for Diving In and Threat Modeling - Strategies for Threat Modeling - Structured Approaches to Threat Modeling - **Models of Software**.

UNIT II **(12 Hrs)**
Finding Threats: STRIDE - Understanding STRIDE - Spoofing Threats - Tampering Threats - Repudiation Threats - Information Disclosure Threats - **Denial-of-Service Threats** - Elevation of Privilege Threats - STRIDE Variants - Attack Trees: Working with Attack trees - Representing a Tree - Real Attack Trees - Perspective on Attack Trees - Attack Libraries: **Properties of Attack Libraries** - CAPEC - OWASP Top Ten.

UNIT III **(12 Hrs)**
Privacy Tools: Solove's Taxonomy of Privacy - Privacy Considerations for Internet Protocols - Privacy Impact

Assessments - Processing and Modeling Threats: Starting the Threat Modeling Project - **Tracking with Tables and Lists – Scenario - Specific Elements of Threats Modeling.**

UNIT IV   **(12 Hrs)**
Threat Modeling Tools: Open Source Tools - Commercial Tools - Web and Cloud Threats: Web threats - Cloud Tenant Threats - Cloud Provider Threats - Mobile Threats. Human Factors and Usability_ Models of Software Scenarios - Tools and Techniques for Addressing Human Factors - **User Interface Tools and Techniques**.

UNIT V   **(11 Hrs)**
Threats to Cryptosystems – Cryptographic primitives – Classic Threat actors – Attacks against actors – Attacks against Cryptosystems – Building with Crypto – **Things to remember about crypto – Secret systems** – Kerckhoffs and his principles.

Text Book

S.No	Authors	Title	Publishers	Year and Edition
1.	Adam Shostack	Threat Modeling – Designing for Security	Wiley India Pvt Ltd	2014, 1st Edition

Reference Books

S.No	Authors	Title	Publishers	Year and Edition
1.	Swiderski, Frank and Syndex	Threat Modeling	Microsoft Press	2016, 1st Edition
2.	Jocelyn O. Padallan	Cyber Security	Arcler Press Publisher	2019, 2nd Edition

Pedagogy
- Chalk and Talk PPT, Discussion, Assignment, Demo, Quiz, Case study.

Course Designer
Mrs. M Selvanayaki

COURSE CODE	COURSE TITLE	CATEGORY	L	T	P	CREDIT
AI23C10	MACHINE LEARNING	THEORY	73	2	-	4

Preamble

- *This course has been designed to introduce the concepts and techniques of machine learning. It also emphasizes various principles, algorithms, and applications of machine learning.*

Course Learning Outcomes

CO Number	CLO Statement	Knowledge Level
CLO1	Recall the fundamentals of Machine Learning Concepts.	K1
CLO2	Understand the features of machine learning to apply on real world problems	K2
CLO3	Apply various algorithms of supervised and unsupervised learning	K3
CLO4	Analyze the concepts of linear and non-linear activation functions	K4

Mapping with Programme Outcomes

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5
CLO1	S	M	S	M	S
CLO2	S	S	S	M	S
CLO3	S	S	M	S	S
CLO4	S	S	M	M	S

S- Strong; M-Medium

MACHINE LEARNING - AI23C10   73 Hrs.

Unit I   **14 Hrs.**

The Machine Learning Landscape: Introduction to Machine Learning - Why Use Machine Learning? - Examples of Applications - Types of Machine Learning systems – Main Challenges of Machine Learning – Testing and Validating - Classification and Prediction **- The Role of Python in Machine Learning - Anaconda in Python - Python Libraries.**

Unit 2   **15 Hrs.**

Classification: MNIST - Training a Binary Classifier - Performance Measures: Measuring Accuracy Using Cross-Validation - Confusion Matrix - Precision and Recall - Precision/Recall Trade-off - The ROC Curve. Multiclass Classification - Multilabel Classification - Multi Output Classification – Classification Tree. **Advanced Machine Learning: Scikit-Learn Library for Machine Learning -** Cross-Validation. **Support Vector Machine: Linear SVM Classification – Nonlinear SVM Classification.**

Unit 3 15 Hrs.

Linear Regression: Simple Linear Regression – Steps in Building a Regression Model – Building Simple Linear Regression Model – Multiple Linear Regression: Developing Multiple Linear Regression Model Using Python – **Categorical Encoding Features - Splitting the Dataset into Train and Validation Sets - Building the Model on a Training Dataset** – Logistic Regression.

Unit 4 14 Hrs.

Unsupervised Learning Techniques: Clustering – K-Means Clustering – Limits of K-Means – Clustering for Image Segmentation - Clustering for Preprocessing - Clustering for Semi-Supervised Learning – DBSCAN – **Other Clustering Algorithm. Creating Product Segments Using Clustering - Hierarchical Clustering.**

Unit 5 15 Hrs.

Forecasting: Forecasting Overview - Components of Time-Series Data. Recommender Systems: Overview – Association Rules – Applying Association Rules. Text Analytics: Overview – Sentiment Classification - **Naïve-Bayes Model for Sentiment Classification. Introduction to Artificial Neural Networks with Keras: From Biological to Artificial Neurons**. Deep Computer Vision Using Convolutional Neural Networks: Convolutional Layers

Text Book

S.No	Author	Title of the Book	Publishers	Year and Edition
1	Tom M Mitchell	Machine Learning	Tata McGraw- Hill, New Delhi	2017, 1st Ed
2	Anuradha Srinivasa Raghavan, Vincy Joseph	Machine Learning	Wiley India	2019, 1st Ed
3	Zsolt Nagy	Artificial Intelligence and Machine Learning Fundamentals	Packt publisher	2018, 1st Ed
4	Dr. S Sridhar, Dr. M. Vijayalakshmi	Machine Learning	Oxford University Press	2021, 1st Ed

Reference Book

S.No	Authors	Title of the Book	Publishers	Year and Edition
1	Manaranjan Pradhan, U Dinesh Kumar	Machine Learning using Python	Wiley India	2019, 1st Ed
2	Aurelien Geron	Hands-On Machine Learning with Scikit Learn, Keras and Tensorflow Concepts Tools and Techniques to Build Intelligent Systems	OReilly Media	2019, 2nd Ed

Pedagogy

- Chalk and talk, PPT, Discussion, Assignment, Demo, Quiz, Case study.

Course Designer

Dr. A. Sabitha Banu

COURSE CODE	COURSE NAME	CATEGORY	L	T	P	CREDIT
CY23C11	SOFTWARE ENGINEERING AND TESTING	THEORY	73	2	-	4

Preamble

- *The course is designed to impact the knowledge on building reliable software products. It also emphasizes various testing's undergone to enhance the quality of the software.*

Course Learning Outcomes

On the successful completion of the course, students will be able to

CLO Number	CLO Statement	Knowledge Level
CLO1	Recall about the software evolution, software engineering practice, life cycle models and testing concepts.	K1
CLO2	Understand on Agile models, various Phases of software Project and its life cycle models.	K2
CLO3	Apply the various building models, software testing tactics and its Methodologies.	K3
CLO4	Analyze the System, Acceptance and Performance Testing's criteria and its best practice.	K4

Mapping with Programme Outcomes

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5
CLO1	S	M	S	M	S
CLO2	S	M	S	M	M
CLO3	S	S	M	S	S
CLO4	S	S	M	M	S

S- Strong; M-Medium

SOFTWARE ENGINEERING AND TESTING- CY23C11 73Hrs.

Syllabus

UNIT I 14 Hrs.

Introduction to Software Engineering: The Evolving role of Software **- Software - Changing nature of Software - Legacy Software** - Software myths. Software Engineering Practice: Software engineering practice - Communication practices - Planning practices - Modeling practices - Construction practice- Deployment.

UNIT II 15 Hrs.

Software Development Life Cycle models: **Phases of Software project-Quality, Quality Assurance, Quality control** - Testing, Verification and Validation - Process Model to represent Different Phases - Life Cycle models.

UNIT III   **15 Hrs.**

Agile Development: Agile Process –Agile Process Model-Building the Analysis Model: Requirement Analysis - **Data Modeling concepts - Object Oriented Analysis -Flow Oriented Modeling-**Design Engineering: Design **concepts.**

UNIT IV   **14 Hrs.**

Testing Tactics: Software Testing Fundamentals -Types of Testing: White Box Testing - Static Testing-Structural Testing-Black box Testin**g-Integration Testing: Integration testing- Integration Testing as Type of Testing.**

UNIT V   **15 Hrs.**

System and Acceptance Testing: System Testing Overview-**Functional testing versus Non- functional Testing-Functional testing - Non-functional Testing** – Acceptance Testing and its criteria –Performance Testing: Factors governing Performance testing**.**

Text Books

S.No	Authors	Title	Publishers	Year and Edition
1.	Roger S. Pressman	Software Engineering: A Practitioner's Approach	McGraw-Hill Education	2014, 8th Edn
2.	Srinivasan Desikan , Gopalaswamy Ramesh	Software Testing Principles and Practices	Pearson Education	2012, 1st Edn

Reference Books

S.No	Authors	Title	Publishers	Year and Edition
1.	Rajib Mall	Fundamentals of Software Engineering	Prentice Hall of India Pvt Ltd	2010, 3rd Edn
2.	Sandeep Desai, Abhishek Srivastava	Software Testing: A Practical Approach	PHI Learning Pvt. Ltd	2016, 2nd Edn
3.	David Burns	Selenium 2 Testing Tools: Beginner's Guide	Tata McGraw Hill Edition	2012, 1st Edn

Pedagogy
- Chalk and Talk, PPT, Discussion, Assignment, Demo, Quiz, Case study.

Course Designer
Mrs. M Selvanayaki

COURSE CODE	COURSE TITLE	CATEGORY	L	T	P	CREDIT
CY23C12	ETHICAL HACKING	THEORY	73	2	-	4

Preamble

- *The course is designed to introduce the fundamentals of ethical hacking. It provides the fundamental information associated in the art of attacking computer infrastructure for the purposes of testing, auditing, and pre-emptively securing these infrastructures*

Course Learning Outcomes

CLO Number	CLO Statement	Knowledge Level
CLO1	Recall about the Ethical Hacking Concepts, Hacking Tools, OS Concepts, Networks Tools.	K1
CLO2	Understand Intrusion Detection, Social Engineering, Buffer Overflows and different types of Attacks and their protection mechanisms.	K2
CLO3	Apply the various tools to identifying the vulnerabilities.	K3
CLO4	Analyze the Intruders attacks on Networks, OS Vulnerabilities, Wireless Networks	K4

Mapping with Programme Outcomes

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5
CLO1	S	M	S	M	S
CLO2	S	M	S	M	M
CLO3	S	S	M	S	S
CLO4	S	S	M	M	S

S- Strong; M-Medium

ETHICAL HACKING - CY23C12 73 Hrs.

Syllabus

Unit 1   **15 Hrs**

Introduction to Ethical Hacking-**TCP/IP Concepts-IP Addressing**-CIDR Notation-Planning IP Address assignments-IPv6 Addressing-**Network and Computer Attaks-Malicious Software- Protecting against Malware attacks**-Intruder attacks on Networks and Computers-Addressing Physical Security.

Unit II   **14 Hrs**

Foot printing and Social Engineering-Web **Tools for Foot Printing**-Conducting Competitive Intelligence-Introduction to Social Engineering**- Art of Shoulder Surfing-Art of DumpsterDiving**- Art of piggybacking-Phishing.

Unit III 15 Hrs

Port Scanning-**Port Scanning Tools**-Conducting Ping Sweeps- Understanding Scripting- Enumeration-Enumerating Windows Operating Systems-Programming for Security Professionals- **Desktop and Server OS Vulnerabilities-Windows OS Vulnerabilities**-Tools for Identifying Vulnerabilities—Practices for Hardening Windows Systems-**Linux OS vulnerabilities**.

Unit IV 14 Hrs

Embedded Operating Systems: The Hidden Threat-Windows and other **Embedded Operating System-Vulnerabilities of Embedded Oss- Hacking Web Servers**-Understanding Web Applications-Understanding Web Application Vulnerabilities- Tools for Web attackers and Security. **Unit V 15 Hrs**

Hacking Wireless Networks-**Understanding wireless Technology-Understanding Wireless Network Standards-Understanding Authentication**-Understanding Warddriving-Understanding Wireless Hacking-Network Protection Systems-Protecting with Firewalls-Protecting with Intrusion Detection and Prevention Systems.

Text Book

S.No	Authors	Title of the Book	Publishers	Year and Edition
1	Michael T.Simpson, Nocholas D.Anti, Robert S.Wilson	Hands –On Ethical Hacking and Network Defense	`Cengage Learning	2023, 4th Edn

Reference Books

S. No	Authors	Title of the Book	Publishers	Year and Edition
1	Steven DeFino, Barry Kaufman, Nick Valenteen	Official Certified EthicalHacker Review Guide	Cengage Learning	2020, 1st Edn
2	Patrick Engebretson	The Basics of Hacking and Penetration Testing: Ethical Hacking and Penetration Testing MadeEasy	Syngress Basics Series –Elsevier	2013, 2nd Edn

Pedagogy
- Chalk and Talk, PPT, Discussion, Assignment, Demo, Quiz, Case study.

Course Designer
Dr. R. Divya

COURSE CODE	COURSE TITLE	CATEGORY	L	T	P	CREDIT
CY23E01	CLOUD SECURITY	THEORY	73	2	-	5

Preamble

- *This course provides a strong knowledge in cloud security and data storage concepts, a well covering of security design patterns, gives a well background view for security issues and management.*

Course Learning Outcomes

On the successful completion of the course, students will be able to

CLO Number	CLO Statement	Knowledge Level
CLO1	Recall about the concepts of Cloud Computing	K1
CLO2	Understand the infrastructure security level of cloud computing	K2
CLO3	Apply the storage and security management	K3
CLO4	Analyze the security and privacy of cloud environment	K4

Mapping with Programme Outcomes

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5
CLO1	S	M	S	M	S
CLO2	S	M	S	M	M
CLO3	S	S	M	S	S
CLO4	S	S	M	M	S

S- Strong; M-Medium

CLOUD SECURITY- CY23E01   **73 Hrs.**

Unit - I   **14 Hrs**

Cloud Computing -Introduction -Cloud Computing Defined-**Evolution of Cloud Computing - The SPI Framework for Cloud Computing-The Traditional Software Model**-The Cloud Services Delivery Model-Cloud Deployment Models- Key Drivers to Adopting the Cloud-The Impact of Cloud Computing on Users-**Governance in the Cloud**-Barriers to Cloud Computing Adoption in the Enterprise

Unit - II   **15 Hrs**

INFRASTRUCTURE SECURITY: The Network Level: Ensuring Data Confidentiality and Integrity-**Ensuring Proper Access Control-Ensuring the Availability of Internet-Facing Resources Network**-Level Mitigation. **The Host Level:** SaaS and PaaS Host Security-IaaS Host Security-Virtualization Software Security-Virtual Server Security. **The Application Level:** Application- Level Security Threats-DoS and EDoS-End User Security-SaaS Application Security-PaaS Application Security-IaaS Application Security.

Unit - III   **15 Hrs**

DATA SECURITY AND STORAGE: Aspects of Data Security-Data Security Mitigation**- Provider Data and Its Security:** Storage- Confidentiality -Integrity- Availability-Security in Cloud Computing **IDENTITY AND ACCESS MANAGEMENT:** Trust Boundaries and IAM- Why IAM? - IAM Challenges-IAM Definitions- IAM Architecture and Practice-Getting ready for the cloud-IAM standards and protocols for cloud services.

Unit - IV   **15 Hrs**

SECURITY MANAGEMENT IN THE CLOUD: Security Management Standards- Security Management in the Cloud-Availability Management-SaaS Availability Management - PaaS Availability Management - IaaS Availability Management-Access Control-Security Vulnerability, Patch, and Configuration Management. **EXAMPLES OF CLOUD SERVICE PROVIDERS-** Amazon Web Services (IaaS)-Google (SaaS, PaaS)-Microsoft Azure Services Platform (PaaS).

Unit - V   **14 Hrs**

PRIVACY: What Is Privacy-What Is the Data Life Cycle-What Are the Key Privacy Concerns in the Cloud-**Who Is Responsible for Protecting Privacy-Changes to Privacy Risk Management and Compliance in Relation to Cloud Computing**.

Text Books

S.No.	Authors	Title of the Book	Publishers	Year and Edition
1	Tim Mather, Subra Kumaraswamy, Shahed Latif	Cloud Security and Privacy: An Enterprise Perspective on Risks and Compliance	O'Reilly Media, Inc.	2009, 1st Edn

Reference Books

S.No.	Authors	Title of the Book	Publishers	Year and Edition
1	Raghu Yeluri and Enrique Castro Leon	Building the Infrastructure for Cloud Security- A Solution View	Apressopen	2014, 1st Edn
2	Barrie Sosinsky	Cloud Computing Bible	Wiley- India	2010, 1st Edn

Pedagogy

- Chalk & talk, PPT, Group Discussion, Assignment, Demo, Quiz, Role play

Course Designer
Dr. A. Sabitha Banu

COURSE CODE	COURSE TITLE	CATEGORY	L	T	P	CREDIT
CY23E02	WEB APPLICATION AND SECURITY	THEORY	73	2	-	5

Preamble

- *This course covers the various techniques for securing ASP.NET Web API, including basic authentication using authentication filters, forms, Windows Authentication, external authentication services, and integrating ASP.NET's Identity system.*

Course Learning Outcomes

On the successful completion of the course, students will be able to

CLO Number	CLO Statement	Knowledge Level
CLO1	Recall about the concepts of Cloud Computing	K1
CLO2	Understand the infrastructure security level of cloud Computing	K2
CLO3	Apply the storage and security management	K3
CLO4	Analyze the security and privacy of cloud environment	K4

Mapping with Programme Outcomes

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5
CLO1	S	M	S	M	S
CLO2	S	M	S	M	M
CLO3	S	S	M	S	S
CLO4	S	S	M	M	S

S- Strong; M-Medium

WEB APPLICATION AND SECURITY- CY23E02 73 Hrs

Unit I 14 Hrs

Setting up a browser client: ASP.NET Web API security architecture **– Setting up your browser client** – Consuming the Web API using JavaScript and jQuery – Authentication and authorization – **Implementing authentication in HTTP message handlers** – Setting the principal – using the [Authorize] attribute – Custom authorization filters

Unit II 15 Hrs

Enabling SSL for ASP.NET Web API: Enforcing SSL in a Web API controller – Using client certificates in Web API – **Integrating ASP.NET Identity system with Web API** – Creating an empty Web API Application – **Installing the ASP.NET Identity NuGet packages** – Setting up ASP.NET Identity 2.1 – Defining Web API Controllers and methods.

UNIT III 14 Hrs

Securing Web API using OAuth2: Hosting OWIN in IIS and adding Web API to the OWIN pipeline – **Individual user account authentication flow – sending an unauthorized request** – Get an access token – Send an authenticated request. Enabling Basic Authentication using Authentication Filter

Web API: Basic authentication with IIS – Basic authentication with custom membership - Basic authentication using an authentication filter.

Unit IV   **15 Hrs**

Setting an authentication filter – Implementing a Web API authentication filter – Setting an error result – **Combining authentication filters with host-level authentication. Securing a Web API using Forms and Windows Authentication:** Working of forms authentication – Implementing forms authentication in Web API.

Unit V   **15 Hrs**

What is integrated windows authentication? - **Advantages and disadvantages of using the integrated windows authentication mechanism - Configuring windows authentication** – Difference between basic authentication and windows authentication. Avoiding Cross-Site Request Forgery Attacks in Web API: - What is CSRF attack? – Anti-forgery tokens using HTML form or Razor View – **Anti-forgery tokens using AJAX**.

Text Book

S. No	Authors	Title of the Book	Publishers	Year and Edition
1	Rajesh Gunasundaram	ASP.NET Web API Security Essentials	Packt Publications	2019, 1st Edn

Reference Books

S. No	Authors	Title of the Book	Publishers	Year and Edition
1	Jamie Kurtz, Brain Wortman	ASP.NET Web API 2: Building a REST Service from Start to Finish	Apress Publications	2015, 2nd Edn
2	Neil Madden	API Security in Action	Managing Publications	2020, 1st Edn

Pedagogy

- Chalk and Talk, PPT, Discussion, Assignment, Demo, Quiz, Case study.

Course Designer

Mrs P.Yashodha

COURSE CODE	COURSE TITLE	CATEGORY	L	T	P	CREDIT
CY23CP5	ETHICAL HACKING LAB	PRACTICAL	-	-	75	3

Preamble
- *The course is intended to provide the student with the in-depth knowledge of security, importance of data gathering, foot printing and system hacking*

Course Learning Outcomes
On the successful completion of the course, students will be able to

CLO Number	CLO Statement	Knowledge Level
CLO1	Design the Fundamental concepts of Security methods	K1
CLO2	Understand by designing various types of network security techniques	K2
CLO3	Apply the networking concepts and Penetration testing methods	K3
CLO4	Implement and configure different types of vulnerability scanning methods	K4

Mapping with Programme Outcomes

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5
CLO1	S	S	M	S	M
CLO2	S	S	S	S	S
CLO3	S	S	M	M	M
CLO4	S	S	S	S	S

S- Strong; M-Medium

ETHICAL HACKING LAB – CY23CP5   75 Hrs.

Program List:

1. Configure IP addressing using CIDR notation and implement firewall rules using open-source tools on Linux.

2. Utilize open-source footprinting and email spoofing tools to gather information and simulate a social engineering attack.

3. Perform port scanning and enumeration using Nmap and Enum4linux on target systems.

4. Identify and exploit web server vulnerabilities using Nikto and Metasploit.

5. Conduct wireless network penetration tests and set up intrusion detection systems using Aircrack-ng and Snort.

6. Configure IPv6 addressing and conduct malware analysis using OSSEC and Cuckoo Sandbox.

7. Use OSINT tools for competitive intelligence and simulate dumpster diving with Maltego.

8. Write Python scripts for network reconnaissance and exploit Windows desktop vulnerabilities with Exploit-DB.

9. Analyze vulnerabilities in embedded operating systems with Binwalk and conduct web server penetration tests using OWASP ZAP.

10. Analyze wireless network traffic with tcpdump and configure firewall rules with pfSense for wireless network protection.

11. Simulate intruder attacks with Kali Linux and perform physical security assessments with OpenFAIR.

12. Test physical security with piggybacking techniques and execute phishing campaigns using Gophish for employee awareness.

Pedagogy

- System, White board, Demonstration through PPT

Course Designer
Dr.R.Divya

COURSE CODE	COURSE TITLE	CATEGORY	L	T	P	CREDIT
CY23SBP1	MOBILE APP DEVELOPMENT LAB	PRACTICAL	-	4	41	3

Preamble

- *This course is designed to equip with the knowledge and skills needed to create and deploy mobile apps for a variety of platforms, including iOS and Android.*

Course Learning Outcomes

On the Successful Completion of the course, students will be able to

CLO Number	CLO Statement	Knowledge Level
CLO1	Understand basic concepts of Java	K2
CLO2	Demonstrate the Mobile app using Android	K2
CLO3	Apply the techniques to solve real-time problems	K3
CLO4	Analyze the tools and framework for development of mobile app	K4

Mapping with Programme Learning Outcomes

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5
CLO1	M	M	S	S	M
CLO2	M	S	S	S	M
CLO3	S	S	S	S	S
CLO4	S	S	S	S	S

S- Strong; M-Medium; L-Low

Program List

- Designing a Simple Toast application.
- Develop an application that uses GUI components, Font and Colors.
- Develop an application that uses Layout Managers and event listeners.
- Develop a simple calculator application.
- Develop a simple android application using the Image View and Spinner.
- Exercises to send SMS and receive SMS.
- Create an android application to connect to a website using web view.
- Create an android application with progress circle.

- Create an android application to demonstrate countdown timer.
- Create an android application to find location using location-based services.

Pedagogy

- Demonstration of working environment / Tools / Software / Program

Course designer

Dr.R.Divya

COURSE NUMBER	COURSE NAME	CATEGORY	L	T	P	CREDIT
CY23AC1	DATA SECURITY	THEORY	-	-	-	5

Preamble
- *This course provides an overall understanding of the various security techniques and terminologies for data protection.*

Course Learning Outcomes
On the successful completion of the course, students will be able to

CLO Number	CLO Statement	Knowledge Level
CLO1	Recall the concepts of data security, data privacy and IoT Security.	K1
CLO2	Understand the privacy terminologies and data privacy management	K2
CLO3	Apply the concepts of Data protection principles, Safeguards and Privacy Program Governance and Compliance and Legal Framework	K3
CLO4	Analyze the techniques of Data Security Threats, Mitigation and Cloud Security.	K4

Unit 1

Introduction to Privacy-Data Protection & Privacy Terminologies - Data Protection Principles and Approaches to Privacy - Code for protection of Personal Information - Information Life Cycle –Data Security Threats and Mitigation - Data Storage Security Issues in Cloud Computing

Unit 2

Data protection principles and Safeguards-Data protection principles - Subject access request Damage or distress - Preventing direct marketing Automated decision taking - Correcting inaccurate personal data - Compensation, Exemptions & Complaints - Big data - CCTV & Data sharing - Online & apps Privacy by design - Guidance Note on Protecting the confidentiality of Personal Data Safeguarding-Personal Information - Using Personal Information on Websites and with Other Internet related Technologies

Unit 3

Data Privacy Management-Data Privacy Management controls & Plan - Data Privacy Management Reference Model - Data Protection in the context of Police and Criminal Justice - Cross Border data transfer - Do not Track Privacy Policy - Developing Privacy Management Tools -Information security practices for data privacy - Developing a privacy management plan.

Unit 4

Privacy Program Governance and Compliance and Legal Framework-Privacy Organization and Relationship (POR) - Privacy Policy and Processes (PPP) -Regulatory Compliance Intelligence (RCI) - Privacy legislations - applicability and interpretation - Privacy Awareness and Training

(PAT) – Legal Framework for Data protection, Security and Privacy Norms

Unit 5

Privacy in cloud computing and IOT-Privacy in Cloud -Introduction to Privacy in cloud computing

- Cloud computing paradigm and privacy - Challenges to privacy in cloud computing - Privacy in IoT - IoT

Governance

Text Book

S.No.	Authors	Title of the Book	Publishers	Year and Edition
1	Thomas H. Lenhard	Data Security, Technical and Organizational Protection Measures against Data Loss and Computer Crime	Springer Wiesbaden	2019
2	Krishan Kumar Goyal , Amit Garg , Saurabh Singhal	Cyber Security and Data Privacy	PHI	2021
3	Dr.A.S Kalyana Kumar	Cloud Computing and Cyber Security: A Secure Crypto-Based Data Outsourcing and Sensitive Data Monitoring in Cloud Paperback	Adhayan book	2023

Reference book

S.No.	Authors	Title of the Book	Publishers	Year and Edition
1	Heather C. Hudak	Digital Data Security (Get Informed - Stay Informed) Hardcover – Import	Crabtree Forest	2019

COURSE NUMBER	COURSE NAME	CATEGORY	L	T	P	CREDIT
CY23AC2	ARTIFICIAL INTELLIGENCE	THEORY	-	-	-	5

Preamble

- *To provide an overview of Artificial Intelligence, Machine learning algorithm and techniques for decision process.*

Course Learning Outcomes

On the successful completion of the course, students will be able to

CLO Number	CLO Statement	Knowledge Level
CLO1	Recall about the concepts of AI, Fuzzy logic and Knowledge representation, decision process & learning.	K1
CLO2	Understand the applications of AI and Expert Systems, decision process & reinforcement learning.	K2
CLO3	Apply the knowledge representation, fuzzy logic, decision process and machine learning algorithms.	K3
CLO4	Analyze the artificial intelligence search algorithms, logic in Artificial Intelligence.	K4

Unit-I

Foundations of Artificial Intelligence: Artificial Intelligence - Definition of Artificial Intelligence - Through Problems - History of Artificial Intelligence - Artificial Intelligence - Problems and Techniques - Shift in Focus of AI Towards Providing Smarter Solutions - Knowledge Representation: Introduction – Ontologies – Objects - and Events Representations and Mappings.

Unit-II

Basics of Machine Learning: Neural Networks and Applications - Introduction-Learning in Neural Networks - Choosing Cost Function - Types of Learning - Recurrent Neural Network – Back- propagation - Convolutional Neural Networks and Deep Neural Networks -. Applications of Neural Networks.

Unit-III

Statistical Machine Learning: Introduction - Probability Axioms - Bayes' Rule - Bayesian Network

- Decision Processes and Reinforcement Learning: Learning - Forms of Learning – Learning Decision Trees - Learning by Examples - Explanation - Based Learning - Regression and Classification with Linear Models - Artificial Neural Networks.

Unit-IV

Applications of Artificial Intelligence-Game Playing: Minimax Search Procedure -Imperfect Real- Time Decisions - Text Analysis and Mining: Language Models - Text Classification - Information Retrieval - Information Extraction - Syntactic Processing - Speech Recognition.

Unit- V

Logic in Artificial Intelligence: First Order Logic: First Order Logic – Prolog: Logic Programming: Symbolic Logic, Clausal Form - Converting English to Prolog Facts and Rules - Prolog Terminology - Variables and Arithmetic Operators - Inference Process of Prolog - Trends InMachine Learning: Artificial Intelligence versus Machine Learning- Artificial Immune System.

Text Books

S. No	Authors	Title of the Book	Publishers	Year and Edition
1	Lavika Goel	Artificial Intelligence Concepts and applications	Wiley India	2021, 1st Edition

Reference Books

S. No	Authors	Title of the Book	Publishers	Year and Edition
1	Lyla B. Das Sudhish N. George Anup Aprem	Artificial Intelligence And Machine Learning Theory and Practice	IK International Pvt. Ltd	2023, 1st Edition
2	Mariusz Flasinski	Introduction to Artificial Intelligence	Springer International	2018, 2nd Edition
3	Stuart J. Russell Peter Norvig	Artificial Intelligence A Modern Approach	Pearson	2015, 3rd Edition

COURSE NUMBER	COURSE NAME	CATEGORY	L	T	P	CREDIT
NM21CS1	CYBER SECURITY I	THEORY	30	-	-	GRADE

Preamble

- *This course introduces fundamental concepts of Cyber Security in the digital era. It provides the knowledge of cybercrimes, cyber laws and also the security of digital devices. It helps to do secure digital transactions and safe usage of social media.*

CYBER SECURITY I   **30 Hrs.**
Syllabus

Unit I   **6 Hrs**

Principles of Cyber security: Introduction to Cyber security - Defining cyberspace - Architecture of cyberspace - Communication and web technology - Internet infrastructure for data transfer and governance - Regulation of cyber space - Concept of Cyber security - Issue and challenges of cyber security.

Unit II   **6 Hrs**

Cyber Crime: Introduction to Cybercrime - Classification of Cyber-crimes – Cyber-crime against women and children – Financial frauds - Social engineering attacks – Malware - Zero day and zero click attacks.

Unit III   **6 Hrs**

Cyber Law: Cyber Criminals modus-operandi – Reporting of cybercrimes – remedial and mitigation measures – Legal perspective of cybercrime– IT Act 2000 and its amendments – Organization dealing with cybercrimes and cyber security in India.

Unit IV   **6 Hrs**

Social Media Security: Introduction to social network – Types of social media – Social media platform – Hashtag – Viral content – Security issues related to social media. – **Cyber Security tools:** N map – Introduction to Nmap – Nmap scan types- Nmap command list.

Digital Transaction: Introduction to digital payments – Components of digital payments – Modes of digital payments – Banking cards – UPI (Unified Payment Interface) – e-Wallets. (Aligned 90% with UGC)

Unit V   **6 Hrs**

Digital Devices Security: End point device and Mobile phone security – Password policy – Security patch management – Data backup – Device security policy – Cyber security best practices. Installation and configurtion of Computer Anti-Virus.

Case studies: Illustrations of Financial frauds – Digital Signature. Prepare a checklist for secure net banking

Reference books:

1. Raef Meeuwisse , Cybersecurity For Beginners, Lulu Publishing Services,2nd Edition, 2017

2. Scott Augenbaum, The Secret to Cybersecurity-A Simple Plan to Protect Your Family and Business from Cybercrime , Forefront Books Publisher, 2019

3. Sumit Belapure and Nina GodBole, Cyber security understanding cyber crimes computer forensics and Legal perspectives, Wiley India Pvt Ltd, 2011

4. Christopher Hadnagy, Social Engineering: The Science of Human Hacking,Wiley Publisher, 2nd Edition, 2018

5. Pavan Duggal, Artificial Intelligence, Cybercrimes & Cyberlaw, 2018

6. Joe Gray, Practical Social Engineering: A Primer for the Ethical Hacker, 2022 Security in the digital age: social media security threads and vulnerabilities by Henry A. Oliver, Create Space Independence publishing platform.

COURSE CODE	COURSE TITLE	CATEGORY	L	T	P	CREDIT
CY23C13	MALWARE ANALYSIS	THEORY	73	2	-	5

Preamble

The course is designed to provide a foundational understanding of how malware operates, the threats it poses, and the methodologies used to analyze and mitigate its impact in a real-world cyber security context.

Course Learning Outcomes

On the successful completion of the course, students will be able to:

CLO Number	CLO Statement	Knowledge Level
CLO1	Recall about the process of malware analysis, including both static and dynamic techniques.	K1
CLO2	Understand the fundamental concepts of malware and its various types.	K2
CLO3	Apply the various tools for malware prevention, detection, and mitigation.	K3
CLO4	Analyze the functions of malicious windows programs, Malware Behavior and Malware Focused Network Signatures	K4

Mapping with Programme Learning Outcomes

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5
CLO1	S	M	S	S	S
CLO2	S	S	M	S	M
CLO3	S	S	S	M	M
CLO4	S	S	S	M	S

S- Strong; M-Medium

Malware Analysis - CY23C13   (73 Hrs)

Syllabus

UNIT I   [15 Hrs]

Basic Static Techniques- Antivirus Scanning- Hashing: A Fingerprint for Malware- Finding Strings- Packed and Obfuscated Malware- Portable Executable File Format- Linked Libraries and Functions – The PE File Headers and Sections- Malware Analysis In Virtual Machines.

UNIT II [14 Hrs]

Basic Dynamic Analysis- Sandboxes: The Quick-and-Dirty Approach - Running Malware - Monitoring with Process Monitor - Viewing Processes with Process Explorer - Faking a Network - Packet Sniffing with Wireshark - Using INetSim -Advanced Static Analysis: X86 Disassembly- Levels of Abstraction- Reverse Engineering- The x86 Architecture-

UNIT III [15 Hrs]

IDA PRO- Loading an Executable- the IDA Pro Interface- Using Cross-References - Analyzing Functions- Enhancing Disassembly- Extending IDA with Plug-ins- Analyzing Malicious Windows Programs- The Windows API - The Windows Registry- Networking APIs

UNIT IV [14 Hrs]

Advanced Dynamic Analysis- Debugging- Ollydbg- Malware Functionality- Malware Behavior- Covert malware launching: Process Injection- Hook Injection

UNIT V [15 Hrs]

Malware Focused Network Signatures- Anti Reverse Engineering: Anti-Disassembly- Anti Debugging: Windows Debugger Detection- Identifying Debugger Behavior- Interfering with Debugger Functionality- Debugger Vulnerabilities

Text Book

S.No	Authors	Title	Publishers	Year and Edition
1	Michael Sikorski, Andrew Honig	Practical Malware Analysis-The Hands on Guide to Dissecting Malicious Software	William Pollock No Starch Press	2012, 2nd Edn.

Books for Reference

S.No	Authors	Title	Publishers	Year and Edition
1	Michael Hale Ligh, Steven Adair, Blake Hartstein, Matthew Richard	Malware Analyst's Cookbook Tools and Techniques for fighting malicious code	Wiley Publishing Inc,	2011, 1st Edn.
2	Victor Marak	Windows Malware Analysis Essentials	Packt Publishing	2015, 1st Edn.

Pedagogy

- Chalk and Talk PPT, Discussion, Assignment, Demo, Quiz, Case study

COURSE CODE	COURSE TITLE	CATEGORY	L	T	P	CREDIT
CY23C14	DIGITAL FORENSICS	THEORY	73	2	-	5

Preamble

The course covers clear understanding of how digital evidence complements traditional scientific evidence and how it can be used more effectively in a range of criminal investigations.

Course Learning Outcomes

On the successful completion of the course, students will be able to

CLO Number	CLO Statement	Knowledge Level
CLO1	Recall the digital devices and their evaluation, technology	K1
CLO2	Understand the handling of devices	K2
CLO3	Apply the principles for evidence creation and interpretation	K3
CLO4	Analyze the mobile devices, online crime and a case study	K4

Mapping with Programme Learning Outcomes

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5
CLO1	S	S	S	M	S
CLO2	S	S	M	S	M
CLO3	M	S	S	S	S
CLO4	S	M	S	S	S

S- Strong; M-Medium

Digital Forensics - CY23C14   73 Hrs

Syllabus

UNIT I   [15 Hrs]

Introduction-Key developments-Digital devices in society-Technology and culture- Evidential Potential of Digital Devices- Closed vs. open systems-Evaluating digital evidence potential.

UNIT II   [14 Hrs]

Device Handling-Seizure issues-Device identification- Device identification -Contamination.

UNIT III   [15 Hrs}

Examination Principles-Previewing-Imaging-Continuity and hashing-Evidence locations. Evidence Creation -A

seven-element security model-A developmental model of digital systems - Knowing Unknowing-Audit and logs. Evidence Interpretation-Data content- Data context.

UNIT IV [14 Hrs]

Mobile Devices - Mobile phones and PDAs – GPS - Other personal technology.

UNIT V [15 Hrs]

Intelligence-Device usage-Profiling and cyber profiling-Evaluating online crime: automating the model Application of the formula to case studies-From success estimates to profiling-Case Studies and Examples – Introduction - Copyright violation-Missing person and murder-The view of a defense witness.

Text Book

S. No	Author	Title of the Book	Publisher	Year and Edition
1	Angus M. Marshall	Digital Forensics-Digital Evidence in Criminal Investigation	Wiley	2008, 1st Edn.

Reference Books

S. No	Author	Title of the Book	Publisher	Year and Edition
1	Eamon P. Doherty	Digital Forensics for Handheld Devices	CRC Press Taylor & Francis	2021, 1st Edn
2	Nilakshi Jain, Dhananjay R. Kalbande	Digital Forensic: The Fascinating World of Digital Evidences	Wiley	2016, 1st Edn

COURSE CODE	COURSE TITLE	CATEGORY	L	T	P	CREDIT
CY23E03	IoT and SECURITY	THEORY	73	2	-	4

Preamble

This course has been designed to introduce the concepts and techniques of IoT and Security. It also emphasizes various principles, algorithms, and applications of IoT and its Security.

Course Learning Outcomes

On the successful completion of the course, students will be able to

CLO Number	CLO Statement	Knowledge Level
CLO1	Recall the fundamentals of IoT Concepts.	K1
CLO2	Understand the features of IoT to apply on real world problems	K2
CLO3	Apply various Protocols on application of IoT	K3
CLO4	Analyze the concepts of security functions	K4

Mapping with Programme Learning Outcomes

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5
CLO1	S	M	S	M	S
CLO2	S	S	S	M	S
CLO3	S	S	M	S	S
CLO4	S	S	M	M	S

S- Strong; M-Medium

IoT and Security - CY23E03   **73 Hrs**

UNIT I   **[15 Hrs]**

Preliminaries, Motivation, and Related Work: What is the Internet of Things -Wireless Ad-hoc and Sensor Networks - IoT Enabled Applications **-**Home and building automation-Smart cities -Smart Grids Industrial IoT - Smart Farming. Standards: Physical/ Link Layer: IEEE 802.3 (Ethernet) - IEEE 802.11. Network Layer: IP$v6$ and IPv4 - Transport Layer: TCP and UDP .Application Layer: HTTP – AMQP -SIP .The Internet of Things: Designing the Architecture of an IP-based Internet of Things – Physical/Link Layer – IEEE 802.15.4 and ZigBee-Low-Power Wi-Fi – Bluetooth and BLE -Power line Communications -Network Layer – The 6LoWPAN Adaptation Layer -Transport Layer - Application Layer - CoAP - CoSIP Protocol Specification - The Industrial IoT.

UNIT II   **[15 Hrs]**

Applications in the IoT-The Verticals :Cloud Based Solutions- REST Architectures :The Web of Things-Richardson Maturity Model – Level 0 : the Swamp of POX – Level 1: Resources -Level 2 : HTTP Verbs Level 3 : Hypermedia – The Meaning of Levels .The Web of Things - Messaging Queues and Publish / Subscribe Communications: - session Initiation for the IoT- Performance Evaluation – Optimized Communications :the Dual Network Management Protocol -DNMP Motivations – The DNMP Protocol – Implementation with IEEE802.15.4- and IEEE 802.11s- Performance Evaluation .

UNIT III   **[15 Hrs]**

Discoverability: Service and Resource Discovery- Local and Large – scale Service Discovery -Scalable and Self-Configuring Architecture for Service Discovery in IoT- Lightweight Service Discovery in Low Power IoT Networks.

UNIT IV   **[15 Hrs]**

Security and Privacy in IoT: Security Issues in IoT -Security Mechanisms Overview – Privacy Issues in IoT.

UNIT V   **[13 Hrs]**

Cloud and Fog Computing for the IoT :Cloud Computing – Big data Processing Pattern - Big Stream - Big Stream Oriented Architecture – Implementation – Performance Evaluation -Big Stream and Security- Graph Based Cloud Security .The IoT in Practice: Hardware for the IoT – Hardware Platforms: Arduino- Raspberry Pi. Software for the IoT- OpenWSN- Free RTOS-TI-RTOS

Text Book

S.No.	Authors	Title	Publishers	Year & Edition
1	Simone Cirani, Gianluigi Ferrari,Marco Picone, Luca Veltri	Internet of Things Architectures, Protocols and Standards	Wiley	2019, 1st Edn

Books for Reference

S.No.	Author	Title	Publishers	Year & Edition
1	Raj Kamal	Internet Of Things : Architecture and Design Principles	Tata McGraw-Hill, New Delhi	2022, 1st Edn
2	Arsheep Bahga , Vijay Madisetti	Internet of Things – A hands on Approach	Orient Blackswan Private Limited, New Delhi	2015, 1st Edn

COURSE CODE	COURSE TITLE	CATEGORY	L	T	P	CREDIT
CY23E04	BLOCKCHAIN AND CRYPTOGRAPHY	THEORY	73	2	-	4

Preamble

This course has been designed to introduce the concepts and techniques of Cryptography and Block chain. It also emphasizes various principles, algorithms, and applications of Cryptography and Block chain

Course Learning Outcomes

CO Number	CLO Statement	Knowledge Level
CLO1	Recall the fundamentals of Cryptography and Block chain Concepts.	K1
CLO2	Understand the features of Cryptography and Block chain to apply on real world problems	K2
CLO3	Apply various algorithms of Cryptography and Block chain	K3
CLO4	Analyze the concepts of Cryptography and Block chain functions	K4

Mapping with Programme Learning Outcomes

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5
CLO1	S	M	S	M	S
CLO2	S	S	S	M	S
CLO3	S	S	M	S	S
CLO4	S	S	M	M	S

S - Strong; M - Medium

Blockchain and Cryptography – CY23E04   **73 Hrs**
Syllabus

UNIT I   **[14 Hrs]**

Introduction: Security trends, The OSI Security Architecture, Security Attacks, Security Services and Security Mechanisms, A model for Network security. Classical Encryption Techniques: Symmetric Cipher Modes, Substitute Techniques, Transposition Techniques, Rotor Machines, Stenography

UNIT II   **[15 Hrs]**

Block Cipher and Data Encryption Standards: Block Cipher Principles, Data Encryption Standards, the Strength of DES, Differential and Linear Crypt Analysis, Block Cipher Design Principles. Advanced Encryption Standards: Evaluation Criteria for AES, the AES Cipher. More on Symmetric Ciphers: Multiple Encryption,

Triple DES, Block Cipher Modes of Operation, Stream Cipher and RC4.

UNIT III [15 Hrs]

Fundamentals of Block Chain: Introduction - Origin of Block chain - Block chain Solution - Components of Block chain - Block in Block chain - The Technology and the Future. Blockchain Types And Consensus Mechanism Introduction - Decentralization and Distribution - Types of Block chain –Consensus Protocol. Cryptocurrency. Bitcoin, Altcoin and Token: Introduction - Bitcoin and Cryptocurrency Basics - Types of Cryptocurrency - Cryptocurrency Usage.

UNIT IV [15 Hrs]

Public And Private Blockchain System: Introduction - Public Block chain - Popular Public Block chains - The Bitcoin Clock chain – Etherum Block chain Introduction - Key Characteristics of Private Block chain - Why We Need Private Block chain - Private Block chain Examples - Private Block chain and Open Source- E-Commerce Site Examples - Various Commands in E-Commerce Block chain - Smart Contract in Private Environment - State Machine - Different Algorithms of Permissioned Block chain - Byzantine Fault – Multichain.

UNIT V [14 Hrs]

Security in Blockchain: Introduction - Security Aspects in Bitcoin - Security and Privacy Challenges of Block chain in General - Performance and Scalability - Identity Management and Authentication - Regularity Compliance and Assurance – Safeguarding.

Text Books

S.No	Authors	Title of the Book	Publishers	Year and Edition
1	Jean Philippe Aumasson	Serious Cryptography: A Practical Introduction to Modern Encryption	NO starch press	2023, 2nd Edition
2	Nigel Smart	Cryptography Made Simple (Information Security and Cryptography)	Springer Heidelberg Dordrecht, London Newyork	2016, 1st Edition
3	Kumar Saurabh, Ashutosh Saxena	Block Chain Technology and its Applications	Wiley	2020, 1st Edition
4	Imran Bashir	Mastering Block chain: Inner workings of block chain, from cryptography and decentralized identities, to DeFi, NFTs and Web3	Packt Publishing	2025, 4th Edition
5	NickVyas, Aljosja Beije and Bhaskar Krishnamachari	Block chain and the Supply Chain: Concepts, Strategies and Practical Applications	Kogan Page	2025. 2nd Edition

Books for Reference

S.No	Authors	Title of the Book	Publishers	Year and Edition
1	Johannes Buchmann	Introduction to Cryptography	Springer Heidelberg Dordrecht, London Newyork	2005, 2nd Edn
2	Christof Paar, Jan PelZl	Understanding Cryptography	Springer Heidelberg Dordrecht, London Newyork.	2010, 2nd Edn
3	Bud Johnson	Break the Code: Cryptography for Beginners	Jenifer Bredy	2023, 2nd Edition
4	Chandramouli Subramanian Asha A George Abhilash K A , Meena Karthikeyan	Block chain Technology	Universitlos Press	2020, 2nd Edn

COURSE CODE	COURSE TITLE	CATEGORY	L	T	P	CREDIT
CY23CP6	MALWARE ANALYSIS LAB	PRACTICAL	-	-	75	2

Preamble

The course is designed to provide a foundational understanding of the techniques, tools, and methodologies used to analyze malware samples.

Course Learning Outcomes

On the successful completion of the course, students will be able to

CLO Number	CLO Statement	Knowledge Level
CLO1	Recall static and dynamic analysis approaches for dissecting and understanding malware behavior.	K1
CLO2	Understand the techniques, tools, and methodologies.	K2
CLO3	Apply the various tools for malware prevention, detection, and mitigation.	K3
CLO4	Analyze static analysis using tools like hex editors, disassemblers, and decompilers to extract meaningful information from malware binaries	K4

Mapping with Programme Learning Outcomes

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5
CLO1	S	M	S	S	S
CLO2	S	S	M	S	M
CLO3	S	S	S	M	M
CLO4	S	S	S	M	S

S- Strong; M-Medium

Malware Analysis Lab - CY23CP6

List of Programs

•   File Hashing Basics

•   Finding Strings in a File

•   Basic Disassembly in IDA Freeware

•   Basic Function Analysis

•   Identifying Windows API Calls

- Registry Interaction Analysis

- Simple Debugging with OllyDbg

- Process Monitoring

- Observing Anti-Debugging Behavior

- Virtual Machine Detection

COURSE CODE	COURSE TITLE	CATEGORY	L	T	P	CREDIT
CY23SBP2	**DIGITAL FORENSICS LAB**	**PRACTICAL**	-	4	41	3

Preamble

The course is designed to understand how to recover and analyze digital evidence from various platforms.

Course Learning Outcomes

On the successful completion of the course, students will be able to

CLO Number	CLO Statement	Knowledge Level
CLO1	Recall digital devices and their evaluation, technology.	K1
CLO2	Understand the principles, processes, and importance of digital forensics in cybersecurity and legal investigations.	K2
CLO3	Apply industry-standard tools to investigate digital evidence effectively.	K3
CLO4	Analyze volatile memory and network traffic to identify malicious activities and potential evidence.	K4

Mapping with Programme Learning Outcomes

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5
CLO1	S	M	S	S	S
CLO2	S	S	M	S	M
CLO3	S	S	S	M	M
CLO4	S	S	S	M	S

S- Strong; M-Medium

Digital Forensics Lab - CY23SBP2

List of Programs

- Recognizing Digital Devices as Evidence
- Understanding Closed vs. Open Systems
- Simulating Safe Device Handling
- Identifying Networked Devices in a Home Setup
- Hashing Basics
- Viewing System Logs
- Creating a Simple Security Model for Evidence Handling
- Accessing and Identifying Data on a Mobile Device
- Tracking a Simple GPS Location

- Building a Simple Cyber Profile from Device Usage

COURSE CODE	COURSE TITLE	CATEGORY	L	T	P	CREDIT
CY23AC3	BIG DATA ANALYTICS	THEORY	-	-	-	5

Preamble

This Course deals with the Basics of Big Data and Hadoop architecture. It deals with working of Map Reduce and Query Model of NoSQL Databases. It also includes the Advantages of MongoDB

Syllabus

UNIT I

Overview of Big Data: Defining Big Data - Big Data Types – Big Data Analytics – Industry Examples of Big Data - Big Data and Data Risk – Big Data Technologies – Benefits of Big Data.

UNIT II

Basics of Hadoop: Big Data and Hadoop – Hadoop Architecture – Main Components of Hadoop Framework – Analyzing Big Data with Hadoop – Benefits of Distributed Applications – Hadoop Distributed File System – Advantages of Hadoop – Ten Big Hadoop Platforms.

UNIT III

Map Reduce: Introduction to MapReduce –Working of MapReduce – Map operations – MapReduce User Interfaces.

UNIT IV

NoSQL Databases: NoSQL Data Management – Types of NoSQL Databases – Query Model for Big Data – Benefits of NoSQL – MongoDB – Advantages of MongoDB over RDBMS – Replication in MongoDB.

UNIT V

HBase, CASSANDRA and JAQL: Introduction to HBase – Row-oriented and Column- oriented Data Stores – HDFS Vs HBase – Hbase Architecture – HBase Data Model – Introduction to Cassandra – Features of Cassandra. Introduction to JAQL – JSON – Components of JAQL.

Text Book

S. No	Author	Title of the Book	Publisher	Year and Edition
1	V.K. Jain	Big Data and Hadoop	Khanna Book Publishing	2017, 1st Edn

Reference Books

S. No	Author	Title of the Book	Publisher	Year and Edition

1	Frank J Ohlhorst	Big Data Analytics: Turning Big Data into Big Money	Wiley and SAS Business Series	2012, 1st Edn
2	Anand Rajaraman, Jeffrey David Ullman	Mining of Massive Datasets	Cambridge University Press	2012, 1st Edn

COURSE CODE	COURSE TITLE	CATEGORY	L	T	P	CREDIT
CY23E04	**BLOCKCHAIN AND CRYPTOGRAPHY**	**THEORY**	**73**	**2**	**-**	**4**

Preamble

Provides a fundamental issue in network protocol design and implementation with the principles underlying TCP/IP protocol design; historical development of the Internet Protocol Version-6; IPv6 and IP network migrations and applications

Syllabus

UNIT I

Internet and the Networking Protocols: Historical Development - OSI Model - Internet IP / UDP / TCP – IPv4 Addressing Review.

UNIT II

Next Generation Internet Protocol: Internet Protocol Version 6 (IPv6) - History of IPv6 - IPv6 Header Format - Problems with IPv4 - Features of IPv6 - IPv6 Addressing format and Types. ICMPv6 – Features - General Message Format - ICMP Error & Informational Message types - Neighbor Discovery- Path MTU Discovery

UNIT III

Security and Quality of Service in IPv6: Types of Threats - Security Techniques- IPSEC Framework - QoS in IPv6 Protocols

UNIT IV

Routing with IPv6: Routing in the Internet and CIDR – Multicasting - Unidirectional Link Routing - RIPng OSPF for IPv6 - PIM-SM & DVMRP for IPv6.

UNIT V

IPv4 / IPv6 Transition Mechanisms: Tunneling - Automatic Tunneling - Configured tunneling - Dual Stack Translation- Migration Strategies for Telcos and ISPs.

Text Book

S. No	Author	Title	Publisher	Year and Edition
1	Silvia Hagen	IPv6 Essentials	O'Reilly Media	2014, 3rd Edn
2	Joseph Davies	Understanding IPv6	Microsoft Press	2012, 1st Edn
3	Stephen A. Thomas	IPng and the TCP/IP protocols	John Wiley & Sons edition	2016, 1st Edn

Reference Books

S. No	Author	Title of the Book	Publisher	Year and Edition
1	Douglas E Comer	Internetworking with TCP/IP Volume One	Pearson India	2015, 6th Edition
2	Rick Graziani	IPv6 Fundamentals: A Straightforward Approach to Understanding IPv6	Cisco Press	2012, 1st Edition