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 WITH GRAPHICS AND CREATIVE DESIGN

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

## B.Sc. COMPUTER SCIENCE WITH GRAPHICS AND CREATIVE DESIGN

## 2025-2028 BATCH

## PROGRAMME LEARNING OUTCOMES (PLO's)

After completion of the Programme, the students will be able to

**PLO1**: Demonstrate an understanding of visual communication principles to convey messages effectively through design.

**PLO2**: Gain proficiency in industry-standard design software such as Adobe Photoshop, Illustrator, InDesign, After Effects, and others for creating and manipulating graphics, illustrations, and animations.

**PLO3**: Develop critical thinking and creative problem-solving abilities to tackle design challenges, including conceptualization, ideation, and the application of design solutions across various mediums.

**PLO4**: Master the use of typography, fonts, and layout techniques to enhance the legibility, readability, and aesthetic appeal of design projects.

**PLO5**: Understand the principles of branding and identity design, creating visual identities that effectively communicate a brand's message and values.

## PROGRAMME SPECIFIC OUTCOMES (PSO's)

The students at the time of graduation will

**PSO1**: Apply and create high-quality graphic designs and visual content across various media platforms (digital, print, multimedia) that meet industry standards and client requirements.

**PSO2**: Design unique and impactful brand identities, including logos, packaging, and marketing collateral, that reflect the essence of a brand and appeal to its target audience.

**PSO3**: Possess the knowledge and skills to design user interfaces (UI) and user experiences (UX) that prioritize functionality, user-friendliness, and accessibility for websites and mobile applications.

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# B.Sc. Computer Science (Graphics & Creative Design)
## Choice Based Credit System (CBCS)
## Learning Outcomes Based Curriculum Framework LOCF)
## Syllabus & Scheme of Examination
## 2025 -2028 Batch
## Semester I & II

| 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<br>Hindi Paper I<br>French Paper I | L | 4 | 58 | 2 | 3 | 25 | 75 | 100 | 3 |
| | II | ENG2501A | English Paper I | E | 4 | 58 | 2 | 3 | 25 | 75 | 100 | 3 |
| | III | GC25C01 | Graphics and Multimedia | CC | 4 | 58 | 2 | 3 | 25 | 75 | 100 | 3 |
| | III | PP22C02 | Computational and Algorithmic Thinking for Problem Solving | CC | 3 | 45 | - | - | 100 | - | 100 | 3 |
| | III | GC25C03 | Programming in C with Graphics | CC | 4 | 58 | 2 | 3 | 25 | 75 | 100 | 3 |
| | III | GC25CP1 | Programming in C with Graphics Lab | CC | 3 | 45 | - | 3 | 15* | 35* | 50 | 2 |
| | III | TH24A03 | Numerical and Statistical Techniques | GE | 6 | 88 | 2 | 3 | 25 | 75 | 100 | 5 |
| | IV | NME25B1/ NME25A1 | Basic Tamil I / Advance Tamil I | AEC | 2 | 28 | 2 | - | 100 | - | 100 | 2 |
| | | 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<br>24BONL2<br>24BONL3 | Online Course I<br>Online Course II<br>Online Course III | ACC | - | - | - | - | - | - | - | - |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|
| II | I | TAM2502A/ HIN2502A/ FRE2502A | Tamil Paper II/ Hindi Paper II/ French Paper II | L | 4 | 58 | 2 | 3 | 25 | 75 | 100 | 3 |
| | II | ENG2502A | English Paper II | **E** | 4 | 58 | 2 | 3 | 25 | 75 | 100 | 3 |
| | III | GC25C04 | OOPs with Graphics | **CC** | 5 | 73 | 2 | 3 | 25 | 75 | 100 | 3 |
| | III | IN23C05 | Data Structure and Algorithm | **CC** | 4 | 58 | 2 | 3 | 25 | 75 | 100 | 3 |
| | III | GC25CP2 | OOPs with Graphics Lab | **CC** | 5 | 75 | - | 3 | 15# | 35# | 50 | 3 |
| | III | TH24A11 | Discrete Mathematics | **GE** | 6 | 88 | 2 | 3 | 25 | 75 | 100 | 5 |
| | IV | NM25UHR | Universal Human Values and Human Rights | **AEC** | 2 | 30 | - | - | 100 | - | 100 | 2 |
| | IV | *NME25B2/ NME25A2 | Basic Tamil II / Advance Tamil II | **AEC** | - | - | - | - | 100 | - | 100 | Gr. |
| 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 in to 15, ESE conducted for 75 and converted in to 35

CC: Core Courses

CA: Continuous Assessment

GE: Generic Elective

ESE : End Semester Examination

AEC: Ability Enhancement Course

ACC: Additional Credit Course

SS: Self Study

AECC: Ability Enhancement Compulsory Course GC: General Course

**GC25C01 - Graphics and Multimedia**

| 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 |

**PP22C02 – Computational and Algorithmic Thinking for Problem Solving**

| 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 |

**GC25C03 - Programming in C with Graphics**

| 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 |

**GC25CP1 - Programming in C with Graphics Lab**

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

## GC25C04 - OOPs with Graphics

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

## IN23C05 – Data Structure and Algorithm

| CLOs | PLO1 | PLO2 | PLO3 | PLO 4 | PLO5 |
|---|---|---|---|---|---|
| **CLO1** | S | M | M | S | S |
| **CLO2** | S | M | S | M | M |
| **CLO3** | M | M | S | M | S |
| **CLO4** | S | S | S | M | S |

## GC25CP2 - OOPs with Graphics Lab

| 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 |

| Course Code | Course Title | Category | L | T | P | Credit |
|---|---|---|---|---|---|---|
| GC25C01 | Graphics and Multimedia | Theory | 58 | 2 | - | 3 |

**Preamble**

This course provides the knowledge and skills to create visually engaging digital content by teaching them the fundamentals of graphic design, animation, video editing, audio manipulation, and multimedia authoring tools.

**Course Learning Outcomes**

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

| CLO Number | CLO Statement | Knowledge Level |
|---|---|---|
| CLO1 | Understand concepts of 2D and 3D, Viewing, Curves and surfaces, Hidden Line/surface elimination techniques | K1 |
| CLO2 | Understand Multimedia Systems, Text, Audio and Video tools | K2 |
| CLO3 | Apply and Compress audio and video using MPEG-1 and MPEG-2 | K3 |
| CLO4 | Analyze to Create Animation with special effects using algorithms | 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;

**UNIT I** **12 Hrs**

Output Primitives: Points and Lines – Line - Drawing algorithms – Loading frame Buffer – Line function – Circle - Generating algorithms – Ellipse - generating algorithms. Attributes of Output Primitives: Line Attributes – Curve attributes – Color and Grayscale Levels – Area-fill attributes – Character Attributes.

**UNIT II** **12 Hrs**

2D Geometric Transformations: Basic Transformations – Matrix Representations – Composite Transformations – Other Transformations. 2D Viewing: The Viewing Pipeline – Viewing Coordinate Reference Frame – Window-to-Viewport Co-ordinate Transformation - 2D Viewing Functions – Clipping Operations.

**UNIT III** **12 Hrs**

Text: Types of Text – Unicode Standard – Font – Insertion of Text – Text compression – File formats. Image: Image Types – Seeing Color – Color Models – Basic Steps for Image Processing – Scanner – Digital Camera – Interface Standards – Specification of Digital Images – CMS – Device Independent Color Models – Image Processing software – File Formats – Image Output on Monitor and Printer.

**UNIT IV** **11 Hrs**

Audio: Introduction – Acoustics – Nature of Sound Waves – Fundamental Characteristics of Sound – Microphone – Amplifier – Loudspeaker – Audio Mixer – Digital Audio – Synthesizers – MIDI – Basics of Staff Notation – Sound Card – Audio Transmission – Audio File formats and CODECs – Audio Recording Systems – Audio and Multimedia – Voice Recognition and Response - Audio Processing Software.

**UNIT V** **11 Hrs**

Video: Analog Video Camera – Transmission of Video Signals – Video Signal Formats – Television Broadcasting Standards – PC Video – Video File Formats and CODECs – Video Editing – Video Editing Software. Animation: Types of Animation – Computer Assisted Animation – Creating Movement – Principles of Animation – Some Techniques of Animation – Animation on the Web – Special Effects – Rendering Algorithms. Compression: MPEG-1 Audio – MPEG-1 Video - MPEG-2Audio – MPEG-2 Video.

**TEXT BOOK**

| S. No | Author | Title of the Book | Publisher | Year and Edition |
|---|---|---|---|---|
| 1 | M.Pauline Baker | Computer Graphics (Unit- I & II) | PHI | 2014, 4th Edn |
| 2 | Ranjan Parekh | Principles of Multimedia(Unit-III,IV & V) | CRC Press | 2025, 3rd Edn |

**REFERENCE BOOK**

| S. No | Author | Title of the Book | Publisher | Year and Edition |
|---|---|---|---|---|
| 1 | Amarendra N Sinha, Arun D | Computer Graphics | McGraw Hill | 2007, 2nd Edn. |
| 2 | Tay Vaughan | Multimedia : Making it Work | McGraw Hill | 2014, 9th Edn. |

**Pedagogy**

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

**Course Designer**

1. Dr. P. Parvathi

| 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**

**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 | 2014,1st Edn |
| 2 | Paolo Ferragina, Fabrizio Luccio | Computational Thinking First Algorithms | Springer | 2018, 1st Edn |
| 3 | Karl Beecher | Computational Thinking – A beginner's guide to problem solving | BSC publication | 2017, 1st Edn |

**Pedagogy**

- Lectures, Group discussions, Demonstrations, Case studies

**Course Designer**

1. Dr. V. Deepa

| Course Code | Course Title | Category | L | T | P | Credit |
|---|---|---|---|---|---|---|
| GGC25C03 | Programming in C with Graphics | Theory | 58 | 2 | - | 3 |

**Preamble**

This course equips students with the ability to design two-dimensional and three-dimensional graphics, apply transformations, and solve programming problems using C. It covers arrays, functions, structures, pointers, and file handling while incorporating graphical programming techniques, including clipping and animation.

**Course Learning Outcomes**

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

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

## SYLLABUS

**UNIT I** **12 Hrs**

Overview of C: Constants, Variables, Keywords, and Data Types. Structure of a C program, Compilation, and Execution. Operators and Expressions. Control Structures: Decision-making (if, switch), looping (for, while, do-while), and case control structures. Graphics Basics: Introduction to <graphics.h>, initializing graphic modes, and basic graphics functions (line, circle, rectangle).

**UNIT II** **12 Hrs**

Arrays: One-dimensional and multi-dimensional arrays. Strings: String handling functions (strlen, strcpy, strcmp). Reading and writing strings. Graphics Drawing: Algorithms for line drawing (DDA, Bresenham's line algorithm). Circle drawing algorithms (Midpoint, Bresenham's circle algorithm).

**UNIT III** **12 Hrs**

Functions: Types, recursion, scope, and visibility. 2D Graphics: Basics of transformations – translation, rotation, scaling, reflection. Matrix representation and composite transformations. Animation: Introduction to basic animation concepts – frame-by-frame animation.

**UNIT IV** **11 Hrs**

Pointers: Basics of pointers, pointer arithmetic, accessing variables through pointers. File Handling: File operations, random access, and command-line arguments. Clipping Techniques: Line clipping (Cohen-Sutherland Algorithm), polygon clipping (Sutherland-Hodgman Algorithm).

**UNIT V** **11 Hrs**

3D Graphics: Basics of 3D transformations – translation, scaling, rotation. Projections: Orthographic and perspective projections.

**TEXT BOOKS**

| S. No | Author | Title of the Book | Publisher | Year and Edition |
|---|---|---|---|---|
| 1 | Balagurusamy | Programming in ANSI C | McGrawHill, | 2024,9th Edn |
| 2 | David J.Eck | Introduction to Computer Graphics | OTL | 2023, 1st Edn |

**REFERENCE BOOKS**

| S. No | Author | Title of the Book | Publisher | Year and Edition |
|---|---|---|---|---|
| 1 | Byron Gottfried | Programming with C | McGrawHill, | 2018, 4th Edn |
| 2 | Yashavant Kanetkar | Let Us C | BPB | 2022, 19th Edn |
| 3 | Donald Hearn & M. Pauline Baker | Computer Graphics: Principles and Practice | Pearson | 2013, 4th Edn |

**Pedagogy**

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

**Course Designer**

1. Dr. T. Sangeetha

| Course Code | Course Title | Category | L | T | P | Credit |
|---|---|---|---|---|---|---|
| GC25CP1 | Programming in C with Graphics Lab | Practical | - | - | 45 | 2 |

**Preamble**

This lab course provides students with practical experience in implementing graphical applications using C programming. Students will work with the graphics. library to design and develop 2D and 3D graphics, apply graphical transformations, implement basic animation techniques, and utilize clipping algorithms.

**Course Learning Outcomes**

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

| CLO Number | CLO Statement | Knowledge Level |
|---|---|---|
| CLO1 | Demonstrate an understanding of the basic syntax, semantics, and structure of C programming. | K1 |
| CLO2 | Design and Implement simple graphical interfaces and 2D visualizations using C graphics libraries | K2 |
| CLO3 | Apply logical problem-solving techniques to develop algorithms and write structured programs in C to solve computational problems. | K3 |
| CLO4 | Analyze and Implement graphical algorithms such as line drawing, circle drawing, and transformations using C. | K4 |

**Mapping with Programme Learning Outcomes**

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

S- Strong; M-Medium;

**LIST OF PROGRAMS**

- Draw basic shapes (points, lines, circles, and rectangles) in C using graphics functions.
- Implement translation of a 2D object (like a line or shape) in the graphics window.
- Implement scaling and rotation of a 2D object.
- Apply shearing and reflection transformations to 2D objects.
- Implement and compare different line drawing algorithms.
- Implement and compare different circle drawing algorithms.
- Implement line clipping algorithms for 2D objects.
- Implement animation techniques and user interaction with graphics.

**Pedagogy**

Demonstration of working environment / Tools / Software / Program

**Course Designer**

1. Dr. T. Sangeetha

| COURSE CODE | COURSE TITLE | CATEGORY | L | T | P | CREDIT |
|---|---|---|---|---|---|---|
| GC25C04 | OOPS WITH GRAPHICS | THEORY | 73 | 2 | - | 3 |

**Preamble**

This course introduces the concepts of Object-Oriented Programming using Java and graphics concepts to explore its features such as classes, inheritance, packages, interfaces, and exception handling. It further emphasizes applets, graphics, AWT, and Swing to build creative and user interactive applications.

**Prerequisite**

Students should have basic knowledge of programming fundamentals such as variables, control statements, and functions.

**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 principles and implement Java programs using basic constructs. | **K1** |
| **CLO2** | Apply classes, objects, inheritance, and abstraction to design structured solutions to computational problems. | **K2** |
| **CLO3** | Employ packages, interfaces, string handling, exception handling, and file I/O to develop modular and error-free applications. | **K3** |
| **CLO4** | Design and implement applets, graphics, and GUI applications using AWT and Swing with event handling. | **K4** |

**Mapping with Programme Learning Outcomes**

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

S-Strong; M-Medium;

## OOPS WITH GRAPHICS- GC25C04- 73 HRS

**UNIT I** **(14 Hrs)**

Introduction to Object Oriented Programming Paradigm and Java Language: Introduction – Object Oriented Programming Paradigm – Evolution of Java – Features of Java Language – Overview of Java platforms – Basics of Java: Keywords- Identifiers - Data Types - Variables – Console I/O - Simple Java program – Executing a Java Program - Basic Debugging – IDE's (Intellij/Eclipse/NetBeans) and Coding conventions.

**UNIT II** **(15 Hrs)**

Classes, Objects and Methods: Introduction- Class Definition Instance Variables and Member Methods- Declaration of Objects and Accessing Members – Classification of Members methods - Inheritance: Introduction – Method overriding – Types of Inheritance: Single level Inheritance – Multi-level Inheritance –Hierarchical Inheritance -Hybrid Inheritance- Constructors and Inheritance – Abstract classes and methods.

**UNIT III** **(15 Hrs)**

Packages - Packages and Member Access - Importing Packages -Interfaces - Exception Handling Exception Types - Using Try and Catch - Nested Try - Throw - Throws - String Handling - String Operations - Character Extraction - String Comparison - Searching String - Modifying String - I/O Basics -Byte & Character Streams- Reading Console Input –Writing Console Output – Reading and Writing Files.

**UNIT IV** **(14 Hrs)**

Introduction to Applet Programming – Building applet code – Applet life cycle – Applet tag – Adding applet to HTML file – Running the Applet – Introducing Graphics programming – Graphics Class – Lines and Rectangles – Circles and Ellipses – Drawing arcs -Drawing Polygons - Line Graphs – Drawing Bar charts.

**UNIT V** **(15 Hrs)**

Introducing AWT Controls - AWT Control fundamentals - Labels - Using Buttons – Applying Check Boxes - Choice Controls - Using List - Using Text field & Text area – Introducing GUI Programming with Swing - Two Key Swing Features - Components and Containers – Swing Packages – A Simple Swing application - Event Handling - Painting in Swing - Painting example – Compute the Paintable area - A Paint Example.

**Text Book**

| S.No | Authors | Title | Publishers | Year and Edition |
|---|---|---|---|---|
| 1. | Herbert Schildt | Java : The Complete Reference | McGraw Hill Education | 2022,12th Edn |
| 2. | E. Balaguruswamy | Programming with JAVA | McGraw Hill Professional | 2015, 6th Edn |

**Books for Reference**

| S.No | Authors | Title | Publishers | Year and Edition |
|---|---|---|---|---|
| 1. | David M. Geary | Graphic Java 2: Swing | Prentice Hall Professional, 1999 | 1999, 3rd Edn |
| 2. | Amro SOLIMA | Java Swing Complete Comprehensive Guide | Independently published | 2020, 1st Edn |

**Pedagogy**

- PowerPoint Presentations, Group Discussion, Seminar, Quiz Assignment, Experience Discussion

**Course Designer**

1. Dr. P. Parvathi

| COURSE CODE | COURSE TITLE | CATEGORY | L | T | P | CREDIT |
|---|---|---|---|---|---|---|
| IN23C05 | DATA STRUCTURE AND ALGORITHM | THEORY | 58 | 2 | - | 3 |

**Preamble**

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

**Course Learning Outcomes**

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

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

**Mapping with Programme Learning Outcomes**

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

S- Strong; M-Medium;

## DATA STRUCTURE AND ALGORITHM- IN23C05- 58 Hrs

**UNIT I** **(12 Hrs)**

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

**UNIT II** **(12 Hrs)**

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

**UNIT III** **(11 Hrs)**

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

**UNIT IV** **(13 Hrs)**

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

**UNIT V** **(10 Hrs)**

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

**Text Books**

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

**Books for Reference**

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

**Pedagogy**

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

**Course Designer**

Dr. R. Jeevitha

| COURSE CODE | COURSE TITLE | CATEGORY | L | T | P | CREDIT |
|---|---|---|---|---|---|---|
| GC25CP2 | OOPS WITH GRAPHICS LAB | PRACTICAL | - | - | 75 | 3 |

**Preamble**

This lab course provides hands-on experience in Object-Oriented Programming using Java, focusing on classes, inheritance, interfaces, and file handling. It emphasizes graphics programming, applets, AWT, and Swing to develop interactive and visually engaging applications.

**Prerequisite**

Students should have a basic understanding of programming concepts such as variables, control statements, and functions.

**Course Learning Outcomes**

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

| CLO Number | CLO Statement | Knowledge Level |
|---|---|---|
| **CLO1** | Implement basic Java programs using variables, control statements, classes, and objects to solve simple computational problems. | **K1** |
| **CLO2** | Apply object-oriented concepts such as inheritance, polymorphism, abstraction, and interfaces to develop modular Java programs. | **K2** |
| **CLO3** | Utilize string handling, packages, exception handling, and file I/O operations to build robust and reusable Java applications. | **K3** |
| **CLO4** | Design and develop interactive graphical applications using Applets, 2D Graphics, AWT, and Swing with event handling and custom painting. | **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;

## OOPS WITH GRAPHICS LAB - GC25CP2 – 75 Hrs

**Program List**

- Basic Java Programs (variables, operators, control statements, and console I/O).
- Classes and Objects (Implementation of classes, objects, and methods with real-world examples)
- Inheritance and Polymorphism (single, multilevel, hierarchical, and hybrid inheritance)
- Abstract Classes and Interfaces (abstraction and multiple inheritance via interfaces)
- String Handling – (string operations: searching, comparison, extraction, and modification)
- Packages and Access Control (Creating and importing user-defined packages with member access)
- File I/O Operations (Reading from and writing to files using byte and character streams)
- Applet Programming – Creating simple applets, implementing applet lifecycle, and embedding in HTML.
- 2D Graphics Programming – Drawing lines, rectangles, circles, ellipses, arcs, polygons, and charts.
- AWT Controls – Implementing labels, buttons, check boxes, choice controls, lists, text fields, and text areas.
- Swing GUI Applications (Designing GUI with containers, components, and event handling)
- Painting in Swing (Programs demonstrating custom painting and handling paintable areas)
- Developing a small interactive graphical application (e.g., paint app, chart generator, or simple game)

**Pedagogy**

- Demonstration of working environment/Tools/Software/Program

**Course Designer**

1. Dr. P. Parvathi