



**PSGR  
Krishnammal College for Women**



**DEPARTMENT OF COMPUTER SCIENCE**

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

**BACHELOR OF COMPUTER SCIENCE  
2024 - 2027 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



Department of Computer Science  
Choice Based Credit System & Learning Outcomes Based Curriculum Framework  
Bachelor of Computer Science 2024 - 2027 Batch & Onwards

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	TAM2301A/ HIN2301A / FRE2301A	Language I - T / H / F	L	4	58	2	3	25	75	100	3
I	II	ENG2301A	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
<b>Non-Tamil Students</b>												2
I	IV	NME23B1 / NME23A1	Basic Tamil I / Advanced Tamil I	AEC	2	28	2	-	100	-	100	
<b>Students with Tamil as Language</b>												
I	IV	NME23ES	Introduction to Entrepreneurship	AEC	2	30	-	-	100	-	100	
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

L	:	Language	AEC	:	Ability Enhancement Course
E	:	English	ACC	:	Additional Credit Course
CC	:	Core Course	CA	:	Continuous Assessment
GE	:	Generic Elective	ESE	:	End Semester Examination

## **Evaluation Pattern 24-25 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)
<b>Total</b>			<b>: 45 Marks</b>

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

##### **CA Question from each unit comprising of**

One question with a weightage of 2 Marks :  $2 \times 3 = 6$

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

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

**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	
<b>Total</b>			<b>: 25 Marks</b>	

### **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)
<b>Total</b>			<b>: 75 Marks</b>

#### **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 :  $2 \times 5 = 10$

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

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

**ESE Question Paper Pattern:(for Accounts Paper) 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: 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
<b>Total</b>	:	<b>25 Marks</b>

**Practical**

Lab Performance	:	7 marks
Regularity	:	5 marks
Model Exam	:	10 marks
Attendance	:	3 marks
<b>Total</b>	:	<b>25 marks</b>

**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.

**Project:**

**Evaluation of Individual / Group Project & Viva Voce for UG & PG**

I	Review	-	Selection of the field of study, Topic & literature collection	:	5 Marks
II	Review	-	Research Design & Data Collection	:	10 Marks

III Review	-	Analysis & Conclusion Preparation of rough draft	:	10 Marks
<b>Total</b>			<b>:</b>	<b>25 Marks</b>

**End semester examination:**

Evaluation of the project	:	25 Marks
Viva Voce	:	50 Marks
<b>Total</b>	<b>:</b>	<b>75 Marks</b>

**Part IV**

**Introduction to Entrepreneurship / Women Studies / Value education / Environmental Studies / Design**

**Thinking**

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

**Professional English**

The course offered in alignment with TANSCH norms with 2 credits.

Quiz	(5 x 20 Marks)	:	100 Marks
------	----------------	---	-----------

**Cyber Security I & II**

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

## Mapping with Programme Learning Outcomes

### Course 1 - CS23C01

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

### Course 2 - PP22C02

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

### Course 3 - CS23C03

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

### Course 4 - CS23CP1

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

Course Number	Course Name	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)**

#### Syllabus

#### 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	2019, 8 <sup>th</sup> Edition
2	P.Kaliraj, T. Devi	Higher Education for Industry 4.0 and Transformation to Education 5.0	CRC Press - Taylor & Francis Group	2021, 1 <sup>st</sup> Edition

#### Reference Books

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

#### Pedagogy

- Lectures, Group discussions, Demonstrations

#### Course Designer

- Dr. K. Padmavathi

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 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)**

#### 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 and Edition
1	David Riley and Kenny Hunt	Computational Thinking for Modern Solver	Chapman & Hall/CRC	2014, 1 <sup>st</sup> Edition
2	Paolo Ferragina, FabrizioLuccio	Computational Thinking First Algorithms	Springer	2018, 1 <sup>st</sup> Edition
3	Karl Beecher	Computational Thinking - A beginner's guide to problem solving	BSC publication	2017, 1 <sup>st</sup> 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 Number	Course Name	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 successful 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)

### Syllabus

#### 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, 3 <sup>rd</sup> 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, 1 <sup>st</sup> 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, 3 <sup>rd</sup> Edition
2	John .L. Hennessy	Computer Architecture - A Quantitative approach	Elsevier	2018, 6 <sup>th</sup> Edition
3	William Stallings	Computer Organization & Architecture	Pearson Education	2022, 11 <sup>th</sup> Edition

**Pedagogy**

- Lectures, Group discussions, Demonstrations

**Course Designer**

- Mrs. M. Dhivya

Course Number	Course Name	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