



**DEPARTMENT OF COMPUTER SCIENCE WITH
CYBER SECURITY**

**CHOICE BASED CREDIT SYSTEM (CBCS)
&
LEARNING OUTCOMES BASED CURRICULUM FRAMEWORK (LOCF)**

B.Sc. COMPUTER SCIENCE WITH CYBER SECURITY

2025-2028 BATCH

PROGRAMME LEARNING OUTCOMES (PLO's)

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/computer forensics 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



B.Sc. Computer Science with Cyber Security
Choice Based Credit System (CBCS)
Learning Outcomes Based Curriculum Framework (LOCF)
Syllabus & Scheme of Examination
2025-2028 Batch
Semester I

Semester	Part	Course Code	Title of the Course	Course Type	Instruction Hours / Week	Contact Hours	Tutorial Hours	Duration of Examination	Examination Marks			Credits
									CA	ESE	Total	
I	I	TAM2501A/ HIN2501A/ FRE2501A	Tamil Paper I/ Hindi Paper I/ French Paper I	L	4	58	2	3	25	75	100	3
I	II	ENG2501A	English Paper I	E	4	58	2	3	25	75	100	3
I	III	CY25C01	Programming in C	CC	4	58	2	3	25	75	100	3
I	III	PP22C02	Computational and Algorithmic Thinking for Problem Solving	CC	3	45	-	-	100	-	100	3
I	III	CY24C03	IT Fundamentals for Cyber Security	CC	4	58	2	3	25	75	100	3
I	III	TH24A03	Numerical and Statistical Techniques	GE	6	88	2	3	25	75	100	5
I	III	CY24CP1	C Programming and Cyber Security Tools Lab	CC	3	45	-	3	15*	35*	50	2
I	IV	NME25B1 / NME25A1	Basic Tamil I / Advanced Tamil I	AEC	2	28	2	-	100	-	100	2
I	IV	NME23ES	Introduction to Entrepreneurship	AEC	2	30	-	-	100	-	100	
I-II	VI	NM25GAW	General Awareness	AECC	SS	-	-	-	100	-	100	Gr.

I-II	VI	COM25SER	Community Services 30 Hours	GC	-	-	-	-	-	-	-	-
I -V	VI	24BONL1 24BONL2 24BONL3	Online Course I Online Course II Online Course III	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	
II	I	TAM2502A/ HIN2502A/ FRE2502A	Tamil Paper II/ Hindi Paper II/ French Paper II	L	4	58	2	3	25	75	100	3
II	II	ENG2502A	English Paper II	E	4	58	2	3	25	75	100	3
II	III	IN24C04	Python Programming	CC	5	73	2	3	25	75	100	3
II	III	CY24C05	Operating systems and Security	CC	4	58	2	3	25	75	100	3
II	III	CY24CP2	Python Programming and OS Security Lab	CC	5	75	-	3	15 [#]	35 [#]	50 [#]	3
II	III	TH24A12	Number Theory and Algebra	GE	6	88	2	3	25	75	100	5
II	IV	NM25UHR	Universal Human Values and Human Rights	AECC	2	30	-	-	100	-	100	2
II	IV	NME25B2 / NME25A2	Basic Tamil II / Advanced Tamil II	AEC	-	-	-	-	100	-	100	Gr
II	VI	NM25GAW	General Awareness	AECC	SS	-	-	-	100	-	100	Gr
I-II	VI	COM25SER	Community Services - 30 Hrs	GC	-	-	-	-	-	-	-	-
I -V	VI	24BONL1 24BONL2 24BONL3	Online Course I Online Course II Online Course III	ACC	-	-	-	-	-	-	-	-

Semester III

Semester	Part	Course Code	Title of the Course	Course Type	Instruction hours	Contact hours	Tutorial Hours	Duration of Examination	Examination Marks			Credits
									CA	ESE	Total	
III	I	TAM2303 A/ HIN2303 A/ FRE2303 A	Tamil Paper III/ Hindi Paper III/ French Paper III	L	4	58	2	3	25	75	100	3
III	II	ENG2403A	English Paper III	E	4	58	2	3	25	75	100	3
III	III	CY23C06	Computer Networks and Security	CC	4	58	2	3	25	75	100	3
III	III	CY24C07	Database Management System	CC	4	58	2	3	25	75	100	3
III	III	CY24CP3	Database Management System Lab	CC	5	75	-	3	15*	35*	50	3
III	III	CS23SBGP	Gen AI	SEC	3	44	1	-	100	-	100	3
III	III	TH24A20	Optimization Techniques	GE	4	58	2	3	25	75	100	3
III	IV	NM23DTG	Design Thinking	AE C	2	30	-	-	100	-	100	2
III	IV	NM25HAW	Health and Wellness	VA C	SS	-	-	-	100 *	-	100	1
I – V	VI	24BONL1 24BONL2 24BONL3	Online Course I Online Course II Online Course III	AC C	-	-	-	-		-	-	-

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

CC: Core Courses
GE: Generic Elective

CA: Continuous Assessment
ESE: End

Semester Examination

SS: Self Study

AEC: Ability Enhancement Course

AECC: Ability Enhancement Compulsory Course

ACC: Additional Credit Course

GC: Gene Course

Evaluation Pattern 25-28 Batch onwards

CA Question Paper Pattern and distribution of marks

UG Language and English

Section A	5 x 1 (No choice)	:	5 Marks
Section B	4 x 5 (4 out of 6)	:	20 Marks (250 words)
Section C	2 x 10 (2 out of 3)	:	20 Marks (500 words)
Total		:	45 Marks

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 End Semester Examination – Question Paper Pattern and Distribution of Marks

Language and English – UG

Section A	10 x 1 (10 out of 12)	:	10 Marks
Section B	5 x 5 (5 out of 7)	:	25 Marks (250 words)
Section A	4 x 10 (4 out of 6)	:	40 Marks (600 - 700 words)
Total		:	75 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

Continuous Internal Assessment

Pattern Theory

I Year UG / PG

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.

Part IV

Introduction to Entrepreneurship

Quiz	:	50 marks
Assignment	:	25marks
Project / Case study	:	25 marks
Total	:	100 Marks

COURSE	PROGRAMME OUTCOMES				
	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5
CY25C01					
CLOs	PLO1	PLO2	PLO3	PLO4	PLO5
CLO1	S	S	S	S	S
CLO2	S	S	M	S	M
CLO3	S	S	S	S	S
CLO4	S	S	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
CY24C03					
CLO1	S	M	S	S	M
CLO2	S	S	S	S	M
CLO3	S	M	M	S	S
CLO4	S	M	S	S	S
CY24CP1					
CLO1	S	S	M	S	M
CLO2	S	S	S	S	S
CLO3	S	S	S	S	M
CLO4	S	S	M	S	S

IN24C04					
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

CY24C05					
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	S	M	S

CY24CP2					
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

CY23C06					
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

CY24C07					
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

CY24CP3

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

CS23SBGP

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

COURSE CODE	COURSE TITLE	CATEGORY	L	T	P	CREDIT
CY25C01	PROGRAMMING IN C	THEORY	58	2	-	3

Preamble

This course introduces fundamental programming constructs in C. It covers the concepts such as arrays, functions, structures, pointers and file handling. It provides comprehensive coverage on industry 4.0.

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 and Industry 4.0 technologies	K1
CLO2	Understand the purpose 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	S
CLO2	S	S	M	S	M
CLO3	S	S	S	S	S
CLO4	S	S	S	S	S

S- Strong; M-Medium

PROGRAMMING IN C – CY25C01

58 Hrs.

Syllabus

Unit I

12 Hrs

Overview of C - Constants, Variables and Data types - Operators and Expressions - Managing Input and Output Operations -**Sulba Sutras-Decision Making and Branching - Decision Making and Looping.**

Unit II

12 Hrs

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

Unit III

12 Hrs

Chandas -User-Defined Functions: Need - Return Values and Types - Function Calls - Function

declaration - Category of Functions - No Arguments and No Return Values - Arguments but No Return Values - Arguments with Return Values - Recursion - Scope Visibility and Life time of Variables
Structures and Unions - Definition: Structure Initialization - Comparison of Structure Variables - Arrays of Structures - Arrays within Structures - Unions.

Unit IV

12 Hrs

Pointers: Understanding Pointers - Accessing the Address of a Variable - Declaring and Initializing Pointers - Accessing a Variable through its Pointers - **Pointers and Arrays**. File Management in C: Defining and Opening a File - Closing File - **I/O Operations on Files** - Dynamic Memory allocation MALLOC, CALLOC, REALLOC.

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

S. No	Author	Title of the Book	Publisher	Year and Edition
1	E.Balagurusamy	Programming In ANSI C	Tata Mc Graw Hill	2019, 8 th Edn
2	P. Kaliraj, T. Devi	Higher Education for Industry 4.0 and Transformation to Education 5.0	CRC Press - Taylor & Francis Group	2021, 1 st Edn

Reference Books

S. No	Author	Title of the Book	Publisher	Year and Edition
1	Byron Gottfried	Programming with C	Tata McGraw Hill	2018, 4 th Edn
2	Yashwvant Kanetkar	Let Us C: Authentic Guide To C Programming Language	BPB Publications	2020, 17 th Edn

Pedagogy

- Lectures, Group discussions, Demonstrations

Course Designer

Dr. Sabitha Banu A

COURSE CODE	COURSE TITLE	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

COMPUTATIONAL AND ALGORITHMIC THINKING FOR PROBLEM SOLVING- PP22C02

Syllabus

45 Hrs.

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 and Edition
1	David Riley and Kenny Hunt	Computational Thinking for Modern Solver	Chapman & Hall/CRC	2014, 1 st Edn
2	Paolo Ferragina, Fabrizio Luccio	Computational Thinking First Algorithms	Springer	2018, 1 st Edn
3	Karl Beecher	Computational Thinking – A beginner's guide to problem solving	BSC publication	2017, 1 st Edn

Pedagogy

- Lectures, Group discussions, Demonstrations, Case studies

Evaluation Pattern

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

Course Designer

Mrs. P. Yashodha

COURSE CODE	COURSE TITLE	CATEGORY	L	T	P	CREDIT
CY24C03	IT FUNDAMENTALS FOR CYBER SECURITY	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

IT FUNDAMENTALS FOR CYBER SECURITY – CY24C03

Syllabus

58 Hrs.

Unit I

12 Hrs

Introduction: Generations of Computer, **Types of Computer** - Functional units of a computer system- **Input Devices -Output devices – Memory – Storage Devices**. Number Systems: Decimal, Binary, Octal and Hexadecimal – Conversion –Computer Codes- Binary Addition, Subtraction- Complements.

Unit II

12 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 III**12 Hrs**

Introduction to Cyber Security: Basic Cyber Security Concepts, layers of security, Vulnerability, threat, Harmful acts, 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-Types of Threats**

Unit IV**12 Hrs**

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

Unit V**10 Hrs**

Cybercrime: Definition and Origin of the World-Cybercrime and Information Security- Cyber Criminals –Classification of Cybercrimes- Methods of defense, Security Models, risk management, Cyber Threats- **Cyber Warfare, Cyber Crime, Cyber terrorism, Cyber Espionage.**

Text Books

S. No	Author	Title of the Book	Publishers	Year and Edition
1	P K Sinha&PritiSinha	Computer Fundamentals	BPB Publications	2017, 6 th Edn
2	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, 1 st Edn
3	Nina Godbole, Sumit Belapure	Cyber Security: Understanding Cyber Crimes,Computer Forensics and Legal Perspectives,	Wiley	2011, 1 st Edn

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, 1 st Edn
2	George K. Kostopoulous	Cyber Space and Cyber Security	CRC Press	2013, 1 st 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
CY24CP1	C PROGRAMMING AND CYBER SECURITY TOOLS LAB	PRACTICAL	-	-	45	2

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 and construction of C code. The course involved in compiling, linking and debugging C code and developing some complex programs. The course gives hands-on experience on Cyber Security tools.

Course Learning 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 cyber security tools and 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	S	S
CLO3	S	S	S	S	M
CLO4	S	S	M	S	S

S- Strong; M-Medium

C PROGRAMMING AND CYBER SECURITY TOOLS LAB- CY24CP1

45 Hrs.

Programs 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 Structure.
- Exercise in Pointers.
- 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.

Pedagogy

- Demonstration of working environment / Tools / Software / Program

Course Designer

Dr. R. Divya

COURSE CODE	COURSE TITLE	CATEGORY	L	T	P	CREDIT
IN24C04	PYTHON PROGRAMMING	THEORY	73	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 concepts from IKS 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

Python Programming - IN24C04

73 Hrs

Syllabus

UNIT I

(14 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

(15 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 – Panini's Ashtadhyayi, Anitya - Dictionaries-Tuples and Immutable Truths-Sutras-Files.

UNIT III**(15 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)**

Files and Exception handling: Files -Text Files, File Objects, File Built-in Methods, File Built-in Attributes, Standard Files, Reading and writing, Format operator, Filenames and Paths, Pipes.
 Exceptions: Built-in Exceptions, Handling Exceptions, Exception with Arguments- Nyaya Logic- User-Defined Exceptions.

UNIT V**(15 Hrs)**

Modules and Packages: Modules - Modules and Files, Namespaces, Importing Modules, Importing Module Attributes, Module Built-in Functions. Python packages- Simple programs using the built-in functions of packages matplotlib, numpy, pandas. GUI Programming - Tkinter introduction, Buttons and callbacks, Canvas widgets, Coordinate sequences, Tk Widgets, Menus and Callables.

Text Books

S. No	Author	Title of the Book	Publisher	Year and Edition
1	Mark Lutz	Learning python(Unit I-III)	O'Reilly Publication	2013, 5 th Edn
2	Allen B. Downey	Think Python: How to Think like a Computer Scientist(Unit IV-V)	O'Reilly Publishers,	2016 , 2nd Edn
3	Kapil Kapoor	Indian Knowledge System	Indian Institute of Advanced Study	2005, 1 st Edn

Reference Books

S.No	Authors	Title	Publishers	Year and Edition
1	E. Balagurusamy	Problem Solving and Python Programming	McGraw-Hill	2017, 1 st Edn
2	Guido van Rossum and Fred L. Drake Jr	An Introduction to Python – Revised and updated for Python 3.2	Python Software Foundation, Network Theory Ltd	2011, 1 st Edn
3	Wesley J Chun	Core Python Applications Programming	Prentice Hall	2012, 3 rd Edn

Pedagogy

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

COURSE CODE	COURSE TITLE	CATEGORY	L	T	P	CREDIT
CY24C05	OPERATING SYSTEMS AND SECURITY	THEORY	58	2	-	3

Preamble

To provide a discussion of the fundamentals of operating system design and to relate these to contemporary design issues and to current directions in the development of operating systems Security.

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 basic concepts of operating system and its Security	K1
CLO2	Understand the operating systems objectives and functionality along with system programs and system calls	K2
CLO3	Applying various concepts and algorithms for scheduling, partitioning, storage management concepts and Security Concepts.	K3
CLO4	Analyze the operating system Storage, Deadlock, File System and Security	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	S	M	S

S- Strong; M-Medium

Operating Systems and Security – CY24C05

58 Hrs

UNIT I

(11 Hrs)

Introduction and process concepts: Definition of OS - Definition of process - Process States - Process State Transition - Semaphores - Deadlock and Indefinite postponement.

UNIT II

(11 Hrs)

Storage management: Real storage: Real storage management strategies - Contiguous Vs non- contiguous storage allocation - Single user contiguous storage allocation - Fixed partition multiprogramming - Variable partition multiprogramming. Virtual storage: Virtual storage management strategies: Page replacement strategies - working sets - Demand paging.

UNIT III

(12 Hrs)

Processor management: Introduction - Job and processor scheduling: Preemptive Vs Non- preemptive

scheduling – priorities - Deadline scheduling - FIFO-RR - SJF-SRT. Distributed computing–Pipelining – Vector processing. Multiprocessing - Fault Tolerance.

UNIT IV

(12 Hrs)

Device and information management: Disk performance optimization: Operation of moving head disk storage - Need for disk scheduling – FCFS - SSTF – SCAN. Optical Disks - file and database systems: File system – Access control by user Classes. Allocating and freeing space - file descriptor -Backup and Recovery.

UNIT V

(12 Hrs)

Reference Books

S.No.	Authors	Title	Publishers	Year and Edition
1	Andrew S.Tanenbaum, Albert S.Woodhull.	Operating Systems- Design and Implementation	Pearson Education	2011, 3 rd Edn
2	Abraham Silberschatz, Peter Baer Galvin, Greg Gagne	Operating System Concepts	John Wiley & Sons	2010, 8 th Edn
3	Archer J Harries	Operating Systems	Tata McGraw Hill	2008, 1 st Edn

Pedagogy

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

COURSE CODE	COURSE TITLE	CATEGORY	L	T	P	CREDIT
CY24CP2	PYTHON PROGRAMMING AND OS SECURITY LAB	PRACTICAL	-	-	75	3

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 and the knowledge of operating system Process to implement the state of process and storage and processor management. 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, functions and basic concepts of operating system	K1
CLO2	Develop programs with implementation of operators & I/O operations and operating systems functionality methods	K2
CLO3	Construct programs with features of Lists, Strings	K3
CLO4	Develop readable programs with files for Exception handling concepts.	K4

Mapping with Programme Learning 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

Python Programming and OS Security Lab - CY24CP2

75 Hrs

Program List

- Operators & I/O operations.
- Lists.
- Strings.
- Functions.
- Dictionaries.

- Tuples.
- Files, Modules and Packages.
- Program to ping two Network Machine using TCP code

COURSE CODE	COURSE TITLE	CATEGORY	L	T	P	CREDI T
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	Knowled ge Level
CLO1	Recall the concepts and terminologies of OSI model, network security.	K1
CLO2	Understand the OSI and TCP/IP models.	K2
CLO3	Apply various cryptographic algorithms.	K3
CLO4	Analyse 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 - CY23C06

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 Books

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

Reference Books

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

Pedagogy

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

COURSE CODE	COURSE TITLE	CATEGORY	L	T	P	CREDI T
CY24C07	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 and accessing 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	PLO 1	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

Database Management System - CY24C07

58 Hrs

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 new row/record – updating and deleting existing rows/records - Retrieving data from table.

UNIT - III

12 Hrs

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 - cursor FOR loops - Records - Tables - Procedures -Functions –Triggers

UNIT – V

10 Hrs

An overview of NoSQL - Characteristics 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. Database Security Fundamentals - Overview of Database Security-Features- What Is Database Security Management -Database Security Framework- Database Security features - Access Control - What Is IAM -IAM Features-IAM Authorization.

Text Books

S. No	Author	Title of the Book	Publisher	Year and Edition
1	Nilesh Shah	Database Systems Using Oracle	PHI	2016, 2 nd Edn
2	Gaurav Vaish	Getting Started with NoSQL	Packt	2013, 1 st Edn
3	Huawei ICT Academy	Database Security Fundamentals	SPRINGER	2022, 1 st Edn

Reference Books

S. No	Author	Title of the Book	Publisher	Year and Edition
1	Rajesh Narang	Database Management Systems	Prentice Hall of India	2011, 2 nd Edn
2	Kristina Chodorow	MongoDB: Definitive Guide	Oreilly	2015, 2 nd Edn

Pedagogy

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

COURSE CODE	COURSE TITLE	CATEGORY	L	T	P	CREDI T
CY24CP3	DATABASE MANAGEMENT SYSTEM LAB	PRACTICAL	-	-	75	3

Preamble

- The lab course provides a way to explore storing and accessing data in database through query languages and PL/SQL programming language.

Course Learning Outcomes

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

CLO Number	CLO Statement	Knowledge level
CLO1	Understand basic SQL query statements	K1
CLO2	Gain knowledge on primary and foreign key constraints	K2
CLO3	Apply functions and joins on data	K3
CLO4	Demonstrate PL/SQL programming on databases and Differentiate Key/value store database from relational database	K4

Mapping with Programme Learning Outcomes

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

S- Strong; M-Medium

Database Management System Lab - CY24CP3

75 Hrs.

Program List

- Different data types and operators
- ER diagram with entities, attribute, keys and relations
- Integrity constraints
- Built-in functions and views
- Create, insert, update and alter table
- Implement PL/SQL Block
- Control Structures and Embedded SQL

- Splitting and Joining the table
- PL/SQL Functions
- PL/SQL Procedure
- Spoofing using SQL injection
- A case study and formulate the problem statement on a specific project

Pedagogy

Demonstration of working environment/Tools/Software/Program

COURSE CODE	COURSE TITLE	CATEGORY	L	T	P	CREDIT
CS23SBGP	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

Gen-AI - CS23SBGP

45 Hrs

Unit 1: Introduction to Gen AI

9 Hrs

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 Hrs

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 Hrs

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 Hrs

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 Hrs

- 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.

