PGDCA Semester: I 2025-26

Discipline Centric Core Course (DCC)

FOCCC27001T: Fundamentals of Computers & Operating System

(20 CIA + 80 EoSE. = Max. Marks: 100)

Course Credits	No. of Teaching Hours Per Week	Total No. of Teaching Hours
3 Credits	3 Hours	45 Hours

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

- Understand the basic components, functions, and types of computers and their applications.
- Describe the architecture, working, and characteristics of input, output, memory, and storage devices.
- Explain the concept of software, types of software, and role of system and application software.
- Analyze the role and functions of operating systems in managing hardware and software resources.
- Compare different types of operating systems and demonstrate understanding of their features (e.g., batch, multi-user, real-time).

SYLLABUS

Unit-I: Evolution of computers, Classification of computers: Micro, Mini, Mainframe, Supercomputers, Characteristics and applications of computers, Block diagram of a computer, Input, Output and Storage Devices

Unit-II: Data and Information Management: Concept of Data, Information, and Knowledge, Types and sources of data, Introduction to databases, File systems vs. DBMS, Basic concepts of data storage and retrieval, Data security and privacy basics

Unit-III: Data Communication and Networks: Introduction to data communication, Network types: LAN, MAN, WAN, PAN, Topologies: Bus, Ring, Star, Mesh, Hybrid, Internet, Intranet, and Extranet, Basics of IP address, domain names, and DNS, Network devices: Router, Switch, Hub, Modem

Unit-IV: Applications and Emerging Trends: Role of IT in business, education, healthcare, and governance, E-Governance, E-Commerce, M-Commerce, Social, legal, and ethical aspects of IT, Cloud Computing and IoT – introduction, Cyber security

Unit-V: Computer Software and Operating Systems: System Software and Application Software, Operating Systems: Functions and types (DOS, Windows, Linux, Android), Introduction to programming languages: Machine, Assembly, High-level languages, Open-source software and licensing, Utility programs and their types.
Introduction to Ms –Office(Word, Excel, PowerPoint)

SUGGESTED BOOKS

1. "Fundamentals of Computers" – V. Rajaraman
2. "Computer Fundamentals" – P.K. Sinha & Priti Sinha
3. "Introduction to Computers" – Peter Norton
4. "Operating System Concepts" – Abraham Silberschatz, Peter B. Galvin, Greg Gagne
5. "Operating Systems" – Achyut S. Godbole & Atul Kahate

Discipline Centric Core Course (DCC)

PGCCC27001T: Programming in C

(20 CIA + 80 EoSE. = Max. Marks: 100)

Course Credits	No. of Teaching Hours Per Week	Total No. of Teaching Hours
3 Credits	3 Hours	45 Hours

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

- Understand and apply the basic syntax and structure of C programming.
- Analyze and solve computational problems using appropriate algorithms and logic.
- Write modular and reusable code using functions and recursion.
- Implement and manipulate arrays, strings, and structures effectively.
- Use pointers for efficient memory access and dynamic allocation.

SYLLABUS

Unit-I: Program Concept, Characteristics of Programming, Various stages in Program Development, Algorithm and Flowchart, Programming Techniques – Top down, Bottom up, Modular, Structured, Cohesion & Coupling. Introduction & features of C, Structure of C program, Variable, Tokens: keywords, identifiers, constants, and operators. Data Types: built-in, derived and user defined. Type conversion: Implicit and Explicit.

Unit-II: Operator's classification: based on availability of operands (unary, binary and ternary) and based on specific category: Arithmetic, Assignment, Relational, Logical, Bitwise, increment/ decrement, conditional. Basic input/output and library functions: Single character (Unformatted) input/output i.e. getch(), getchar(). getche(), putchar(),Formatted input output i.e. printf() and scanf(), Library functions - concepts, Mathematical functions: pow(), sqrt(), sin(), tan(), cos().

Unit-III: Control structures / statements: Conditional statements: independent if, if..else, if..elseif ladder, nested if, switch.. case, Looping: entry controlled and exit controlled and Jump Statements: goto, break, continue, return, exit(). Array: Single and Multi-Dimensional arrays, Array declaration and initialization of arrays, Strings: declaration, initialization, built-in functions: strupr(), strlwr(), strlen(), strrev(), strcat(), strcpy(), strcmp(). Pointers: Declaration, initialization, pointer arithmetic, pointer to pointer, types: generic (void) pointer, NULL pointer.

Unit-IV: Functions: needs, types: User defined: function prototyping, function definition, function calling and library function, categories of function, passing arguments: call by value and call by reference, Recursive function, Array as function argument, Scope and life of variables - local and global variable, Storage class specifier - auto, extern, static, register.

Unit-V: Structure: Defining structure, Declaration of structure variable, Accessing structure members, Union. File Handling Basics: Working with text files

SUGGESTED BOOKS

1. "Programming in ANSI C" – E. Balagurusamy
2. "Let Us C" – Yashavant Kanetkar
3. "The C Programming Language" – Brian W. Kernighan & Dennis M. Ritchie
4. "Programming with C" – Byron Gottfried (Schaum's Outlines)
5. "Computer Fundamentals and Programming in C" – Reema Thareja

Discipline Centric Core Course (DCC)

DMSCC27001T: Database Management Systems (DBMS)

(20 CIA + 80 EoSE. = Max. Marks: 100)

Course Credits	No. of Teaching Hours Per Week	Total No. of Teaching Hours
3 Credits	3 Hours	45 Hours

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

- Recall the Database Management Systems (DBMS) and the challenges of file-based data management systems and the responsibilities of a database administrator (DBA) and a database manager in database management.
- Explain the concepts of entities, attributes, and relationships in ERM and their roles in database design
- Apply the concepts of database languages, data independence principles to design and create database schemas
- Apply various join operations, mathematical functions and string oriented functions
- Explain PL/SQL block, data type, control structures, sequential control, transaction management

SYLLABUS

Unit-I: Introduction to Database: Need for DBMS, advantages of DBMS, views of data, instances and schema data independence, database administrator, database manager, database languages, overall structure of DBMS.

Unit-II: Entity Relationship Model: Entities, attributes, relationships, constraints, keys, E-R diagram. Concept of strong and weak entity sets, generalization, specialization and aggregation. RDBMS – Basic concept, Codd's rule for RDBMS. Functional dependencies and Normalization for relational databases - design guidelines for relational schema, functional dependencies, normal forms (1NF, 2NF and 3NF).

Unit-III: SQL – Basic structure – Clauses, data types, creates tables. Modification of the database – deletion, insertion, updates. Retrieving data from tables, ordering, set operations – union, intersect, except, concept of NULL values, nested subqueries – set membership, set comparison, exist and not exist operator, unique, not unique construct.

Unit-IV: Joins, equi-joins, non-equi-joins, self joins, outer joins. Aggregate functions – group by and having clause. Math functions-ABS, CEIL, FLOOR, ROUND, POWER, SQRT, EXP, MOD AND TRUNC, string functions-LENGTH, LOWER, UPPER, TRIM, CONCAT. Views, granting and revoking permissions.

Unit-V: PL/SQL: Basics concepts, advantages, variables, constants, data types, comments, output function, control structures – conditional, iterative and sequential control, database access with PL/SQL, transaction management Cursor – basic concept, types-implicit and explicit, Procedures and Functions - advantages, creation, execution, deletion, overloading, stored procedures and functions. Packages – creation and execution. Triggers - use, types, creating, deleting. Exception Handling.

SUGGESTED BOOKS

1. "Database System Concepts" by Abraham Silberschatz, Henry F. Korth, and S. Sudarshan
2. "Fundamentals of Database Systems" by Ramez Elmasri and Shamkant B. Navathe
3. "Database Management Systems" by Raghu Ramakrishnan and Johannes Gehrke
4. "An Introduction to Database Systems" by C.J. Date
5. "Learning SQL" by Alan Beaulieu (O'Reilly Media)
6. "Database Systems: A Practical Approach to Design, Implementation and Management" by Thomas Connolly and Carolyn Begg

Discipline Centric Core Course (DCC)

WTCCC27001T: Web Technologies

(20 CIA + 80 EoSE. = Max. Marks: 100)

Course Credits	No. of Teaching Hours Per Week	Total No. of Teaching Hours
3 Credits	3 Hours	45 Hours

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

- To understand the structure and function of the web and client-server architecture.
- To develop web pages using HTML, CSS, and JavaScript.
- To introduce server-side programming using PHP or Node.js.
- To understand the basics of web hosting and databases (like MySQL or MongoDB).
- To create responsive and interactive websites.

SYLLABUS

Unit-I: **Introduction to Web & HTML**

Basics of Internet and Web Technologies WWW, HTTP/HTTPS, URL, Web Browsers
Introduction to HTML HTML Elements: headings, paragraphs, links, lists, images, tables, forms HTML5 Features: audio, video, semantic tags

Unit-II: **Cascading Style Sheets (CSS)**

Introduction to CSS Types of CSS: Inline, Internal, External CSS Selectors and Properties
Box Model, Positioning, Flexbox Media Queries and Responsive Design

Unit-III: **JavaScript & DOM Manipulation**

Introduction to JavaScript Variables, Data types, Operators, Functions Conditional statements and loops Events and Event Handling DOM Manipulation: getElementById, querySelector, innerHTML, etc. Introduction to ES6 features (let, const, arrow functions)

Unit-IV: **Server-Side Scripting with PHP**

Introduction to PHP Variables, Data types, Control structures
Forms and User Input Sessions and Cookies File Handling Connecting to MySQL

Unit-V: **Web Hosting and Project**

Introduction to Web Servers: Apache,Hosting a website: Domain and Hosting basics
FTP, cPanel basics Introduction to CMS (WordPress) – optional
Mini Project: Develop a Dynamic Website using HTML, CSS, JS, and PHP

SUGGESTED BOOKS

1. Achyut Godbole & Atul Kahate – *Web Technologies*, Tata McGraw Hill
2. Thomas A. Powell – *HTML & CSS: The Complete Reference*
3. Robin Nixon – *Learning PHP, MySQL & JavaScript*, O'Reilly
4. Ivan Bayross – *Web Enabled Commercial Application Development using HTML, JavaScript, DHTML and PHP*
5. Jon Duckett – *JavaScript and jQuery*

Ability Enhancement Core Course (AECC)

ENGAC27001T: Communication Skills in English

(20 CIA + 80 EoSE. = Max. Marks: 100)

Course Credits	No. of Teaching Hours Per Week	Total No. of Teaching Hours
4 Credits	4 Hours	60 Hours

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

- Students will gain a comprehensive understanding of basic sounds of English and identify key literary forms.
- Students will Interpret and appreciate selected poetic and literary texts by Shakespeare, Tagore, and R.K. Narayan, demonstrating a grasp of theme, tone, and literary techniques.
- Students will apply knowledge of English grammar structures such as form classes, articles, prepositions, modal auxiliaries, and the use of prefixes, suffixes, and connectives in context..
- Students will explore the concept of Using appropriate tenses, voice (active/passive), and speech (direct/indirect) so as to learn English effectively.
- Students will compose formal and informal letters, reports, and job applications with clarity, correct structure, and suitable vocabulary.

SYLLABUS

Unit-I: The Sounds of English: Consonants, Mono-thongs, Diphthongs. An Acquaintance with Literary Forms:- Elegy, Ballad, and Sonnet An Acquaintance with Figures of Speech:- Simile, Metaphor, Personification, and Irony

Unit-II: Poetry : William Shakespeare – All the World is a stage. Rabindranath Tagore – Where the Mind is without Fear. Act Play/Novel: R. K. Narayan – Vendor of Sweets.

Unit-III: Introduction to Form Classes, Tenses and its uses. Articles, Preposition and Modal auxiliaries.

Unit-IV: Active and Passive Voice, Direct and Indirect Speech, Prefixes and Suffixes, Connectives.

Unit-V: English Writing Skills: Formal Letters & Informal Letters, Report Writing, Application for Job / Job Letter.

SUGGESTED BOOKS

1. "An Introduction to Literary Forms" by W.H. Hudson.
2. "The Vendor of Sweets" by R.K. Narayan
3. "English Verse: An Introduction" by David Kennedy
4. "High School English Grammar and Composition" by P.C. Wren & H. Martin.
5. "Effective English Communication" by M.A. Yadugiri & Geetha Rajeevan.

Discipline Centric Core Course (DCC)

FOCCC27001P: Fundamentals of Computers & Operating System Lab

(20 CIA + 80 EoSE. = Max. Marks: 100)

Course Credits	No. of Teaching Hours Per Week	Total No. of Teaching Hours
1 Credits	2 Hours	30 Hours

SUGGESTED LABORATORY EXERCISE

Part A: MS Word

1. Create a **formal letter** to your principal requesting leave for a personal reason. Use proper formatting:
    a. Font: Times New Roman, Size: 12
    b. Bold the headings and underline the subject.
    c. Insert header with your name and footer with page number.
2. Design a **biodata/resume** using tables, bullet points, and borders.
3. Create a **mail merge** document to send invitations to 10 friends.

Part B: MS Excel

4. Create a **marksheet** for 10 students with fields: Name, Roll No, Subject 1–5, Total, Percentage, Grade.
    a. Use formulas for Total and Percentage.
    b. Use conditional formatting for grades (A, B, C, etc.).
5. Prepare a **monthly expense sheet** using Excel with bar/line chart representation.
6. Use **functions** like SUM, AVERAGE, IF, VLOOKUP/HLOOKUP in sample data.

Part C: MS PowerPoint

7. Design a **5-slide presentation** on any one of the following topics:

    - Impact of Technology in Education
    - Cyber Security Basics
    - Artificial Intelligence in Daily Life

    Include:

    - Title Slide
    - At least one image
    - Use of transitions and animations
    - Proper use of bullet points and layout

Discipline Centric Core Course (DCC)

PGCCC27001P: Programming in C Lab

(20 CIA + 80 EoSE. = Max. Marks: 100)

Course Credits	No. of Teaching Hours Per Week	Total No. of Teaching Hours
1 Credits	2 Hours	30 Hours

SUGGESTED LABORATORY EXERCISE

1. Write a program to swap two numbers using a temporary variable.
2. Write a program to find the sum and average of three numbers.
3. Write a program to check whether a number is even or odd using.
4. Write a program to find the largest among three numbers.
5. Write a program to display a simple calculator using switch-case.
6. Write a program to print the multiplication table of a number using loops.
7. Write a program to generate the Fibonacci series up to n terms.
8. Write a program to find the sum and average of elements in a 1D array.
9. Write a program to sort an array in ascending order.
10. Write a program to perform matrix addition and multiplication.
11. Write a program to count the number of vowels in a string.
12. Write a program to find the factorial of a number using recursion.
13. Write a program to demonstrate call by value and call by reference.
14. Write a program to create a structure for student data and display it.
15. Write a mini-project to manage employee records using structures and file handling.

SUGGESTED BOOKS

1. "Programming in ANSI C" – E. Balagurusamy
2. "Let Us C" – Yashavant Kanetkar
3. "The C Programming Language" – Brian W. Kernighan & Dennis M. Ritchie
4. "Programming with C" – Byron Gottfried (Schaum's Outlines)
5. "Computer Fundamentals and Programming in C" – Reema Thareja

Discipline Centric Core Course (DCC)

DMSCC27001P: DBMS Lab

(20 CIA + 80 EoSE. = Max. Marks: 100)

Course Credits	No. of Teaching Hours Per Week	Total No. of Teaching Hours
1 Credits	2 Hours	30 Hours

SUGGESTED LABORATORY EXERCISE

Q1. Create a database named UniversityDB.

Q2. Create the following tables with appropriate data types and constraints:

- Students(StudentID, Name, Gender, DOB, DepartmentID)
- Departments(DepartmentID, DeptName)
- Courses(CourseID, CourseName, Credits)
- Enrollments(EnrollID, StudentID, CourseID, Semester)

Q3. Alter the Students table to add a new column Email with NOT NULL constraint.

Q4. Add a CHECK constraint to ensure that the Credits in Courses table is between 1 and 6.

Q5. Add a FOREIGN KEY to Enrollments table referencing Students.

Q6. Insert at least 5 sample records into each of the above tables.

Q7. Update the Email of a student whose name is 'Amit'.

Q8. Delete all students who belong to a department that no longer exists.

Q9. Display all student names in ascending order.

Q10. List all students born after the year 2000.

Q11. Retrieve the list of departments that start with the letter ‘C’.

Q12. Count the total number of students enrolled in the 'Computer Science' department.

Q13. Find the average number of credits for all courses.

Q14. List departments having more than 3 students.

Q15. Write a query to list all students with their course names using INNER JOIN.

Q16. Display all students and the courses they are enrolled in, including those not enrolled in any course (LEFT JOIN).

Q17. Find the courses that are not taken by any student.

Q18. Find the names of students who have enrolled in all courses having more than 3 credits.

Q19. Retrieve students who belong to the same department as 'Priya'.

Q20. Display the names of courses that have more credits than the average course credit.

Q21. Write a PL/SQL block to check if a number is even or odd.

Q22. Write a PL/SQL program to calculate factorial of a number using FOR loop.

Discipline Centric Core Course (DCC)

WTCCC27001P: Web Technologies Lab

(20 CIA + 80 EoSE. = Max. Marks: 100)

Course Credits	No. of Teaching Hours Per Week	Total No. of Teaching Hours
1 Credits	2 Hours	30 Hours

SUGGESTED LABORATORY EXERCISE

1. Basic HTML Pages

- Create a personal portfolio page using HTML.
- Design a college website homepage using HTML tags and elements.
- Create a registration form using form elements.

2. HTML + CSS

- Design a responsive website layout using CSS Grid
- Create a product landing page with styled buttons, images, and navigation bar.
- Apply external, internal, and inline CSS styles to format a web page.

3. JavaScript Basics

- Write a script to validate user input in a form (email, phone number, etc.).
- Create a calculator using JavaScript.
- Develop a script to dynamically change content/style of a webpage on button click.

4. DOM Manipulation

- Build a to-do list application with add, delete, and edit features.
- Implement an image slider using JavaScript and DOM.
- Develop a quiz app that evaluates answers and shows a score.

5. Bootstrap / Responsive Design

- Build a responsive website using Bootstrap.
- Create a card-based layout for a blog or gallery using Bootstrap components.

6. Mini Project

- Develop a complete website (e.g., Student Management System / Portfolio / Shopping Cart).
- Ensure it has navigation, multiple pages, responsive design, form handling, and JavaScript interactivity.

PGDCA Semester: II 2025-26

Discipline Centric Core Course (DCC)

DSACC27002T: Data Structures and Algorithms

(20 CIA + 80 EoSE. = Max. Marks: 100)

Course Credits	No. of Teaching Hours Per Week	Total No. of Teaching Hours
3 Credits	3 Hours	45 Hours

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

- Explain the foundational concepts of data structures and memory management, and demonstrate the concept of recursion through examples.
- Apply and implement array and linked list structures in programs, performing insertion, deletion, and traversal operations.
- Construct stacks and queues and apply them in expression handling and recursive function simulations.
- Analyze tree and graph data structures using various traversal techniques and apply them in real-world applications.
- Evaluate the performance of searching and sorting algorithms and choose the most appropriate method for different scenarios.

SYLLABUS

Unit-I: Introduction and Basic Concepts: Introduction to Algorithms and Flowcharts. Definition of Data Structures, Classification of data structures (primitive and non-primitive, linear and non-linear), and Abstract Data Type (ADT).Definition and meaning of static and dynamic memory allocation, Memory allocation functions. Recursion – Definition, advantages, Writing Recursive algorithms.

Unit-II: Array & Linked List: Arrays: Definition, Single and Multidimensional Arrays, Row Major Order, and Column Major Order, Sparse Matrices and their representations.
Linked lists: Definition of linked list, Representation of linked list, Advantages and Disadvantages of linked list. Types of linked list: Singly linked list, doubly linked list, Circular linked list. **Operations on singly linked list:** creation, insertion, deletion, search and display. Applications of Arrays and Linked lists.

Unit-III: Stack and Queue: Stacks: Definition, Array and Linked list representation of Stack, Push & Pop Operation. **Application of stack:** Infix, Prefix and Postfix representation and conversion using Stack, Postfix expression evaluation using stack, recursion using stack.
Queues: Array and Linked list representation of Queue, Operations on Queue: Create, Add, Delete. **Types of queues:** Simple queue, Circular queue, Double ended queue (deque), Priority queue. Applications of queues.

Unit-IV: Tree and Graph: Trees: Definition of Tree and basic Tree terminology, Types of Trees: Binary tree, Complete binary tree, Binary search tree, AVL Tree and Heap. Binary Tree Representation and operations. Tree Traversal algorithms: In order, Pre-order and Post order. **Graphs:** Terminology used with Graph, Data Structure for Graph Representations (Adjacency Matrices, Adjacency List). Graph Traversal: Depth First Search and Breadth First Search. Applications of graphs.

Unit-V: Searching and Sorting: Searching & Sorting: Concept of Searching, Sequential search, Binary Search. Comparison between sequential and binary search. Concept of Hashing & Collision resolution Techniques used in Hashing. **Sorting:** Insertion Sort, Selection Sort, Bubble Sort, Quick Sort, Merge Sort.

SUGGESTED BOOKS

1. Seymour Lipschutz, Data Structures, Schaum's Outlines Series, Tata McGraw-Hill.
2. Ellis Horowitz, S. Sahni, Freed, "Fundamentals of Data Structures in C", 2nd edition, 2015.
3. Thomas H. Cormen, C.E. Leiserson, R L.Rivest and C. Stein, Introduction to Algorithms, Third edition, MIT Press.
4. Y. Langsam, M. J. Augenstein and A. M. Tanenbaum, ―Data Structures using C, Pearson Education, Asia

Discipline Centric Core Course (DCC)

OOPCC27002T: Object-Oriented Programming Using Java

(20 CIA + 80 EoSE. = Max. Marks: 100)

Course Credits	No. of Teaching Hours Per Week	Total No. of Teaching Hours
3 Credits	3 Hours	45 Hours

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

- Understand the fundamentals of Java including data types, control structures, and arrays.
- Implement object-oriented concepts like classes, objects, inheritance, and polymorphism.
- Handle exceptions and apply robust error-handling mechanisms.
- Use threads and perform file operations using Java I/O APIs.
- Develop GUI-based applications using AWT/Swing and handle events effectively.

SYLLABUS

Unit-I: Introduction to Java Programming: History and evolution of Java, Java features and architecture, Java Development Kit (JDK), JRE, JVM, Structure of a Java program, Data types, variables, operators, expressions, Control structures (if, switch, loops), Introduction to arrays and command-line arguments

Unit-II: Object-Oriented Programming in Java: Classes and objects, Constructors and types, Method overloading, Static members, Access specifiers, Introduction to packages and interfaces

Unit-III: Inheritance, Polymorphism & Exception Handling: Inheritance: types, super and final keywords, Method overriding and dynamic method dispatch, Abstract classes and interfaces, Exception handling: try-catch, finally, throw, throws, Built-in and user-defined exceptions

Unit-IV: Multithreading, String Handling & I/O: String and StringBuffer classes, Multithreading: Thread class, Runnable interface, thread lifecycle, Thread synchronization and inter-thread communication, Java I/O: Byte and Character streams, File handling (FileReader, FileWriter, BufferedReader)

Unit-V: Applet, AWT & Event Handling (GUI Programming): Applet lifecycle and basics, Abstract Window Toolkit (AWT) controls and layout managers, Event handling mechanisms, Introduction to Swing components (JButton, JLabel, JTextField) Simple GUI-based applications.Introduction to JDBC, Essential JDBC classes, Connecting to database.

SUGGESTED BOOKS

1. E. Balagurusamy – *Programming with Java*, McGraw Hill Education
2. Herbert Schildt – *Java: The Complete Reference*, McGraw Hill
3. Kathy Sierra, Bert Bates – *Head First Java*, O'Reilly Media
4. Paul Deitel & Harvey Deitel – *Java How to Program*, Pearson Education
5. Dr. R. Nageswara Rao – *Core Java: An Integrated Approach*, Dreamtech Press

Discipline Centric Core Course (DCC)

PPGCC27002T: Python Programming

(20 CIA + 80 EoSE. = Max. Marks: 100)

Course Credits	No. of Teaching Hours Per Week	Total No. of Teaching Hours
3 Credits	3 Hours	45 Hours

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

- Understand and apply basic syntax, variables, and program structure in Python.
- Apply control statements of python programming language
- Understand and implement built in data structures of Python
- Perform file handling and exception handling in Python
- Apply object-oriented programming principles and libraries of Python.

SYLLABUS

Unit-I: Introduction to Python: Python Features, Structure of a Python Program, Elements of Python, Python Interpreter, Python shell, Indentation, Strongly Typed features, Basic data types, Variables, Expressions, Statements, Flow of Execution, Input and Output Statements, Atoms, Identifiers and Keywords, Literals, Strings. Operators: Arithmetic operator, Relational operator, Logical or Boolean operator, Assignment, Operator, Ternary operator, Bit wise operator, Increment or Decrement operator.

Unit-II: Control Statements: IF, IF...ELSE, IF...ELIF..ELSE, MATCH...CASE. Loop Controls: WHILE Loop, FOR Loop, Range function, break, continue and pass statement with loop.
Python Data Structures: Strings: single line and multi-line strings, formatter, isdigit, isalpha, isalnum, islower, isupper, isspace, title, lower, upper, strip, split, splitlines join.

Unit-III: Lists: append, extend, insert, index, remove, pop, count, sort, reverse, slicing, Copying a list deep copy, shallow copy. Tuples: tuples, index, count, max, min, len. Dictionaries: keys, values, nested dictionaries, dictionary comprehension, clear, copy, get, items, keys, pop, popitem.
Sets Union, Intersection, Subset, Superset, Difference, Symmetric Difference, Copy, Add, Remove, Discard.

Unit-IV: Files, Regular Expression, and Exception Handling: File Objects, File Built-in Function, File Built-in Methods, File Built-in Attributes, Standard Files, Command-line Arguments, File System, File Execution, Persistent Storage Modules. Regular Expression: Introduction/Motivation, Special Symbols, and Characters for REs, REs, and Python. What Are Exceptions? Exceptions in Python, Detecting and Handling Exceptions, Exceptions as Strings, Raising Exceptions, Assertions, Standard Exceptions.

Unit-V: Concept of Object Oriented Programming: Data Hiding, Data Encapsulation, Class and Object, Polymorphism, Inheritance, Advantages of Object Oriented Programming over Earlier Programming Methodologies Classes: Defining Classes, Creating Instance Objects, Accessing Attributes and Methods, Constructor Methods in a Class. Introduction to Libraries: NumPy, Pandas, Matplotlib.

SUGGESTED BOOKS

1. Core Python Programming, R. Nageswara Rao, Dreamtech Press, Second Edition, 2018
2. Python Programming, Dr. M. Suresh Anand, Dr. R. Jothikumar, Dr. N. Vadivelan, Notion Press, First Edition, 2020
3. The Complete Reference Python, Martin C. Brown, McGraw Hill Education, Fourth Edition, 2018
4. Think Python, Allen B. Downey, O'Reilly Media, 2016

Discipline Specific Elective (DSE)

EECSE27002T: Essentials of E- Commerce

(20 CIA + 80 EoSE. = Max. Marks: 100)

Course Credits	No. of Teaching Hours Per Week	Total No. of Teaching Hours
4 Credits	4 Hours	60 Hours

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

- Describe the foundations and models of e-commerce.
- Analyze the impact of e-commerce on business processes and strategies.
- Demonstrate knowledge of electronic payment systems and e-commerce infrastructure.
- Apply legal, ethical, and security principles to e-commerce environments.
- Evaluate different e-commerce applications and platforms.

SYLLABUS

Unit I: Introduction to E-Commerce
Definition, history, and evolution,Traditional Commerce vs. E-Commerce Types of E-Commerce: B2B, B2C, C2C, C2B, G2C,Benefits and limitations of E-Commerce,E-Commerce trends and statistics

Unit-II:E-Commerce Business Models
Revenue models in e-commerce,Marketplaces and aggregators,Online retailing and e-tailing E-commerce portals (Amazon, Flipkart, etc.),Case studies of successful models

Unit-III:Technology Infrastructure for E-Commerce Internet and WWW as infrastructure Web hosting and cloud services E-Commerce websites: front-end and back-end Databases and Content Management Systems (CMS),Mobile commerce and emerging technologies

Unit-IV:Electronic Payment Systems
Overview of electronic payments Payment gateways and aggregators Digital wallets (Paytm, Google Pay, PhonePe, etc.) Credit/debit cards, net banking UPI, BHIM, cryptocurrency basics

Unit-V:Legal, Ethical, and Security Issues
Cyber laws related to e-commerce (IT Act 2000, GDPR overview) Intellectual Property Rights (IPR) Consumer Protection in e-commerce Online frauds and cybercrimes
E-commerce security protocols (SSL, encryption)

SUGGESTED BOOKS

1. E-Commerce: Strategy, Technologies and Applications – David Whiteley
2. Electronic Commerce – Gary Schneider
3. E-Business and E-Commerce Management – Dave Chaffey
4. Laudon & Traver, *E-commerce: Business, Technology, Society*
5. Websites like eMarketer, Statista, and Digital India initiatives
6. Government resources on Digital Payments and Startup India

Discipline Specific Elective (DSE)

CLCSE27002T: Cloud Computing

(20 CIA + 80 EoSE. = Max. Marks: 100)

Course Credits	No. of Teaching Hours Per Week	Total No. of Teaching Hours
4 Credits	4 Hours	60 Hours

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

- Understand cloud computing fundamentals, models, and architecture.
- Learn about virtualization, cloud infrastructure, and services.
- Gain practical skills in using cloud platforms like AWS, Azure, or GCP.
- Explore security, governance, and deployment strategies in the cloud.

SYLLABUS

Unit-I: **Introduction to Cloud Computing**
Definition and Characteristics of Cloud Computing Cloud Deployment Models: Public, Private, Hybrid, Community Cloud Service Models: IaaS, PaaS, SaaS Benefits and Challenges of Cloud Computing Use Cases and Applications

Unit-II: **Cloud Architecture & Virtualization**
Cloud Reference Model Cloud Infrastructure: Data Centers, Hypervisors Virtualization: Concept, Types (Full, Para, OS-level) Virtual Machines, Containers (Docker) Resource Management and Scheduling

Unit-III: **Cloud Service Providers**
Overview of AWS, Microsoft Azure, Google Cloud Platform Cloud Storage: S3, Blob Storage Compute Services: EC2, Azure VMs, GCP Compute Engine Networking in Cloud: VPC, Subnets, Load Balancers

Unit-IV: **Cloud Security and Compliance**
Security Issues in Cloud Computing Identity & Access Management (IAM) Data Privacy and Protection Legal & Regulatory Compliance (GDPR, HIPAA) Risk Management and Governance

Unit-V: **Cloud Applications and Trends**
Serverless Computing and Function-as-a-Service (FaaS) Edge and Fog Computing
Multi-cloud and Hybrid Cloud Strategies Cloud Automation and DevOps Tools Emerging Trends: AI in Cloud, Kubernetes, FinOps

SUGGESTED BOOKS

1. Cloud Computing: Principles and Paradigms – Rajkumar Buyya
2. Cloud Computing: Concepts, Technology & Architecture – Thomas Erl
3. Mastering Cloud Computing – Rajkumar Buyya, Christian Vecchiola, Thamarai Selvi
4. AWS Certified Cloud Practitioner Guide – Ben Piper

PGDCA Semester: II 2025-26

Discipline Centric Core Course (DCC)

DSACC27002P: Data Structures and Algorithms Lab

(20 CIA + 80 EoSE. = Max. Marks: 100)

Course Credits	No. of Teaching Hours Per Week	Total No. of Teaching Hours
1 Credits	2 Hours	30 Hours

SUGGESTED LABORATORY EXERCISE

1. Array Operations

Create an array and perform the following:

- Insertion
- Deletion
- Traversal
- Searching

2. Stack using Array

Implement stack using array with operations:

- Push
- Pop
- Peek
- Display

3. Stack using Linked List

- Same as above but using singly linked list.

4. Infix to Postfix Conversion

- Convert an infix expression to postfix using stack.

5. Queue using Array

- Implement a linear queue with enqueue and dequeue operations.

6. Circular Queue

- Implement a circular queue and handle overflow and underflow conditions.

7. Singly Linked List

- Create a singly linked list and perform:
- Insert at beginning/end
- Delete from beginning/end
- Display list

8. Doubly Linked List

- Perform insert and delete operations on both ends of a doubly linked list.

9. Binary Search

- Implement binary search on a sorted array.

10. Sorting Algorithms

Write programs to implement:

- Bubble Sort
- Insertion Sort
- Selection Sort

11. Binary Search Tree (BST)

- Create a BST and perform:
- Insertion
- Deletion
- In-order, Pre-order, Post-order traversals

PGDCA Semester: II 2025-26

Discipline Centric Core Course (DCC)

OOPCC27002P: Object-Oriented Programming Using Java Lab

(20 CIA + 80 EoSE. = Max. Marks: 100)

Course Credits	No. of Teaching Hours Per Week	Total No. of Teaching Hours
1 Credits	2 Hours	30 Hours

SUGGESTED LABORATORY EXERCISE

Q1. Write a program to calculate the sum of 2 user input integer number.

Q2. Write a program to find whether a given number is prime or not.

Q3. Write a menu driven program for following:

1. Compute Factorial of a number.

2. Check whether a given number is odd or even.

3. Check whether a given string is Palindrome or not.

Q4. Write a program to create an array of 10 integers. Accept values from the user in that array. Input another number from the user and find out how many numbers are equal to the number passed, how many are greater and how many are less than the number passed.

Q5. Write a program in java to input N numbers in an array and print out the Armstrong numbers from the set.

Q6. Write Java program to find the sum of all odd numbers in a 2D array.

Q7. Write a Java program to find duplicate elements in a 1D array and find their frequency of occurrence.

Q8. Write a java program for the following matrix operations:

1. Addition of two matrices.

2. Multiplication of two matrices.

Note: Input the elements of matrices from user.

Q9. Write a java program that computes the area of a circle, rectangle and a triangle using function overloading.

Q10. Write a Java for the implementation of multiple inheritance using interfaces to calculate the area of a rectangle and triangle.

Q11. Write a java program to create a package that validates username and password.

Q12. Write a java program to design a basic calculator using SWING.

Q13. Write a program for the following string operations: Compare two strings, Concatenate two strings, Compute length of a string.

A14. Create a class called Fraction that can be used to represent the ratio of two integers. Include appropriate constructors and methods. If the denominator becomes zero, throw and handle an exception.

Q15. Write a Java program in which total 4 threads should run. Set different priorities to the thread.

Q16. Write a JAVA program to perform the following:

1. Insert records in a database
2. Update searched record in a database
3. Delete searched records in a database
4. Display selected/all records from a database

Discipline Centric Core Course (DCC)

PPGCC27002P: Python Programming Lab

(20 CIA + 80 EoSE. = Max. Marks: 100)

Course Credits	No. of Teaching Hours Per Week	Total No. of Teaching Hours
1 Credits	2 Hours	30 Hours

SUGGESTED LABORATORY EXERCISE

1. Write a program in Python to count repeated characters in a string.

2. Write a program in Python to implement various string operators.

3. Write a program in Python to implement different types of built in string oriented functions.

4. Write a program in Python to create, append, and remove list elements from a given list. (List elements must be from user side)

5. Write a program in Python to display the sum and square of given integer elements from a given list.

6. Write a program in Python to find the largest and smallest number in a user defined list.

7. Write a program in Python to find unique and duplicate items of a user defined list.

8. Write a program in Python to count the numbers of characters in the string and store them in a dictionary data structure.

9. Write a program in Python to implement linear search.

10. Write a program in Python to implement various built in functions for Tuple.

11. Write a program in Python to implement Regular Expression (RegEx).

12. Write a program in Python to define a module to find Fibonacci Numbers and import the module to another program.

13. Write a program in Python to define a module and import a specific function in that module to another program.

14. Write a Python script named demo.py. This script should prompt the user for the names of two text files. The contents of the first file should be input and written to the second file.

15. Write a program in Python to accept student details and store in a database.

SUGGESTED BOOKS

1. Core Python Programming, R. Nageswara Rao, Dreamtech Press, Second Edition, 2018
2. Python Programming, Dr. M. Suresh Anand, Dr. R. Jothikumar, Dr. N. Vadivelan, Notion Press, First Edition, 2020
3. The Complete Reference Python, Martin C. Brown, McGraw Hill Education, Fourth Edition, 2018
4. Think Python, Allen B. Downey, O'Reilly Media, 2016

Skill Enhancement Course (SEC)

MPISC27002P: **Major Project / Industry Internship**

(20 CIA + 80 EoSE. = Max. Marks: 100)

Course Credits	No. of Teaching Hours Per Week	Total No. of Teaching Hours
3 Credits	6 Hours	90 Hours

SUGGESTED LABORATORY EXERCISE

1. Project Selection and Proposal

- Students must propose a project idea (web app, mobile app, system software, etc.)
- Individual or team of max 3 students
- Proposal should include:
    - Title
    - Problem statement
    - Objectives
    - Scope
    - Tools/Technologies planned
    - Expected Outcome
- Faculty guide will be assigned

2. System Analysis and Design

- Feasibility Study
- Requirement Gathering and Specification (SRS Document)
- UML Diagrams (Use Case, Class, Sequence, Activity)
- Data Flow Diagrams (DFD)
- ER Diagram (if DBMS is used)

3. Development and Implementation

- Coding using appropriate front-end and back-end tools
- Integration of modules
- Database Design and Implementation
- Version Control (e.g., Git) – recommended
- Use of frameworks and APIs if applicable

4. Testing and Deployment

- Unit testing, Integration testing, System testing
- Bug fixing and validation
- Deployment on local server/cloud platform (Heroku, Firebase, etc.)
- User Manual or Help Guide preparation

5. Final Report and Presentation

Project Report Documentation Guidelines

Formatting

- A4 size, Times New Roman, 12pt, 1.5 line spacing
- Justified alignment, 1" margin on all sides
- Header/Footer with page numbers

Content Structure

- Cover Page (Project Title, Student Info, College Name, Guide Name, Year)
- Certificate from Institution
- Declaration by Student
- Acknowledgment
- Abstract (200–300 words)
- Table of Contents
- Chapters:
    - Chapter 1: Introduction
    - Chapter 2: System Analysis (Problem, Objectives, SRS, Feasibility)
    - Chapter 3: System Design (DFD, ERD, UML diagrams)
    - Chapter 4: Implementation (Tools, Code snapshots, UI)
    - Chapter 5: Testing and Validation
    - Chapter 6: Conclusion and Future Enhancement
- Bibliography / References
- Appendix (if needed: code, extra screenshots)

Presentation Guidelines

- **Duration:** 10–15 minutes
- **Mode:** PowerPoint or Google Slides
- **Suggested Slides:**
    - Title Slide
    - Problem Statement
    - Objectives
    - Tools/Tech Stack
    - System Architecture & Design
    - Screenshots / Demo
    - Testing Highlights
    - Conclusion & Future Work

Value Added Course (VAC)

ICSVC27002T: Introduction to Cyber Security

(20 CIA + 80 EoSE. = Max. Marks: 100)

Course Credits	No. of Teaching Hours Per Week	Total No. of Teaching Hours
3 Credits	3 Hours	45 Hours

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

- Explain the fundamentals of cyber security and its importance.
- Recognize various cyber attacks and countermeasures.
- Apply basic security principles to protect IT systems.
- Analyze security threats in networks and software.
- Demonstrate knowledge of legal and ethical issues in cyber security.

SYLLABUS

Unit-I: **Introduction to Cyber Security** Importance and scope of cyber security
Threats, vulnerabilities, and attacks Types of attackers (script kiddies, insiders, hacktivists, etc.) Security goals: Confidentiality, Integrity, Availability (CIA)

Unit-II: **Cyber Crimes and Laws**
Types of cyber-crimes (hacking, phishing, identity theft, etc.) Indian IT Act 2000 and amendments Legal frameworks and cyber law policies Cyber forensics basics

Unit-III: **Network Security Fundamentals**
Introduction to network security Firewalls, IDS/IPS Cryptography basics: symmetric & asymmetric encryption Secure communication protocols (SSL/TLS, VPNs)

Unit-IV: **System and Application Security**
Operating system security principles Malware types and prevention Secure coding practices Authentication, authorization, and access control

Unit-V: **Cyber Security Tools and Practices**
Antivirus, anti-malware, and firewall tools Penetration testing and ethical hacking basics Incident response and disaster recovery Cyber hygiene and best practices for individuals

SUGGESTED BOOKS

1. Cybersecurity: The Beginner's Guide by Raef Meeuwisse
2. Principles of Information Security by Michael E. Whitman & Herbert J. Mattord
3. Cyber Security Essentials by James Graham, Richard Howard, and Ryan Olson
4. Information Security by Mark Stamp
5. IT Act 2000 (India) – Government Publications

Value Added Course (VAC)

IAMVC27002T: Introduction to AI and ML

(20 CIA + 80 EoSE. = Max. Marks: 100)

Course Credits	No. of Teaching Hours Per Week	Total No. of Teaching Hours
3 Credits	3 Hours	45 Hours

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

- Describe the fundamentals of AI and ML, including history and applications.
- Apply various problem-solving and search strategies in AI.
- Understand and implement basic supervised learning algorithms.
- Understand and apply unsupervised learning techniques.
- Develop simple AI/ML models using Python.

SYLLABUS

Unit-I: Introduction to AI: Definition, History and Evolution of AI Applications of AI in various domains, Foundations of AI: agents and environments Types of AI: Narrow, General, Strong AI, Introduction to Intelligent Agents

Unit-II: Problem Solving and Search Techniques: Problem formulation Uninformed Search Strategies: BFS, DFS, Uniform Cost Search, Informed Search Strategies: Greedy, A* Algorithm Heuristics and their role in search, Constraint Satisfaction Problems (CSP)

Unit-III: Introduction to Machine Learning : Definition and types of ML Differences between AI, ML, and Data Science, Supervised, Unsupervised, Reinforcement Learning ML life cycle and applications, Python libraries for ML: Scikit-learn, NumPy, Pandas

Unit-IV: Supervised Learning Algorithms: Regression: Linear, Polynomial Classification: k-NN, Decision Trees, Naive Bayes, Model evaluation: Accuracy, Precision, Recall, F1-Score Overfitting and Underfitting

Unit-V: Unsupervised Learning Algorithms: Clustering: K-Means, Hierarchical Dimensionality Reduction: PCA Applications of unsupervised learning Visualization of clustering and PCA results

SUGGESTED BOOKS

1. **Stuart Russell and Peter Norvig**, *Artificial Intelligence: A Modern Approach*, Pearson Education.
2. **Tom Mitchell**, *Machine Learning*, McGraw Hill.
3. **Aurélien Géron**, *Hands-On Machine Learning with Scikit-Learn, Keras, and TensorFlow*, O'Reilly.
4. **Ethem Alpaydin**, *Introduction to Machine Learning*, MIT Press.
5. **Trevor Hastie, Robert Tibshirani, Jerome Friedman,** *The Elements of Statistical Learning*, Springer.