PSGR
Krishnammal College for Women

Affiliated to Bharathiar University \ Autonomous \ College of Excellence \ Accredited with A++ Grade \ Ranked 9th in NIRF

DEPARTMENT OF COMPUTER SCIENCE

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

BACHELOR OF COMPUTER SCIENCE
2025 - 2028 BATCH

Programme Learning Outcomes

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

PLO1	:	Demonstrate a solid foundation in the discipline of computer science and computer-based problem-solving skills
PLO2	:	Formulate, model, design and solve real world problems by using software tools
PLO3	:	Apply cognitive, design thinking and critical problem-solving skills to establish a productive career in industry, research and academia
PLO4	:	Meet the demands of IT industry with hands-on experience on current technological tools, effective communication skills and team work
PLO5	:	Pursue higher studies/ employ themselves either as software professionals or entrepreneurs through their technical competencies

Programme Specific Outcomes

The students at the time of graduation will

PSO1	:	Apply domain knowledge and problem-solving skills to solve real-time problems and to work independently on software projects as an effective team member
PSO2	:	Design and develop applications in the areas like artificial intelligence and machine learning algorithms, networking, web design, cloud computing, IoT and data analytics

BACHELOR OF COMPUTER SCIENCE
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 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	CS23C01	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	CS23C03	Computer Organization and Architecture	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	CS23CP1	C Programming 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	2
I-II	VI	NM25GAW	General Awareness	AEC	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	-	-	-	-	-	-	-	-

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

CC	Core Course	AECC	Ability Enhancement Compulsory Course
GE	Generic Elective	SS	Self-Study
AEC	Ability Enhancement Course	ACC	Additional Credit Course
CA	Continuous Assessment	Gr.	Grade
ESE	End Semester Examination		

Course Code	Course Title	Category	L	T	P	Credit
CS23C01	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	M
CLO2	S	S	S	M	S
CLO3	S	M	S	S	M
CLO4	S	S	S	S	S

S-Strong; M-Medium.

Programming in C - CS23C01-(58 Hrs)

Unit I **12 Hrs**

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

Unit II **12 Hrs**

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**

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

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 - Pointers and Character Strings - Pointers and Functions.

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

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 4.0 - 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	2023, 9th Edition
2	P. Kaliraj, T. Devi	Higher Education for Industry 4.0 and Transformation to Education 5.0	CRC Press - Taylor & Francis Group	2022, 1st Edition

Reference Books

S. No	Author	Title of the Book	Publisher	Year and Edition
1	Byron Gottfried	Programming with C	Tata McGraw Hill	2018, 4th Edition
2	Yashwvant Kanetkar	Let Us C: Authentic Guide to C Programming Language	BPB Publications	2023, 20th Edition

Pedagogy

- Lectures, Group discussions, Demonstrations

Course Designer

- Dr. K. Padmavathi

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 behaviour 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 -(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, 1st Edition
2	Paolo Ferragina, Fabrizio Luccio	Computational Thinking First Algorithms	Springer	2018, 1st Edition
3	Karl Beecher	Computational Thinking - A beginner's guide to problem solving	BSC publication	2017, 1st Edition

Pedagogy

- Lectures, Group discussions, Demonstrations, Case studies

Course Designer

- Mrs. S. Kavitha

Evaluation Pattern

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

Course Code	Course Title	Category	L	T	P	Credit
CS23C03	Computer Organization and Architecture	Theory	58	2	-	3

Preamble

This course provides the principles and practices of digital electronics and computer system. It covers data transfer techniques, computer arithmetic operations, I/O and memory organization.

Course Learning Outcomes

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

CLO Number	CLO Statement	Knowledge Level
CLO1	Understand number systems, conversions, boolean algebra and karnaugh map	K1
CLO2	Differentiate the functioning of flip-flops, multiplexer and decoder	K2
CLO3	Illustrate the concepts of register transfer, micro-operation, arithmetic operations, addressing modes and instruction format	K3
CLO4	Analyze various I/O and memory organizations	K4

Mapping with Programme Learning Outcomes

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

S- Strong; M-Medium.

Computer Organization and Architecture - CS23C03 - (58 Hrs)

Unit I **12 Hrs**

Data Representation: Data Types - Number Systems: Octal & Hexadecimal Numbers, Decimal Representation, Alphanumeric Representation. Logic Circuits: Gates - AND, OR, NOT, NAND, NOR Gates and Truth Tables - Boolean Algebra.

Unit II **12 Hrs**

Flip Flops: SR, JK, D, T Flip Flops. Karnaugh Maps - Product of Sums Method - Sum of Products Method- Don't Care Condition - Decoders-Multiplexer -Demultiplexer.

Unit III **11Hrs**

Register Transfer and Micro Operations: Register Transfer Language - Register Transfer-Bus and Memory Transfers - Arithmetic Micro Operations-Logic Micro Operations - Shift Micro Operation. Instruction Format: Three Address Instruction-Two Address Instruction-One Address Instruction-Zero Address Instruction.

Unit IV **12Hrs**

Input / Output Organization: Input Output Interface - Asynchronous Data Transfer - DMA. Memory Organization: Memory Hierarchy - Main Memory - Cache Memory - Virtual Memory.

Unit V **11 Hrs**

Case study: 32bit /64bit processor architecture, Next generation computer architecture: Introduction to Graphics Processing Units (GPU) -CPU and GPU difference - Quantum Computers – Neuromorphic chips.

Text Book

S. No	Author	Title of the Book	Publisher	Year and Edition
1	M Morris Mano	Computer System Architecture	Pearson Education	2017, 3rd Edition
2	Jim Ledin	Modern Computer Architecture and Organization: Learn x86, ARM, and RISC-V architectures and the design of smartphones, PCs, and cloud servers	Packt Publishing Limited	2020, 1st Edition

Reference Books

S. No	Author	Title of the Book	Publisher	Year and Edition
1	Yale N. Patt& Sanjay Patel	Introduction to Computing Systems: From Bits and Gates to C and Beyond	McGraw-Hill Education	2019, 3rd Edition
2	John.L. Hennessy	Computer Architecture - A Quantitative approach	Elsevier	2018, 6thEdition
3	William Stallings	Computer Organization & Architecture	Pearson Education	2022, 11th Edition

Pedagogy

- Lectures, Group discussions, Demonstrations

Course Designer

- Mrs. M. Dhivya

COURSE CODE	COURSE TITLE	CATEGORY	L	T	P	CREDIT
TH24A03	ALLIED - NUMERICAL AND STATISTICAL TECHNIQUES	Theory	88	2	-	5

Preamble

- To present students the Basic concepts of Numerical Methods and Statistics.
- To enable the students to find the practical applications to the real-world problems.

Course Learning Outcomes

- Upon the successful completion of the course, students will be able to

CLO Number	CLO Statement	Knowledge Level
CLO1	Recall basic Mathematics and Statistical concepts	K1
CLO2	Understand results from the application of standard statistical and numerical methods.	K2
CLO3	Apply the concepts of Numerical differentiation and Theoretical distributions	K3
CLO4	Analyze numerical and statistical methods to solve complex problem.	K4

Mapping with Programme Learning Outcomes

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

S-Strong; M-Medium.

(Common to B.SC (CS), B.SC (CS with Cognitive Systems& CS with Cyber Security), BCA, B.SC (IT)

Syllabus Numerical and Statistical Techniques - TH24A03 88 Hours

Unit I 17Hrs

Solution of Linear Simultaneous Equations: Gauss elimination - Gauss Jordan - Gauss Seidel and Gauss Jacobi methods -simple problems. Interpolation: Newton Forward and Backward Interpolation Formulae.

Unit II 17Hrs

Numerical Differentiation, Formulae for Derivatives: Newton's Forward Difference - Newton's Backward Difference, Numerical Integration: Introduction, Newton-Cotes Quadrature formulas: trapezoidal rule, Simpson's 1/3 and 3/8 rules, Taylor's series method.

Unit III 18Hrs

Skewness - Correlation analysis: Introduction - Significance of the study of correlation - correlation and causation - Types of correlation - Methods of studying correlation - Graphic

method - Karl Pearson's coefficient of correlation - Coefficient of correlation and probable error - Coefficient of determination - Properties of the coefficient of the correlation - Rank correlation coefficient - Features of Spearman's correlation coefficient, Regression analysis.

Unit IV **17 Hrs**

Probability: Introduction - probability defined - Importance of the concept of probability - Calculation of probability - Theorems of probability (statements only) – Mathematical Expectation-Simple problems.

Unit V **19 Hrs**

Theoretical Distributions: Binomial distribution - Poisson distribution and normal distribution (without derivations & proof).

Text Books

S. No	Author	Title of the book	Publishers	Year & Edition
1.	B.S. Grewal	Numerical Methods in Engineering and Science with Programs in C & C++	Khanna Publishers	2014 & 11th edition
	Unit I: Chapter III &VII: 3.3, 3.4, 3.5 &7.1-7.3 Unit II: Chapter VIII& X: 8.1, 8.2:(1,2),8.4, 8.5:(I, II, III),10.3			
2.	S.P.Gupta	Statistical methods	Sultan Chand & Sons Publications	2005 & 43rd Edition
	Unit III: Volume I: Chapter 9(till measures of skewness),10,11. (pg: 329-341, 377-412, 435-454) Unit IV: Volume-II Chapter 1(till Baye's theorem) (pg: 751-771) Unit V : Volume-II Chapter2 (pg:805-824, 826-834, 836-856)			

Reference Books

S. No	Author	Title of the book	Publishers	Year & Edition
1.	P.A.Navanitham	Business Mathematics and Statistics	Jai Publishing Company	2014
2.	S.C Gupta and V.K. Kapoor	Fundamentals of Mathematical Statistics	Sultan Chand & Sons Publications	2001 & 10th revised edition
3.	P.Kandasamy, K.Thilagavathy and K.Gunavathy	Numerical Methods	S.Chand and company LTD	Reprint 2007
4.	V.K.Kapoor	Fundamentals of Applied Statistics	Sultan Chand & Sons	2020 &12th revised edition

MOOC learning

https://nptel.ac.in/courses/111/107/111107105/

(Lectures by Prof.Ameeya Kumar Nayak and Prof. Sanjeev Kumar, Department of Mathematics, Indian Institution of Technology Roorkee)

Lecture 02 Gaussian elimination with partial pivoting Lecture 04 Jacobi and Gauss Seidel methods

Lecture 20 Newton's Forward Difference & Newton's Backward Difference Lecture 34

Simpsons 1/3rd rule and 3/8 rule https://nptel.ac.in/courses/111/106/111106112/
(6 Lectures by Prof.G.Srinivasan, Department of Management Studies, Indian Institution of Technology Madras)
Lecture 12 Probability
Lecture 13 Rules of probability Lecture 19 Binomial distribution Lecture 20 Poisson distribution

Note

- Question paper setters to confine to the above text books only

Pedagogy

- Chalk and Talk, PPT, Group discussion, Seminar, Quiz, Assignment

Course Code	Course Title	Category	L	T	P	Credit
CS23CP1	C Programming Lab	Practical	-	-	45	2

Preamble

The lab course provides a way to explore the C programming constructs. It enables to experience pointers, structures and file handling techniques through simple programs.

Course Learning Outcomes

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

CLO Number	CLO Statement	Knowledge Level
CLO1	Understand the basic programming in C language	K1
CLO2	Differentiate built-in functions and apply user defined functions to solve problems	K2
CLO3	Demonstrate the concepts of arrays, strings, pointers, structures	K3
CLO4	Design and develop the programs to solve real-world problems	K4

Mapping with Programme Learning Outcomes

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

S- Strong; M-Medium.

C Programming Lab -CS23CP1-(45 Hrs)

List of Programs

- Exercise using different data types
- Exercise using different operators
- Exercise to implement control structures
- Exercise using loop statements
- Exercise using arrays
- Exercise to explore built-in functions
- Exercise to create user defined function
- Exercise using structures
- Exercise using pointers
- Exercise to work with files

Pedagogy

- Demonstration of working environment / Tools / Software / Program

Course Designer

- Mrs. K. Padmavathi

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BACHELOR OF COMPUTER SCIENCE
CHOICE BASED CREDIT SYSTEM (CBCS)
LEARNING OUTCOMES - BASED CURRICULUM FRAMEWORK (LOCF)
SYLLABUS & SCHEME OF EXAMINATION
2025 – 2028 BATCH
SEMESTER II

Semester	Part	Course Code	Title of the Course	Course Type	Instruction Hours / Week	Contact Hours	Tutorial Hours	Duration of Examinatio	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	CS24C04	Java Programming	CC	5	73	2	3	25	75	100	3
II	III	CS24C05	Data Structures	CC	4	58	2	3	25	75	100	3
II	III	TH24A11	Discrete Mathematics	GE	6	88	2	3	25	75	100	5
II	III	CS25CP2	Java Programming Lab	CC	5	75	-	3	*15	*35	50	3
II	IV	# NME25B2/ NME25A2	Basic Tamil II / Advanced Tamil II	AEC	-	-	-	-	100	-	100	Gr.
II	IV	NM25UHR	Universal Human Values and Human Rights	AEC	2	30	-	-	100	-	100	2
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	-	-	-	-	-	-	-	

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

AECC	Ability Enhancement Core Course	L	Language
AEC	Ability Enhancement Course	E	English
ESE	End Semester Examination	CC	Core Course
CA	Continuous Assessment	GE	Generic Elective
ACC	Additional Credit Course	SS	Self-Study
GC	General Courses	Gr.	Grade

COURSE CODE	COURSE TITLE	CATEGORY	L	T	P	CREDIT
CS24C04	JAVA PROGRAMMING	THEORY	73	2	-	3

Preamble

The course introduces object-oriented programming concepts and it covers arrays, strings, threads, interfaces, files and exceptions. It introduces collection framework and database connectivity.

Course Learning Outcomes

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

CLO Number	CLO Statement	Knowledge Level
CLO1	Recall the object-oriented concepts, programming constructs in Java	K1
CLO2	Understand the usage of various packages, classes and collections in Java to solve problems	K2
CLO3	Apply Java APIs to solve problems using object-oriented approach	K3
CLO4	Analyze the problems and solve it by applying appropriate logic using Java language	K4

Mapping with Programme Learning Outcomes

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

S- Strong; M-Medium.

JAVA PROGRAMMING - CS24C04-73 HRS

Unit I (14 Hrs)

Introduction to Java - Naming conventions and data types - Literals - Operators in Java -Control statements in Java- Implementing Efficient Encryption Algorithms using Vedic Sutras -Classes and objects- Instance variables, set Methods and get methods - Initializing objects with constructors.

Unit II (15 Hrs)

Arrays - String, String Buffer and StringBuilder Class - Inheritance: Inheritance - super keyword - Protected Specifier - Types of Inheritance - Polymorphism - Type Casting - Abstract Classes- Generating Binary Sequences with Pingala's Chandas sutra Algorithm.

Unit III (14 Hrs)

Interface: Interface -Multiple Inheritance using Interfaces - Abstract Classes Vs Interfaces. Packages: Package - Different Type of Package - JAR files -Creating Sub-Package - Exception Handling - Wrapper Classes- Streams and Files -Threads.

Unit IV **(15 Hrs)**

Collection Framework: Collection Objects -Retrieving Elements from Collections – Hash Set- Linked List- Array List- Vector –Hash Map-Hash table- Arrays - String Tokenizer - Calendar - Date Class.

Unit V **(15 Hrs)**

Java Database Connectivity: Database Server - Database Clients - JDBC - Working with Oracle DB - Registering the Driver - Connecting to a Database - Preparing SQL Statements - Using JDBC- ODBC Bridge Driver to Connect to Oracle Database - Types of Result Sets.

Text Book

S. No	Author	Title of the Book	Publisher	Year and Edition
1	R.Nageswara Rao	Core Java - An Integrated Approach	Dream Tech	2024
2	Paul Deitel and Harvey Deitel	Java How to Program	PHI Learning Pvt Ltd	2018 and 11th Edn.

Reference Books

S.No	Author	Title of the Book	Publisher	Year and Edition
1	Herbert Schildt	Java: The complete Reference	McGraw Hill Professional	2017
2	Robert Sedgewick& Kevin Wayne	Introduction to Programming in Java	Addison Wesley	2017
3	Y. Daniel Liang	Introduction to Java Programming	Pearson Education	2017

Pedagogy

- Lectures, Group discussions, Demonstrations

Course Designer

- Dr. S. Karpagavalli
- Mrs. A. Priyadharsini

COURSE CODE	COURSE TITLE	CATEGORY	L	T	P	CREDIT
CS24C05	DATA STRUCTURES	THEORY	58	2	-	3

Preamble

This course covers the basic concepts, terminologies in data structure. It provides knowledge on data representation, storage and retrieval in various data structures as well as sorting and searching 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 basic data structures and data representations	K1
CLO2	Understand different data structures, operations and applications	K2
CLO3	Apply specific data structures like stack, queue, linked list, trees, and graph to solve problems	K3
CLO4	Analyze and evaluate the use of data structures in computerized problem solving	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	M	S	S	M	S
CLO4	S	M	S	M	M

S-Strong; M-Medium.

DATA STRUCTURES- CS24C05 - 58 HRS

Unit I (12 Hrs)

Introduction and Overview: Introduction - Basic Terminology - Elementary Data Organization - Data structures - Data structure operations - Algorithms: Complexity, Time- Space Trade-off. Preliminaries: Algorithmic Notation - Control Structures- Variables, Data Types. Arrays, Records and Pointers: Introduction - Linear Arrays – Operations in Linear Arrays.

Unit II (12 Hrs)

Stack, Queues, Recursion: Introduction -Stacks - Array Representation of Stacks - Linked Representation of Stacks - Arithmetic Expressions - Polish Notation - Recursion- Towers of Hanoi - Implementation of Recursive Procedures by Stacks -Queues - Linked Representation of Queues – Circular Queue - Dequeue – Priority Queue.

Unit III **(11 Hrs)**

Linked Lists: Introduction - Linked Lists - Representation of Linked Lists in Memory- Traversing a Linked List - Memory Allocation-Garbage Collection–Insertion in Linked List- Deletion from a Linked List - Header Linked Lists– Circular Linked List.

Unit IV **(12 Hrs)**

Trees: Introduction - Binary Trees - Representing Binary Trees in Memory - traversing binary trees - AVL Tree - B Tree - Panini's Grammar and Patten Matching (Syntax Trees). Graphs: Terminology and Representations- Sequential Representation of Graphs- Adjacency Matrix, Path Matrix – Graph Traversal –Mandala Pattern and Graph Theory- Shortest Path Problems - Spanning Trees.

Unit V **(11 Hrs)**

Sorting and Searching: Introduction - Sorting - Insertion Sort - Selection Sort - Merging - Merge Sort - Radix Sort -Bubble Sort-Quick Sort. Searching and Data Modification – Hashing - Linear Search – Binary Search.

Text Book

S. No	Author	Title of the Book	Publisher	Year and Edition
1	Seymour Lipschutz	Data Structures	Tata Mc-Graw Hill	2017 and 5th Edn.

Reference Books

S. No	Author	Title of the Book	Publisher	Year and Edition
1	Ellis Horowitz SartajSahni	Fundamentals of Data Structures	Galgotia Book House	2014
2	Harry Hariom Choudhary	Data Structures	Create Space Independent Publishing Platform	2014
3	Rajdev Tiwari and Nagesh Sharma	Design and Analysis Algorithms	Pearson Education	2014

Pedagogy

- Lectures, Demonstration, Case studies

Course Designer

- Dr. K. Padmavathi

COURSE CODE TH24A11	COURSE NAME ALLIED - DISCRETE MATHEMATICS SEMESTER II	CATEGORY	L	T	P	CREDIT
		Theory	88	2	-	5

Preamble

Principle of Mathematical Structures which are essential and related to the concepts of Computer Science. This helps the students to approach any Mathematical Problem which arise in the field of Computer Science

Course Learning Outcomes

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

CLO Number	CLO Statement	Knowledge Level
CLO1	Identify Mathematical logic and definitions and well-formed formula and outline the understanding of Tautology and Equality relations thereby helps students to understand ambiguity and disagreement in real world problems	K1
CLO2	Lattices and Boolean algebras enable one to understand applications in logic, circuit theory, and probability	K2
CLO3	Demonstrate the importance of Graph Theory in Computer Science	K3
CLO4	Apply and demonstrate algebraic concepts in Coding theory using group codes enhances their ability to detect and correct errors	K4

Mapping with Programme Learning Outcomes

CLOs/PLO s	PLO 1	PLO2	PLO3	PLO 4	PLO 5	PLO 6	PLO 7
CLO1	S	S	S	S	M	S	S
CLO2	S	S	S	M	S	S	S
CLO3	S	S	S	S	S	S	S
CLO4	M	S	M	S	S	S	S

S- Strong; M-Medium.

Common to B.SC (CS), B.SC (CS with Cognitive Systems), BCA, B.SC (IT)

Syllabus ALLIED - DISCRETE MATHEMATICS - TH24A11 – 88 Hours

Unit I **18 Hrs**

Mathematical Logic: Connectives– Statement Formulas and Truth Tables - Conditional and Biconditional - Well-formed Formulas - Tautologies - Equivalence of Formulas -Duality law - Tautological implications -Normal forms –Theory of inference for the Statement Calculus - Predicate Calculus.

Unit II **17 Hrs**

Coding Theory: Introduction – Hamming distance – Encoding a message – Group codes – Procedure for generating Group Codes – Decoding and Error Correction – An example of a Simple error correcting code.

Unit III **18 Hrs**

Formal languages and Automata: Grammar and Languages -Phrase Structure grammar – Types of Phrase Structure Grammar – Backus-Naur form [BNF] - Finite State Acceptors and Regular Grammars: Deterministic finite automata-non-Deterministic Finite-State Automata-Conversion of Non-Deterministic finite automata to finite state automata.

Unit IV **19 Hrs**

Lattice and Boolean Algebra: Lattices as Partial ordering set – Some Properties of Lattices-Distributive Lattices-Complemented Distributive Lattices-Boolean algebra – Boolean Function – Representation and Minimization of Boolean function using K-Map.

Unit V **16 Hrs**

Graph Theory: Basic Concepts of Graph Theory – Path, Reachability and Connectedness – Circuits-Hamiltonian Paths- Euler paths-Matrix representation-Incidence matrix-Adjacency matrix-Tree and Binary tree – Theorems-Statement only(No Proof).

Text Books

S. No	Author	Title of the book	Publishers	Year of Publication
1.	J.P.Tremblay and R.Manohar	Discrete Mathematical Structures with Applications to Computer Science	McGraw Hill Publishing Company	Edition 1997, Reprint 2008
	Unit I : Section: 1.2.1 -1.2.4, 1.2.6 -1.2.11, 1.3.1 -1.3.4, 1.4.1 – 1.4.2, 1.5.1 -1.5.4 Unit III : Section: 3.3.1 -3.3.3, 6.1.1 Unit IV : Section: 4.1.1 -4.3.1 ,4.4.1, 4.4.2 Unit V : Section: 5.1.1 -5.2.2			
2.	Dr. M.K. Venkataraman,Dr. N. Sridharan and N. Chandrasekaran	Discrete Mathematics	The National Publishing company, Chennai	First edition Reprint 2003,
	Unit II: Chapter 8 Sections 8.1 – 8.7			

Reference Books

S.NO	Author	Title of the book	Publishers	Year of publication
1	T.Veerarajan	Discrete Mathematics with Graph Theory and Combinatorics	Tata Mcgraw-Hill publishing company Limited	2008
2	NarSinghDeo	Graph Theory with Applications to Engineering and Computer Science	PHI, India	2006
3	T. Santha and P. Radha	Discrete Mathematics for Computer Science and Applications	Kalaikathir Publications	2002

MOOC learning

https://nptel.ac.in/courses/111/107/111107058/

(Lectures by Dr.AditiGangopadhyay, Dr.SugataGangopadhyay and Dr.TanujaSrivastava, Department of Mathematics, IIT Roorkee)

- Lecture 06 Logical Inferences
- Lecture 32 Lattices
- Lecture 33 Boolean algebra
- Lecture 17 Basic definition
- Lecture 18 Isomorphism and sub graphs
- Lecture 19 Walks, paths and circuits operations on graphs
- Lecture 20 Euler graphs, Hamiltonian circuits

Note

- Question paper setters to confine to the above text books only

Pedagogy

- Chalk and talk, Powerpoint Presentation, E-Content, Group discussion, Seminar, Quiz, Assignment and Peer learning

COURSE CODE	COURSE TITLE	CATEGORY	L	T	P	CREDIT
CS25CP2	JAVA PROGRAMMING LAB	PRACTICAL	-	-	75	3

Preamble

The lab course is intended to explore object-oriented concepts through Java programming language. It enables to develop Java programming skills in packages, files, collection framework classes and database connectivity.

Course Learning Outcomes

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

CLO Number	CLO Statement	Knowledge Level
CLO1	Understand the object-oriented concepts through java programming constructs	K2
CLO2	Demonstrate principle of inheritance, interface, file and exception handling	K3
CLO3	Implement data structures using Java collection framework	K3
CLO4	Construct database connectivity applications	K4

Mapping with Programme Learning Outcomes

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

S- Strong; M-Medium.

JAVA PROGRAMMING LAB - CS25CP2 -75 HRS

List of Programs

- Exercises using classes and objects
- Exercises using demonstrating String Tokenizer
- Exercises using inheritance
- Exercises using interfaces
- Exercises using packages and sub-packages, including JAR file creation
- Exercises to implement built-in and user defined exception handling
- Exercises using streams and files
- Exercises using collection framework - Stack and Queue class
- Exercises using collection framework – LinkedList and ArrayList
- Exercises using collection framework – HashMap and Hashtable
- Exercises using insertion sort using ArrayList and heap sort using PriorityQueue
- Exercises using collection framework - Date and Calendar class

- Exercises using JDBC
- Exercises using retrieve and display updatable ResultSets

Pedagogy

- Demonstration of working environment / Tools / Software / Programs

Course Designers

- Dr. S. Karpagavalli
- Mrs. A. Priyadarshini

Bachelor of Computer Science
Choice Based Credit System (CBCS)
Learning Outcomes Based Curriculum Framework (LOCF)
Syllabus & Scheme of Examination
2025 - 2028 Batch
Semester III

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	
III	I	TAM2303A/ HIN2303A / FRE2303A	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	CS24C06	Operating System	CC	4	58	2	3	25	75	100	3
III	III	CS23C07	Computer Networks	CC	4	58	2	3	25	75	100	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	III	CS23CP3	DBMS Lab	CC	5	75	-	3	15*	35*	50	4
III	IV	NM23DTG	Design Thinking	AEC	2	30	-	-	100	-	100	2
III	IV	NM25HAW	Health and Wellness	VAC	SS	-	-	-	100*	-	100	1
I -V	VI	24BONL1 24BONL2 24BONL3	Online Course I Online Course II Online Course III	ACC	-	-	-	-	-	-	-	-

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

CC : Core Course
GE : Generic Elective
AEC : Ability Enhancement Course
CA : Continuous Assessment
ESE : End Semester Examination
ACC : Additional Credit Course
VAC : Value Added Course
SEC : Skill Enhancement Course
SS : Self-Study
L : Language
E : English

Course Code	Course Title	Category	L	T	P	Credit
CS24C06	Operating System	Theory	58	2	-	3

Preamble

This course provides the basic operating system functionalities. The course covers deadlock, storage management, file system, and I/O systems. It also introduces Linux commands and shell programming.

Course Learning Outcomes

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

CLO Number	CLO Statement	Knowledge Level
CLO1	Recall the fundamental operating system abstractions such as processes, resources, threads, semaphores, memory files and Linux operating system	K1
CLO2	Understand the basic functionality of operating system like process, resource, memory, disk management	K2
CLO3	Apply the various operating system algorithms and techniques in solving problems	K3
CLO4	Analyse the abstractions of operating system in solving problems	K4

Mapping with Programme Learning Outcomes

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

S- Strong; M-Medium.

OPERATING SYSTEM- CS24C06 (58 Hrs)

Unit I (12 Hrs)

Introduction: Operating Systems - Operating-System Structure -Operating System operations. Operating System Structures: Operating System Services - User and Operating System Interface - System Calls - System Programs - Operating System Design and Implementation - Operating System Generation.

Unit II (12 Hrs)

Process Management: Process Concept - Process Scheduling - Operations on Processes. Threads: Overview - Multicore Programming - Multithreading Models. Process Synchronization: Synchronization Hardware - Mutex Locks - Semaphores. CPU Scheduling: Basic Concepts - Scheduling Criteria - Scheduling Algorithms.

Unit III (12 Hrs)

Deadlock: System Model - Deadlock Characterization - Methods for Handling Deadlocks - Deadlock Prevention- Deadlock Avoidance- Deadlock Detection- Recovery from Deadlock.

Storage Management: Overview of Mass Storage Structure -Disk Structure - Disk Attachment - Disk Scheduling - Disk Management.

Unit IV **(12 Hrs)**

File System Interface: File Concept- Access Methods -Directory and Disk Structure- File-System Mounting - File Sharing - Protection. I/O Systems: Overview- I/O Hardware - Application I/O Interface- Kernel I/O Subsystem.

Unit V **(10 Hrs)**

Linux System: Introduction - Programming Linux. Shell Programming: Shell Introduction - Pipes and Redirection – The Shell as a Programming Languages- Shell Syntax - Working with Files: Linux File Structure -The Standard i/o Library - Formatted Input Output - File and Directory Maintenance.

Case Study: Mac operating system and Android operating system.

Text Book

S. No	Author	Title of the Book	Publisher	Year and Edition
1	Abraham G Silberschatz	Operating System	Wiley Publisher	2017, 10th Edition
2	Richard Stones, Neil Matthew	Beginning: Linux Programming	Wiley Publisher	2007, 4th Edition
3	Guy Hart-Davis	Mac OS Sequoia for dummies	Wiley Publisher	2025

Reference Books

S. No	Author	Title of the Book	Publisher	Year and Edition
1	Andrew.S. Tannenbaum	Modern operating System	Pearson Education	2014, 1st Edition
2	Abraham Silberschatz, Peter B. Galvin, Greg Gane	Operating System Concepts	Wiley Global Education	2012, 9th Edition
3	Mark G. Sobell	A Practical Guide to Linux commands, Editors, and Shell Programming	Addison Wesley	2011, 2nd Edition
4	William Stallings	Operating System Internals and Design Principles	Pearson Education	2018, 9th Edition

Note

- Blended mode topics are highlighted. Links will be provided.

Pedagogy

- Lectures, Demonstration, Case studies

Course Designer

- Dr. K. Padmavathi

Course Code	Course Title	Category	L	T	P	Credit
CS23C07	Computer Networks	Theory	58	2	-	3

Preamble

The course is designed to provide in depth knowledge of the various network types, protocols, components, security and basics of data communication.

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 network terminologies, hardware, architectures and security	K1
CLO2	Understand various reference models, protocols, functioning of layers and cryptography algorithms	K2
CLO3	Apply the network concepts in problem solving	K3
CLO4	Analyze the characteristics of networks, routing protocols and security techniques	K4

Mapping with Programme Learning Outcomes

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

S- Strong; M-Medium.

COMPUTER NETWORKS -CS23C07 (58 HRS)

Unit I **(12 Hrs)**

Data Communications: Components- data representation- Dataflow Networks: Distributed processing-network criteria -physical structures -network models-categories of networks- Interconnection of Networks: Internetwork- Protocols and Standards: protocols – standards - internet standards the OSI model- layers in the OSI model-TCP/IP protocol suite.

Unit II **(12 Hrs)**

Guided Media: Twisted-pair cable-coaxial cable - fiber-optic cable- unguided media: - Telephone Network: Major components - Latas -signaling services provided by telephone networks dial-up modems: Modem standards digital subscriber line- cable TV networks. Wireless LANS: Bluetooth-connecting devices.

Unit III **(11 Hrs)**

Data Link Layer: Introduction- block coding-framing- flow and error control- protocols- noiseless channels- noisy channels. Network Layer: IPV4 addresses- IPV6 addresses-delivery-forwarding-unicast routing protocols.

Unit IV **(11 Hrs)**

Transport layer: Process-to-Process delivery- user datagram protocol - TCP- congestion control and quality a TCP connection- congestion control - quality of service.

Unit V **(12 Hrs)**

Application Layer: Name space- domain name space- distribution of name space- DNS in the internet- resolution- remote logging - cryptography: Introduction- symmetric-key cryptography-asymmetric-key cryptography.

Text Book

S. No	Author	Title of the Book	Publisher	Year and Edition
1	Behrouz A Forouzan	Data communications and networking	Tata McGraw Hill	2017, 4th Edition

Reference Books

S. No	Author	Title of the Book	Publisher	Year and Edition
1	Robert Orfali, Dan Harkey, Jerry Edwards	Client/Server Survival Guide	John Wiley & sons	2008, 3rd Edition
2	Larry L Peterson, Bruce S Davie	Computer Networks - A Systems Approach	Elsevier Press	2012, 5th Edition
3	Andrew S Tanenbaum	Computer Networks	Pearson Education	2011, 5th Edition
4	William Stallings	Data and Computer Communications	Prentice Hall of India Private Limited	2011, 8th Edition

Pedagogy

- Lecture, Demonstration, Case Studies

Course Designer

- Mrs. S. Kavitha

Course Code	Course Title	Category	L	T	P	Credit
CS23SBGP	Gen AI	Theory	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	PO1	PO2	PO3	PO4	PO5
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 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 Code	Course Title	Category	L	T	P	Credit
CS23CP3	DBMS Lab	Practical	-	-	75	4

Preamble

The lab course provides a way to explore storing and accessing data in database through query languages and PL/SQL programming language. It enables to give systematic database design approaches and project-oriented learning through real time applications.

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	K2
CLO2	Gain knowledge on various constraints	K2
CLO3	Apply functions, packages, views, joins and Exception handling on data	K3
CLO4	Demonstrate PL/SQL programming on real time applications	K4

Mapping with Programme Learning Outcomes

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

S - Strong; M - Medium.

DBMS LAB - CS23CP3 (75 HRS)

List of Programs

- Exercise using different data types and operators
- Exercise to implement database schema using constraints
- Exercise to implement queries using DDL and DML
- Exercise to implement built-in functions
- Exercise to implement views
- Exercise to implement PL/SQL basics
- Exercise to implement PL/SQL table and record
- Exercise to implement joins
- Exercise using Functions
- Exercise using Packages

- Exercise using Cursors
- Exercise using Triggers
- Exercise using Exception Handling

Pedagogy

- Demonstration of working environment/Tools/Software/Program

Course Designer

- Mrs. J. Gayathri
- Mrs. M. Dhivya