



SNDT Women's University, Mumbai

**Undergraduate Degree / UG
Programme (Syllabus as Per NEP) -
Faculty of Science & Technology**

Bachelor of Computer Application

(B.C.A.)

As Per NEP – 2020

Semester – III & IV

Syllabus

(W.E.F. Academic Year 2025-26)

Terminologies

Vertical	Full-Form/Definition	Remarks	Related To Major And Minor Courses
Major (Core)	Subject Comprising Mandatory and Elective Courses, Major Specific IKS, Vocational Skill Courses, Internship/ Apprenticeship, Field Projects, Research Projects Connected to Major	Minimum 50% Of Total Credits Corresponding to Three/Four - Year UG Degree- Mandatory Courses	Related To The Major
Minor Course	Course From Same Or Different Faculty	Minimum 18-20 Credits to Be Completed in The First Three Years of UG Programme	Related To the Minor
OEC	Open Elective Courses/ Generic Courses	10-12 Credits to Be Offered in I And/Or II Year. Faculty-Wise Baskets of OEC To Be Prepared	OEC Is to Be Chosen Compulsorily from Faculty Other Than That of the Major
VSC	Vocational Skill Courses, Including Hands On Training Corresponding To The Major And/Or Minor Subject	8-10 Credits, To Be Offered in First Three Years, Wherever Applicable Vocational Courses Will Include Skills Based on Advanced Laboratory Practical's of Major	Related To the Major or Minor
SEC	Skill Enhancement Courses	06 Credits, To Be Offered in I And II Year, To Be Selected from The Basket of Skill Courses Approved by University	Related To the Major or Minor Any Relevant Skill
AEC	Ability Enhancement Courses	08 Credits, To Be Offered in I And II Year, English: 04 Credits to Be Earned in Sem - I, Modern Indian Language Of 04 Credits to Be Offered in II Year	NA
VEC	Value Education Courses	Understanding India, Environmental Science/Education, Digital and Technological Solutions, Health &	NA

		Wellness, Yoga Education, Sports, And Fitness	
IKS	Indian Knowledge System	Generic IKS Course: Basic Knowledge Of The IKS To Be Offered At First Year Level	Major-Specific IKS Courses: Advanced Information About the Major, Part of the Major Credit to Be Offered at Second- Or Third-Year Level
OJT	On-Job Training (Internship / Apprenticeship)	Corresponding To the Major Subject	Related To The Major
FP	Field Projects	Corresponding To the Major Subject	Related To the Major
CC	Co-Curricular Courses	Health And Wellness, Yoga Education Sports, And Fitness, Cultural Activities, NSS/NCC And Fine/ Applied/Visual/ Performing Arts	NA
CE	Community Engagement and Service		Related To Major
RP	Research Project	Corresponding To the Major Subject	Related To Major

Programme Template

Degree		Bachelor of Computer Application (BCA)
Programme		Physics
Preamble		The Bachelor of Computer Applications (BCA) program is a four-year undergraduate degree program as per NEP-2020 designed to provide students with a strong foundation in computer science and its applications. The program aims to equip students with the knowledge and skills required to excel in the rapidly evolving field of computer science and information technology. The BCA program combines theoretical knowledge with practical applications to ensure that students develop a comprehensive understanding of computer systems, software development, database management, networking, and other core areas of computer science. It is an ideal choice for students who are interested in pursuing a career in the IT industry or furthering their studies in computer science. During the course of the BCA program, students are exposed to a wide range of subjects that cover various aspects of computer science. These subjects typically include programming languages, data structures, algorithms, computer architecture, operating systems, software engineering, web development, database management systems, computer networks, and information security. Upon successful completion of the BCA program, graduates have a wide range of career opportunities in the IT industry. They can work as software developers, system analysts, database administrators, network administrators, web developers, IT consultants, and other related roles. Graduates may also choose to pursue higher education, such as a Master's degree in computer science or a specialized field within the IT domain. By combining theoretical knowledge, practical skills, and industry exposure, the program equips students with the necessary tools to thrive in the IT industry and contribute to technological advancements
Programme Specific Outcomes (PSOs)		After completing this programme, Learner will
	1	Describe a strong foundation in computer application, including knowledge of Programming languages, Database, Mathematics, Operating system and Networking.
	2	Analyze the ethical and professional responsibilities in the

		field of computer applications by evaluating the Implications of adhering to professional standards and practices.
	3	Applying programming knowledge to develop a software application to solve specific problems.
	4	Evaluate software designs and architectures for efficiency, security and user experience.
	5	Design a software application to meet the requirements of the Industrial Standards.
Eligibility Criteria for Programme		As per AICTE approval process
Intake (For SNTD WU Departments and Conducted Colleges)		

Structure with Course Titles**Bachelor of Computer Application (BCA)****Semester – III**

Sr. No.	Course	Type of Course	Credits	Marks	Int Marks	Ext Marks
	Semester - III					
30135411	Probability & Statistics (Th)	Major (Core)	4	100	50	50
30135412	Database Management System (Th+Pr) (2+2)	Major (Core)	4	100	50	50
30135413	Advanced Web Designing (Th+Pr) (2+2)	Major (Core)	4	100	50	50
30335411	Design Thinking & Innovation (Th)	Minor Stream	2	50	0	50
30435411	Basics of Data Analysis using spreadsheet (Th)	OEC (Any One)	2	50	0	50
30435412	AI Tools (Th)					
30435413	E-commerce Technologies (Th)					
	Modern Indian Language Ability Enhancement Course (AEC) Link: https://sndt.ac.in/pdf/academics/syllabus-as-per-nep/aec-syllabus/ug-degree/aec-semester-iii.pdf (Available on Website)	AEC (Any One)	2	50	50	0
30810201	શીખો ગુજરાતી - પ્રાથમિક ભાગ ૧: પરિચય, લેખન અને વાચન કૌશલ્ય (ગુજરાતી) Shikho Gujarati – Prathmik Bhag 1: Parichay, Lekhan ane Vachan Kaushalya (Gujarati)					
30810301	रचनात्मक लेखन (हिन्दी) Rachnatmak Lekhan					

	(Hindi)					
30810401	मराठी भाषेचा परिचय - भाग १ (मराठी) Marathi Bhashecha Parichay-Bhaag 1 (Marathi)					
30810501	लौकिक संस्कृत न्यायः (संस्कृत) Contemporary Sanskrit Nyaya (Sanskrit)					
31335401	Field Project (Pr)	FP	2	50	50	0
	Co-Curricular Course (CC) Link: https://sndt.ac.in/pdf/academics/syllabus-as-per-nep/cc-syllabus/ug-degree/co-curricular-course-as-per-nep-2020-semester-iii-syllabus.pdf (Available on Website)	CC (Any One)	2	50	50	0
31450121	Social issues Advocacy and Action					
31450221	National Cadets Corps. (NCC) Studies – III					
31450321	Traditional Sports and Fitness					
31450421	Unfolding The Beauty of Indian Music					
			22	550	300	250

Semester – IV

Sr. No.	Course	Type of Course	Credits	Marks	Int Marks	Ext Marks
	Semester - IV					
40135411	Adv. Java Programming (Th+Pr) (2+2)	Major (Core)	4	100	50	50
40135412	Mobile Programming (Th+Pr) (2+2)	Major (Core)	4	100	50	50
40335411	Design & Analysis of Algorithm (Th+Pr) (2+2)	Major (Core)	4	100	50	50
40435411	Data Visualization (Th)	OEC (Any One)	2	50	0	50
40435412	Web Content Management Systems (Th)					
40435413	Graphic Design (Th)					
40735411	Introduction to Microprocessor and Microcontroller (Th)	SEC	2	50	0	50
	Modern Indian Language Ability Enhancement Course (AEC) Link: https://sndt.ac.in/pdf/academics/syllabus-as-per-nep/aec-syllabus/ug-degree/aec-semester-iv.pdf (Available on Website)	AEC (Any One)	2	50	0	50
40810211	શીખો ગુજરાતી – પ્રાથમિક (ગુજરાતી) Shikho Gujarati – Prathmik (Gujarati)					
40810311	सूचना प्रौद्योगिकी और हिन्दी भाषा (हिन्दी) Suchana Praudyogiki aur Hindi Bhasha (Hindi)					
40810411	मराठी भाषेचा परिचय – भाग २					

	(मराठी) Marathi Bhashecha Parichay-Bhaag 2 (Marathi)					
40810511	वाल्मीकीयकृत रामायणम् – अयोध्याकाण्डः (संस्कृत) Valmikiyakrut Ramayanam – Ayodhyakanda (Sanskrit)					
41535401	Digital Literacy and E- waste management (Pr)	CE	2	50	50	0
	Co-Curricular Course (CC) Link: https://sndt.ac.in/pdf/academics/syllabus-as-per-nep/cc-syllabus/ug-degree/co-curricular-course-as-per-nep-2020-semester-iv-syllabus.pdf (Available on Website)	CC (Any One)	2	50	50	0
41450121	NSS Volunteers under National service scheme special camp					
41450122	Personality and Leadership Development through National Service Scheme					
41450221	National Cadets Corps. (NCC) Studies – IV					
41450321	Basics of Self Defence and Fitness Training					
41450421	Theatre & Dance					
			22	550	250	300

Exit with UG Diploma with 4 extra credits (44 + 4 credits)

Course Syllabus

Semester – III

.3.1 Major (Core)

Course Titles	Probability and Statistics (Th)
Course Credits	4 Credit's
Course Outcomes	1. Define with Statistical terminology, demonstrate problem-solving skills.
	2. Explain statistical models and techniques to analyse and understand problems in Probability.
	3. Make use of Basics of Statistics, Measure Central Tendency and Dispersion.
	4. Examine how the statistical and probability are developed
	5. Apply statistical and probability principles help to develop thinking ability
Module 1 (Credit 1): Basics of Probability	
Learning Outcomes	After learning the module, learners will be able to
	1. Learn Basics of Probability
Course Outline	• Probability: Introduction, sample space and events, Axioms of probability, Addition and multiplication theorems, conditional probability, Bayes' Theorem, problems.
Module 2 (Credit 1): Probability Distribution	
Learning Outcomes	After learning the module, learners will be able to
	1. Understand the Principles of Probability Distribution
Course Outline	• Probability Distributions: Random variables (discrete and continuous), probability mass/density function, Binomial, Poisson, Exponential and normal distributions.
Module 3 (Credit 1): Measure Central Tendency and Dispersion.	
Learning Outcomes	After learning the module, learners will be able to
	1. Learn Basics of Statistics, Measure Central Tendency and Dispersion
Course Outline	• Basic Statistics: Measures of central tendency, measures of dispersion, range quartile deviation, mean deviation, standard deviation, coefficient of variation.
Module 4 (Credit 1): Statistical Methods	
Learning Outcomes	After learning the module, learners will be able to
	1. Develop Statistical Methods for Correlation, Regression Analysis
Course Outline	• Statistical Methods: correlation and regression –Karl Pearson's coefficient of correlation and rank correlation problems,

	regression analysis-lines of regression, problems.
Assignments towards Comprehensive Continuous Evaluation:	
Module 1: • Examples based on Addition and Multiplication theorem. • Examples based on Bayes Theorem. • Examples based on Conditional Probability.	
Module 2: • Difference between Random and continuous variables. • Examples based on Theoretical Distribution.	
Module 3: • Examples based on measures of central tendency. • Examples based on measures of dispersion. • Examples based on measures of mean and quartile deviation.	
Module 4: • Difference between correlation and regression. • Examples based on correlation. • Examples based on regression.	

Reference Books:

1. Gupta, S. C., & Kapoor, V. K. (2008). Fundamentals of mathematical statistics. Sultan Chand & Sons.
2. Gupta, C. B., & Gupta, V. (2014). Introduction to statistical methods. Sultan Chand & Sons.

Assessment:

Internal Assessment: (50 marks)

Evaluation Scheme:

Depending on the activities mentioned above a project should be developed for 50 marks. The internal assessment, which is a project evaluation, will be done by conducting a project presentation at the College level, where an External Examiner (Industry Expert or Subject Expert) appointed by the College will be evaluating the project depending on evaluation rubrics given below:

The Rubric will have the following Evaluation Parameters:		
Evaluation Parameters	Description / Evaluation Points	Marks
Conceptual Understanding	Clear and accurate explanation of key concepts: – Probability theorems – Random variables – Central tendency	10

	- Correlation & regression	
Correctness of Examples / Solutions	All calculations, problem-solving steps, and answers are accurate for: - Theorems and probability - Theoretical distributions - Statistical measures	15
Presentation and Organization	Neat, logical organization with headings and subheadings. Proper notation and use of tables/graphs (were applicable).	5
Application of Concepts	Demonstrates real-world relevance or proper application of statistical and probability methods. Insightful use of data (if any).	10
Completeness of All Modules	All required activities from Modules 1 to 4 are attempted and appropriately addressed	10

Given below are two sample projects but it is expected to work on similar sort of projects

1. **Project 1:** Collect Sample data and perform measures of central tendency and measures of dispersion on it and interpret the result.
2. **Project 2:** Design a game which will show the winning or losing chances of the player after the move of the player.

External Assessment: (50 Marks)

End Semester examination of 50 marks for 2 hours duration will be conducted

Semester – III**.3.2 Major (Core)**

Course Titles	Data Base Management System (Th+Pr)
Course Credits	4 Credit's (2 Th + 2 Pr)
Course Outcomes	1. Familiarize the core concepts of DBMS
	2. Design and implement database architectures and data models
	3. Demonstrate the Commands of SQL and key constraints
	4. Define the concept of Transaction, Concurrency and Database Recovery System
	5. Apply data normalization techniques to ensure data integrity and optimize performance
Module 1 (Credit 1) Introduction to Database Management system and Database Systems Architecture	
Learning Outcomes	After learning the module, learners will be able to
	1. Define Database, DBMS and its applications.
	2. Differentiate between Traditional file system and Database system
	3. Define the Architecture of Database system
Content Outline	• Introduction to Database Systems: Definition of Database and DBMS, Database Approach, Traditional File system, Actors, Data Abstraction, Database Applications • Database Systems and Architecture: Three Tier Architecture, Centralized and Client-Server Architecture
Module 2 (Credit 1) Introduction to Data Models, RDBMS and Database Design	
Learning Outcomes	After learning the module, learners will be able to
	1. Define Data Model and its different types
	2. Relate Relational Database Management Systems
	3. Utilize different Keys used in database, constraints applied on attributes and developing ER diagrams
Content Outline	• Data Models: Types of Data Models (Hierarchical, Network, Relational, Object-oriented), Importance of Data Models in DBMS • Introduction to RDBMS, Object-oriented database, Distributed Database, No SQL • Database Design: Keys: Primary Key, Candidate Key, Super Key, Foreign Key, Composite Key, Alternate Key, Unique Key, Surrogate Key • Key Constraints in a table: Primary Key, Foreign Key, Unique

	Key, NOT NULL, CHECK, Entity-Relationship (ER) Model, Entities and Entity Sets, Attributes and Relationships, ER Diagrams, Key Constraints and Weak Entity Sets, Extended ER Features, Introduction to the Relational Model and Relational Schema
Module 3 (Credit 1) Introduction to Functional dependencies, Normalization and Structured Query Language	
Learning Outcomes	After learning this module learners will be able to understand
	1. Importance of functional dependencies, Normalization and its implications with the database
	2. Implement basics of Structured Query Language
Content Outline	• Normalization: Functional Dependencies, 1NF, 2NF, 3NF, BCNF, 4NF, 5NF • Structured Query Language (SQL): SQL Basics: DDL and DML, Aggregate Functions (Min(), Max(), Sum(), Avg(), Count()), Logical operators (AND, OR, NOT), Predicates (Like, Between, Alias, Distinct), Clauses (Group By, Having, Order by, top/limit), Inner Join, Natural Join, Full Outer Join, Left Outer Join, Right outer Join, Equi Join, TCL and DCL
Module 4 (Credit 1) Transaction Processing System, Concurrency Control Techniques and Database Recovery System	
Learning Outcomes	Learners will be able to understand
	1. The importance of Transaction Processing System
	2. Techniques of Concurrency Control system
	3. Techniques and importance of Database recovery system
Content Outline	• Transaction Processing System Concepts: Why concurrency control, ACID Properties, Schedule & Serialiability • Concurrency Control Techniques: 2PL, Timestamp Ordering, Optimistic Concurrency Control technique • Database Recovery: Recovery concepts, Caching, Checkpoints, Transaction Rollback
Assignments towards Comprehensive Continuous Evaluation:	
Module 1: Introduction to Database Management System and Database Systems Architecture Assignment Title: Understanding Database Systems and Architecture Assignment Tasks: 1. Define the following with suitable examples: - o Database - o DBMS - o Database Applications 2. Compare and contrast:	

- o Traditional File System vs Database System (Tabulate at least 5 differences)
- 3. Describe the roles of different Database Actors (e.g., DBA, End-users, Application Programmers).
- 4. Explain Data Abstraction levels in DBMS with a diagram.
- 5. Create a diagrammatic representation of:
 - o Three-Tier Architecture
 - o Centralized and Client-Server Architecture

Module 2: Introduction to Data Models, RDBMS and Database Design

Assignment Title: Data Models and Entity Relationship Design

Assignment Tasks:

1. Define Data Model and briefly explain:
 - o Hierarchical
 - o Network
 - o Relational
 - o Object-oriented data models
2. Write a short note on:
 - o RDBMS
 - o NoSQL vs Traditional Databases
 - o Distributed Database
3. Explain with examples:
 - o Primary Key
 - o Foreign Key
 - o Composite Key
 - o Surrogate Key
4. Design an ER Diagram for a college database with entities: Student, Course, Faculty, Enrollment. Include:
 - o Attributes
 - o Keys
 - o Relationships
 - o Use extended ER features (if any)

Module 3: Introduction to Functional Dependencies, Normalization and Structured Query Language

Assignment Title: Database Normalization and SQL Implementation

Assignment Tasks:

1. Define and explain the importance of:
 - o Functional Dependencies
 - o Normal Forms (1NF to BCNF)
2. Normalize the given unnormalized table to 3NF.
(Provide sample unnormalized data: e.g., student info with repeating groups.)

Write SQL queries for the following tasks:

- o Create a table for "Employee" with at least 5 fields and constraints.
- o Insert 3 rows of data.
- o Write a query to display the highest salary.

- o Display employees in ascending order of joining date.
- o List departments with more than 5 employees (use GROUP BY & HAVING).
- o Perform different joins (INNER JOIN, LEFT JOIN) between Employee and Department tables.

Module 4: Transaction Processing, Concurrency Control and Recovery System

Assignment Title: Transactions, Concurrency, and Recovery Techniques in DBMS

Assignment Tasks:

1. Define Transaction, ACID properties, and explain with real-time examples.
2. Differentiate between serial and concurrent schedules using diagrams.
3. Discuss the need for Concurrency Control and compare:
 - o 2PL
 - o Timestamp Ordering
 - o Optimistic Concurrency Control
4. Describe the steps of Database Recovery:
 - o Checkpoints
 - o Caching
 - o Transaction Rollback

Text Book:

1. Korth, H. F., & Silberschatz, A. (2010). Database system concepts (6th ed.). McGraw-Hill.

Reference Books:

1. Elmasri, R., & Navathe, S. B. (2010). Fundamentals of database systems (6th ed.). McGraw-Hill.
2. Bayross, P. (n.d.). Oracle: The complete reference. BPB Publications.
3. Datapro InfoWorld Ltd. (n.d.). Upgrade to Oracle 8.
4. Widom, J., & Wiederhold, G. (1995). Database design. McGraw-Hill.

Assessment:

Internal Assessment: (Marks 50)

Evaluation Scheme:

Depending on the activities mentioned above a project should be developed for 50 marks. The internal assessment, which is a project evaluation, will be done by conducting a project presentation at the College level, where an External Examiner (Industry Expert or Subject Expert) appointed by the College will be evaluating the project depending on evaluation rubrics given below:

The Rubric will have the following Evaluation Parameters:

The Rubric will have the following Evaluation Parameters:		
Evaluation Parameters	Description / Evaluation Points	Marks
Conceptual Understanding	Clear definitions of terms (e.g., DBMS, normalization, transaction). Demonstrates subject clarity.	10
Accuracy and Completeness	All questions are attempted. Answers are factually correct. Diagrams/SQL code are properly done.	15
Application and Analysis	Applies concepts correctly (e.g., ER diagrams, joins, normalization). Includes real-life relevance.	10
Presentation and Neatness	Organized layout. Proper use of headings, indentation, bullet points, tables, and labeled diagrams.	5
Innovation and Effort	Attempts original examples. Uses SQL screenshots, ER tools, or explains business cases practically.	5
Timely Submission	Submitted within deadline. Late submission deducts up to 5 marks unless exempted.	5

Given below are two sample projects but it is expected to work on similar sort of projects. (ER Diagrams, Tables and SQL Queries)

1. Online Shopping Management System
2. Medical diagnosis System
3. Bank Database management system etc.

External Assessment: (Marks 50)

End Semester examination of 50 marks for 2 hours duration will be conducted

Semester – III**.3.3 Major (Core)**

Course Titles	Advanced Web Designing (Th+Pr)
Course Credits	4 Credit's (2 Th + 2 Pr)
Course Outcomes	1. Familiarize advanced concepts of Web designing
	2. Gain proficiency in creating dynamic web pages using HTML5, JavaScript
	3. Develop data-driven web applications, combining client-side interactivity with server-side processing for robust web functionality.
	4. Design and Develop a Fully Functional Responsive Website
	5. Create web pages with the advanced Web Design Tools
Module 1 (Credit 1): HTML5 and CSS3 for Advanced Web Design	
Learning Outcomes	After learning the module, learners will be able to
	1. Use advanced HTML5 features such as semantic elements, multimedia integration, and web storage to create modern, dynamic web pages.
	2. Gain expertise in CSS3 techniques, including Flexbox, CSS Grid, animations, transitions, and media queries, to design responsive and visually engaging websites.
	3. Learn to use CSS preprocessors like SASS and LESS, enabling them to streamline and enhance their CSS workflows for scalable and maintainable designs
Content Outline	• HTML5 and CSS3 for Advanced Web Design ○ HTML5 Advanced Features ✓ Semantic HTML, Multimedia (audio, video), Canvas, SVG ✓ Web Storage and Local Storage ○ CSS3 Advanced Techniques ✓ Flexbox and CSS Grid Layout ✓ Advanced CSS Animations and Transitions ✓ Media Queries for Responsive Design ✓ Custom Properties (CSS Variables) ○ CSS Preprocessors ✓ Introduction to SASS and LESS ✓ Benefits and features of CSS preprocessing
Module2 (Credit1): Web Development with JavaScript and PHP	
Learning	After learning the module, learners will be able to

Outcomes	1. Learn foundational concepts of JavaScript and to build interactive client-side web applications and validate forms effectively.
	2. Learn PHP for server-side scripting, including embedding PHP within HTML
Content Outline	• Web Development with JavaScript and PHP ○ JavaScript Programming Basics ✓ Introduction to Client-Side JavaScript, variables and data types, operators ✓ Control Flow: Conditional Statements (if, switch), loops (for, while) ✓ Functions, event bubbling and delegation ○ JavaScript Forms and Validation ✓ Validating form data on the client-side ✓ Handling text fields, checkboxes, radio buttons ✓ Preventing form submission with validation ✓ Modifying form values dynamically ○ Introduction to PHP and Server-Side Scripting ✓ Introduction to server-side scripting, embedding PHP within HTML documents ✓ Basic PHP syntax: variables, data types, constants, ✓ conditional statements, loops ○ PHP Functions and Form Handling ✓ Defining PHP functions: arguments and return values ✓ Handling form data in PHP: using \$_GET, \$_POST, \$_REQUEST ✓ Form validation and sanitization in PHP
Module3 (Credit1): Bootstrap	
Learning Outcomes	After learning the module, learners will be able to
	1. Use of the Bootstrap grid system to create flexible, responsive layouts.
	2. Gain the ability to utilize Bootstrap components
Content Outline	• Bootstrap Grid System ○ Overview of Bootstrap Framework ○ Understanding the grid system: rows and columns ○ Creating responsive layouts with the grid system (e.g., 12-column layout)

	○ Breakpoints and responsive design (xs, sm, md, lg, xl) • Bootstrap Components ○ Navigation Bar: Creating responsive navigation menus with Navbar ○ Buttons: Styling buttons with different sizes, colors, and effects ○ Forms: Using Bootstrap's form elements and validation styles ○ Cards: Implementing card components for content display ○ Modals: Creating and using modals for interactive content
Module4 (Credit1): Introduction to Advanced Web Design	
Learning Outcomes	After learning the module, learners will be able to
	1. Design modern web design trends, including responsive and mobile-first design principles, as well as the fundamentals of Progressive Web Apps (PWAs).
	2. UX and UI design principles to create user-centered, intuitive web experiences, using web design frameworks like Bootstrap and Foundation to build efficient layouts.
	3. Understand basics of design tools such as Adobe XD, Figma, Sketch, and InVision to prototype and visualize their web design concepts.
Content Outline	• Introduction to Advanced Web Design ○ Overview of Modern Web Design Trends ✓ Responsive Design, Mobile-first Design, Progressive Web Apps (PWAs) ✓ User Experience (UX) and User Interface (UI) Design Principles ○ Design Tools and Software: ✓ Adobe XD, Figma, Sketch, and InVision for prototyping
Assignments towards Comprehensive Continuous Evaluation:	
Module 1: HTML5 and CSS3 for Advanced Web Design Assignment Title: Creating a Modern, Responsive Web Page Using HTML5 & CSS3 Assignment Tasks: Semantic HTML: Create a web page for a fictional organization (e.g., NGO, tech startup) using semantic HTML5 elements like <header>, <section>, <article>, <aside>, and <footer>. Multimedia Integration: Embed an audio file (podcast or background music) and a video (YouTube embed or self-hosted video) relevant to the website's theme. Canvas or SVG: Design a simple animation or logo using <canvas> or SVG.	

Web Storage: Demonstrate the use of local Storage to store user preferences like dark/light theme.

CSS3:

Apply Flexbox or Grid to layout the page.

Include CSS animations/transitions (e.g., fade in navigation, hover effects).

Add media queries for responsiveness.

Use CSS variables (custom properties) for consistent styling.

Module 2: Web Development with JavaScript and PHP

Assignment Title: Client and Server-side Form Handling with JavaScript and PHP

Assignment Tasks:

JavaScript Basics: Write a script that uses variables, data types, loops, and conditionals to display a greeting based on the time of day.

Form Validation (JavaScript): Create a contact form with at least 5 fields (e.g., name, email, phone, message). Validate the form using JavaScript (e.g., required fields, email format, character limits).

Event Handling: Use event bubbling and delegation to create a dynamic list where new items can be added or removed.

PHP Basics: Embed PHP in an HTML form to handle submissions. Validate and sanitize form inputs using `$_POST`, `isset()`, `filter_var()`, etc.

PHP Functions: Write a PHP function that calculates and returns a value based on user input (e.g., total price with tax).

Module 3: Bootstrap

Assignment Title: Building a Responsive Layout Using Bootstrap 5

Assignment Tasks:

Grid System: Build a responsive 3-section layout (e.g., homepage) using Bootstrap's 12-column grid. Implement responsive breakpoints (xs, sm, md, lg).

Components: Create a responsive Navbar with branding, links, and a toggle menu. Use Bootstrap buttons with various styles and sizes. Create a form with validation styles (required fields, email, etc.). Use cards to display blog posts or services. Implement a modal to show additional content or contact form.

Styling: Use Bootstrap utilities for spacing, colors, and typography.

Module 4: Introduction to Advanced Web Design

Assignment Title: Modern Web Design Concepts & UI/UX Prototyping

Assignment Tasks:

Trends Report: Write a 1-page report on modern web design trends, including PWA features, mobile-first design, and current UI/UX patterns.

UX/UI Design: Explain at least 5 UX principles and how you would implement them on a website (e.g., navigation, accessibility, feedback). Discuss the difference between UI and UX with examples.

Tool-Based Prototype (choose any one tool: Figma, Adobe XD, Sketch, InVision): Create a basic wireframe or prototype for a landing page or product page. Include headers, hero section, call-to-action, and testimonials. Export and submit the wireframe

(PDF/image/screen recording or share link).

Textbooks:

1. Prasad, R. Web programming with HTML5, CSS3, and Java Script.
2. Nixon, R. Learning PHP, My SQL & JavaScript.
3. Shenoy, A. Learning Bootstrap 4.

Reference Books:

1. Frain, B. Responsive web design with HTML5 and CSS3.
2. KS, R. Modern web design: HTML5, CSS3, JavaScript, jQuery.

Assessment:**Internal Assessment: (Marks 50)****Evaluation Scheme:**

Depending on the activities mentioned above a project should be developed for 50 marks. The internal assessment, which is a project evaluation, will be done by conducting a project presentation at the College level, where an External Examiner (Industry Expert or Subject Expert) appointed by the College will be evaluating the project depending on evaluation rubrics given below

The Rubric will have the following Evaluation Parameters:		
Evaluation Parameters	Description / Evaluation Points	Marks
Conceptual Understanding	Demonstrates understanding of core concepts (HTML5, CSS3, JS, PHP, Bootstrap, UI/UX principles). Accurate terminology and explanations.	10
Technical Accuracy	Correct use of code and tools. Valid HTML/CSS/JS/PHP syntax. Functional features (e.g., form validation, responsive layouts).	15
Practical Application	Correct implementation of concepts in assignments. Use of real-world scenarios. Functional outputs (prototypes, forms, layouts).	10
Presentation & Documentation	Neat formatting of code and write-up. Use of headings, screenshots, labels, comments in code.	5
Creativity and Design Skills	Innovative layout, design, or interactivity. Effective use of colors, typography, spacing. Aesthetic alignment with modern trends.	5
Timely Submission	Submitted on or before deadline. Late submissions may deduct up to 5 marks unless prior approval.	5

Given below are two sample projects but it is expected to work on similar sort of projects

Project 1: E-commerce Website for Fashion Brand

Design and develop an e-commerce website for a fashion brand that sells clothing, accessories, and footwear.

Project 2: Web Application for Event Management

Design and develop a web application for event management that allows users to create, manage, and attend events.

External Assessment: (Marks 50)

End Semester examination of 50 marks for 2 hours duration will be conducted

Semester – III

.3.4 Minor Stream

Course Titles	Design Thinking & Innovation (Th)
Course Credits	2 Credit's
Course Outcomes	1. Familiarize the principles and process of design thinking.
	2. Develop empathy for users and understand their needs.
	3. Frame the problems effectively and identify opportunities for innovation.
	4. Explore various ideation techniques and creative problem-solving methods.
	5. Apply design thinking principles to real-world problems and projects
Module 1 (Credit 1): Introduction to Design Thinking	
Learning Outcomes	After learning the module, learners will be able to
	1. Learn the Fundamentals of Innovation and Design Thinking
	2. Learn the Creative Thinking Process, Techniques and Problem-Solving Approaches
Content Outline	• What is Design Thinking? Definition, history, and application areas The role of empathy, creativity, and innovation • The Design Thinking Process (5 Stages): Empathize: Understanding user needs and behaviours Define: Clearly stating the problem or opportunity Ideate: Generating a wide range of ideas Prototype: Creating tangible representations of solutions Test: Evaluating solutions and iterating on designs • User Research Techniques: Interviews, surveys, observations, and ethnography • Problem Framing and Opportunity Identification: How to identify problems and opportunities Using tools like "How Might We?" questions
Module 2 (Credit 1) Practical Application of Design Thinking	
Learning Outcomes	After learning the module, learners will be able to
	1. Master the Design Thinking Process and Its Applications
	2. Apply Design Thinking to Real-World Business Problems
	3. Develop Practical Skills in Design Thinking
Course Outline	• Ideation Techniques: ○ Brainstorming, mind mapping, SCAMPER, and other creative tools

	• Prototyping: ○ Creating low-fidelity and high-fidelity prototypes ○ Using various prototyping materials and methods • Testing and Iteration: ○ Gathering feedback and refining designs • Case Studies: ○ Analysing successful design thinking projects • Project-Based Learning: ○ Students will work on a design thinking project throughout the course
Module 1: Introduction to Design Thinking • Design Thinking Definition: Ask students to define design thinking in their own words and share their definitions with the class. • Empathy Mapping: Divide students into small groups and ask them to create an empathy map for a given user scenario. • Creative Thinking Exercise: Provide students with a random object and ask them to come up with as many creative uses for the object as possible. • Design Thinking Process Diagram: Ask students to create a diagram illustrating the 5 stages of the design thinking process. • Group Discussion: Divide students into small groups and ask them to discuss the role of empathy, creativity, and innovation in design thinking.	
Module 2: Practical Application of Design Thinking • Ideation Techniques: Divide students into small groups and ask them to practice different ideation techniques such as brainstorming, mind mapping, and SCAMPER. • Prototyping Exercise: Provide students with materials and ask them to create low-fidelity prototypes for a given design challenge. • Testing and Iteration: Divide students into small groups and ask them to test and iterate on their prototypes based on feedback from peers. • Case Study Analysis: Divide students into small groups and ask them to analyze a successful design thinking project and present their findings to the class. • Project-Based Learning: Ask students to work on a design thinking project throughout the course, applying the concepts and techniques learned in the modules.	

Textbooks:

1. Bala Guruswamy, E. (2023). Developing thinking skills: The way to success. Khanna Book Publishing Company.
2. Brown, T. (2008, June). Change by design: How design thinking transforms organizations and inspires innovation. Harvard Business Review.
3. Krishnan, R. T., & Dabholkar, V., 8 steps to innovation. Collins Publishing.

Reference:

1. Cross, N. (2011). Design thinking: Understanding how designers think and work. Bloomsbury.

Assessment:**Internal Assessment: (Marks 50)****Evaluation Scheme:**

Depending on the activities mentioned above a project should be developed for 50 marks. The internal assessment, which is a project evaluation, will be done by conducting a project presentation at the College level, where an External Examiner (Industry Expert or Subject Expert) appointed by the College will be evaluating the project depending on evaluation rubrics given below

The Rubric will have the following Evaluation Parameters:		
Evaluation Parameters	Description / Evaluation Points	Marks
Conceptual Understanding	- Clearly defines design thinking in own words. - Demonstrates grasp of empathy, innovation, and problem-solving.	10
Creativity and Original Thinking	- Demonstrates originality in ideation exercises (e.g., creative uses of objects). - Proposes novel or useful ideas.	10
Practical Application	- Applies ideation methods (brainstorming, SCAMPER). - Develops functional empathy maps, prototypes, and testing results.	10
Team Collaboration & Participation	- Actively participates in group tasks and discussions. - Demonstrates collaborative effort in empathy maps, prototyping, etc.	5
Communication & Presentation	- Effectively communicates ideas through diagrams, posters, or presentations. - Clear, neat, and organized submission.	5
Reflection & Feedback Integration	- Reflects thoughtfully on user feedback and applies changes. - Shows growth in understanding design thinking through iteration.	5
Timeliness & Completeness	- Submits all assignments on time. - Completes all tasks as per guidelines (including peer feedback, testing, etc.).prior approval.	5

Given below are two sample projects but it is expected to work on similar sort of projects

Project 1: E-commerce Website for Fashion Brand

Design and develop an e-commerce website for a fashion brand that sells clothing, accessories, and footwear.

Project 2: Web Application for Event Management

Design and develop a web application for event management that allows users to create, manage, and attend events.

Semester – III

.3.5 A. Open Elective Courses/ Generic (OEC)

Course Titles	Basics of Data Analysis using Spreadsheet (Th)
Course Credits	2 Credit's
Course Outcomes	After Completion of this Course, students will be able
	1. Familiarize with basics of data analysis and its importance in decision-making.
	2. Explain the importance of data collection, organization, and cleaning in data analysis
	3. Apply data visualization, statistical analysis, and data interpretation techniques to perform basic data analysis tasks.
	4. Analyze data and determine the most effective visualization to use to communicate insights and trends.
	5. Create a report that incorporates the application of basic statistical concepts, including mean, median, mode, and standard deviation, to solve a real-world problem
Module 1 (Credit 1) Introduction to Data Analysis, Data Collection and Organization, Data Visualization	
Learning Outcomes	After learning the module, learners will be able to
	1. Identify the different types of data analysis (descriptive, inferential, predictive)
	2. Understand the basic features and functions of spreadsheet software (cells, rows, columns, formulas, functions)
	3. Learn how to use spreadsheet software to perform basic data manipulation tasks (e.g., calculating sums, averages, counts)
	4. Understand the importance of data cleaning and preprocessing in data analysis
	5. Define data visualization and its importance in communicating data insights
Course Outline	• Overview of data analysis, Importance of data analysis in decision-making, Introduction to spreadsheet software (Microsoft Excel/Google Sheets) • Collecting data from various sources, organizing data in a spreadsheet, Data cleaning and preprocessing, Introduction to data visualization, Creating charts and graphs in spreadsheet software • Best practices for data visualization
Module 2 (Credit 1) Statistical Analysis, Data Interpretation and Communication, Case Studies and Project Work	

Learning Outcomes	After learning the module, learners will be able to
	1. Calculate and interpret basic statistical measures
	2. Analyze and interpret data results
	3. Communicate data insights effectively
	4. Apply data analysis concepts to real-world scenarios
	5. Create informative and interactive reports and dashboards
	• Introduction to basic statistical concepts (mean, median, mode, standard deviation) • Calculating statistical measures in spreadsheet software, interpreting statistical results, Interpreting data results, Communicating data insights • Creating reports and dashboards in spreadsheet software, applying data analysis concepts to real-world case studies, working on individual/group projects to analyze and interpret data

Assignments towards Comprehensive Continuous Evaluation:

Module 1:

- Data Collection Project (Group Activity)
- Understanding Terminology of Data Analytics
- Error Detection in Data (Worksheet)

Module 2:

- Statistical Analysis
- Data Interpretation and Communication
- Case Studies (Real-World Data Analysis)
- Project Work (Independent Research)

Text Books

1. Jeeva Jose, (2024). Beginner's Guide for Data Analysis using R Programming. Khanna Publishing House.
2. V.K. Jain, (2024). Data Analytics. Khanna Book Publishing Company.
3. Stephen L. Nelson and E. C. Nelson, John Wiley & Sons, 3rd edition, (2016). Excel Data Analysis For Dummies.
4. Michael R. Middleton, Thomson, Brooks/Cole, 3rd edition, (2004). Data Analysis Using Microsoft Excel.

Reference Books

1. Michael Alexander, Richard Kusleika, and John Walkenbach, John Wiley & Sons, (2018). Excel 2019 Bible.

2. Cliff T Ragsdale, Cengage Learning Asia Pvt. (2015). Spreadsheet Modeling and Decision Analysis: A Practical Introduction to Business Analytics.

Assessment:

External Assessment: (50 Marks)

End Semester examination of 50 marks for 2 hours duration will be conducted

Semester – III

.3.5 B. Open Elective Courses/ Generic (OEC)

Course Titles	AI Tools (Th)
Course Credits	2 Credit's
Course Outcomes	1. To introduce students to the concept and scope of Artificial Intelligence (AI)
	2. To explore user-friendly AI tools with minimal coding
	3. To encourage practical application of AI in creative and productive tasks
	4. To build foundational awareness of ethical and responsible AI use
Module 1 (Credit 1)	
Learning Outcomes	After learning the module, learners will be able to
	1. Remember and define basic concepts and types of Artificial Intelligence.
	2. Understand how no-code AI tools work and their relevance in real-life applications.
	3. Apply simple AI tools like Teachable Machine, Canva AI, and ChatGPT to perform tasks such as image classification, content generation, and design.
Course Outline	• What is AI? ○ History, scope, and types of AI (Narrow, General, Super) ○ Real-world examples in mobile apps, websites, and social media • Simple AI Tools and Applications ○ Google Teachable Machine: Train image/audio classifiers in minutes ○ Microsoft Lobe.ai: Create image-based ML apps visually ○ Canva AI (Magic Write, Magic Design): AI-powered design and content ○ Bing Image Creator / DALL·E: Generate images from text prompts ○ Quillbot: AI writing and paraphrasing tool ○ Google AutoDraw: Sketch-to-image AI ○ ChatGPT: AI assistant for content, code, and answers • Responsible AI Use ○ Bias in AI

	○ Deepfakes and fake content ○ Privacy and data ethics
Module 2 (Credit 1)	
Learning Outcomes	After learning the module, learners will be able to
	1. Apply user-friendly AI tools to create original content and designs
	2. Analyze the features, strengths, and limitations of various AI applications
	3. Create a mini project using one or more AI tools to solve a simple problem or create digital content
Course Outline	• Exploring AI Tools ○ Design.AI: Revolution in Poster Design ○ Site123, Weebly: Essential tools for Web Development ○ LogoAI, Logomaker.ai: Creative Logo creation ○ OpenAI, Codeium: Coding becomes easier ○ ResumeA.I.: Write effective resume ○ Consensus: AI tools for research • Mini Project ○ Choose any AI tool. ○ Create a small project (e.g., a poster, presentation, chatbot mockup, image classifier, text rewriter, etc.)

References:

1. Kelkar B, Pangarkar A. (2023) 'AI YO tools – Leveraging Power of Artificial Intelligence'. Newflex Talent Solutions Pvt. Ltd.
2. Kumar, P. (2021). AI Basics for Schools and Colleges. BPB Publications.
3. Markiewicz, T., & Zheng, J. (2017). Getting Started with Artificial Intelligence. O'Reilly Media.
4. <https://www.lobe.ai>
5. <https://www.canva.com/designschool>
6. <https://chat.openai.com>

Classroom Activities:

Worksheet to be prepared by Teachers on each module and given to students for practice. The correction of the worksheets to be done by the teachers and feedback to be given to the class for better improvement in their end semester examination.

Q: Design a poster/banner on "Future of AI" using only AI tools.

External Assessment: (Marks 50)

End Semester examination of 50 marks for 2 hours duration will be conducted

Semester – III

.3.5 C. Open Elective Courses/ Generic (OEC)

Course Titles	E-Commerce Technologies (Th)
Course Credits	2 Credit's
Course Outcomes	1. To introduce the fundamental concepts and models of e-commerce
	2. To familiarize students with tools and platforms used in e-commerce
	3. To provide basic practical skills in building and managing online stores
	4. To understand online payments and e-commerce security essentials
Module 1 (Credit 1):	
Learning Outcomes	After learning the module, learners will be able to
	1. Understand the scope and types of e-commerce models
	2. Identify key components of an e-commerce platform
	3. Apply simple tools to set up a basic e-commerce website
Course Outline	• What is E-Commerce? Its strengths and weaknesses. • Types: B2B, B2C, C2C, C2B, G2C • E-Commerce vs Traditional Commerce • Overview of E-Commerce Platforms (Shopify, WooCommerce, WordPress) • Setting up a basic online store (WordPress or Shopify demo)
Module 2 (Credit 1):	
Learning Outcomes	After learning the module, learners will be able to
	1. Explain digital payment systems and gateway integration basics
	2. Identify security measures in online commerce
	3. Apply simple digital marketing tools for product promotion
Course Outline	• Online Payment Methods (UPI, cards, wallets) • Payment Gateway Overview (Razorpay, PayPal – sandbox demo) • Basic E-Commerce Security (SSL, safe transactions) • Introduction to E-Commerce Marketing: SEO, Email campaigns, Social media • Demo: Creating a digital flyer or ad for an online store (using Canva)

References:

1. Chan, H., Lee, R., Dillon, T., & Chang, E. (2007). E-Commerce: Fundamentals and Applications. Wiley India Pvt. Ltd.
2. Schneider, G. P. (2020). Electronic Commerce. Cengage Learning, 13th Edition.
3. Pandey, U. S., & Shukla, S. (2019). E-Commerce and Mobile Commerce Technologies. S. Chand Publishing.
4. Laudon, K. C., & Traver, C. G. (2021). E-Commerce: Business, Technology, Society. Pearson Education, 16th Edition.
5. Larson, J., & Draper, S. (2022). Digital Marketing Essentials. Stukent Inc.
6. <https://wordpress.com>
7. <https://woocommerce.com>
8. <https://shopify.com>
9. <https://razorpay.com>
10. <https://canva.com>

Classroom Activities:

Worksheet to be prepared by Teachers on each module and given to students for practice. The correction of the worksheets to be done by the teachers and feedback to be given to the class for better improvement in their end semester examination.

Q: Creating a sample product page using WordPress or Shopify (free version)

Q: Designing a poster or ad for an online business using Canva

External Assessment: (Marks 50)

End Semester examination of 50 marks for 2 hours duration will be conducted

Semester – III

.3.7 Field Project (FP)

Course Titles	Field Project (Pr)
Course Credits	2 Credit's
Course Outcomes	By the end of the project, students will be able to:
	1. Recognize potential project ideas and define their scope and objectives.
	2. Create well-structured project proposals outlining the project title, objectives, scope, and timeline.
	3. Design detailed project implementation plans, including milestones, timelines, and resource allocation.
	4. Demonstrate understanding of project management principles, including planning and execution.
	5. Analyse project requirements and constraints, and develop creative solutions to address them.
Module 1 (Credit 1) Project Planning and Proposal	
Learning Outcomes	Learners will be able to
	1. Apply theoretical concepts to real-world problems in software development, data analysis, or IT-related areas.
	2. Develop and implement a project plan, including scope, timeline and resource allocation.
Course Outline	• Identifying potential project ideas • Defining project scope and objectives • Developing a project proposal
Module 2 (Credit 2) Project Implementation Plan	
Learning Outcomes	Learners will be able to
	1. Create a detailed plan for implementing the project, including milestones, timelines, and resource allocation.
	• Outlining project title, objectives, scope, and timeline • Creating a detailed project plan • Identifying milestones, timelines, and resource allocation

Evaluation Scheme:

Internal Assessment: (Marks 50)

Depending on the activities mentioned above a project should be developed for 50 marks. The internal assessment, which is a project evaluation, will be done by conducting a project presentation at the College level, where an External Examiner

(Industry Expert or Subject Expert) appointed by the College will be evaluating the project depending on evaluation rubrics given below

The Rubric will have the following Evaluation Parameters:		
Evaluation Criteria	Description	Marks
Problem Identification and Relevance	Clarity and relevance of the chosen project idea to the field of IT/software/data analysis.	5
Defined Scope and Objectives	Clearly articulated objectives and well-defined project scope aligned with the problem.	5
Application of Theoretical Concepts	Depth and appropriateness of theory/concepts applied in planning and proposal.	5
Project Proposal Quality	Structure, clarity, and completeness of the project proposal document.	5
Detailed Implementation Plan	Logical breakdown of tasks, stages, and dependencies in project execution.	8
Timeline and Milestones	Realistic scheduling with defined milestones (e.g., Gantt chart, phases, deadlines).	5
Resource Allocation Plan	Allocation of human, technical, and financial resources; use of project management tools if applicable.	5
Feasibility and Risk Assessment	Evaluation of practical constraints (time, scope, budget) and risk mitigation strategies.	5
Professional Presentation	Document formatting, language quality, coherence, visuals (charts/tables), overall presentation.	5
Innovation / Originality	Creativity and novelty in the problem approach or proposed solution.	2

Course Syllabus

Semester – IV

.4.1 Major (Core)

Course Titles	Advanced Java (Th+Pr)
Course Credits	4 Credit's (2 Th + 2 Pr)
Course Outcomes	2. Demonstrate GUI application using Swing components.
	3. Access databases using Java Database Connectivity (JDBC).
	4. Develop Web Applications using Servlets and deploy them on popular servers like Tomcat
	5. Connect JSP based applications with databases
	6. Create web application using JSP Form input elements
Module1(Credit1)	
Learning Outcomes	After learning the module, learners will be able to
	1. Differentiate between AWT and Swing
	2. Develop GUI programs using Swing Components.
	3. Develop simple event driven programs using event class and event listener interface.
Course Outline	• GUI Programming with Swing - Introduction to JFC and Swing, Difference between AWT and Swing. ○ Swing Components: ✓ Swing Classes Hierarchy ✓ Commonly used Methods of Component class (add(), set Size(), set Layout(), and set Visible()) ✓ JApplet, JFrame, JLabel, JTextField, JTextArea, JButton, JCheckBox, JRadioButton, JComboBox, JMenu ○ Layout Management: ✓ Flow Layout, BorderLayout, Card Layout, Box Layout, Grid Layout, Grid bag Layout. ✓ Event Handling: ✓ Introduction, Action Events, Key Events, Focus Events, Window Event, Mouse Event, Item Events ○ Event Listener Interface: ✓ ActionListener, Key Listener, Focus Listener, Window Listener, Mouse Listener, Mouse Motion Listener, Item Listener
Module 2 (Credit 1)	

Learning Outcomes	After learning the module, learners will be able to
	1. Understand JDBC Architecture, its components and the basics of JDBC.
	2. Understand different types of JDBC drivers and use of these drivers for connecting different databases.
	3. Storing, retrieving, and modifying the data in the database using different prepared statements.
	4. Develop program using JDBC to query a database and modify it.
Course Outline	• Java Database Connectivity (JDBC) ○ Introduction: ✓ Components of JDBC, Features of JDBC, JDBC Architecture, JDBC API, types of JDBC Drivers, JDBC Classes and Interfaces. ✓ Steps for accessing databases using JDBC API (Loading a Driver, making a Connection, Execute SQL Statement, Retrieving Result). ○ Executing SQL Queries: ✓ Using Prepared Statements, Callable statement. ✓ Working with Resultset interface and Resultset with metadata.
Module 3 (Credit 1)	
Learning Outcomes	After learning the module, learners will be able to
	1. understand the Life Cycle of Servlet & will be able to create a simple Servlet.
	2. Read databases/table records and display them using servlet.
	3. Develop web application using javax.servlet & javax.servlet.http Package
Course Outline	• Java Servlets ○ Introduction: ✓ The Life Cycle of Servlet, A simple Servlet (create and compile servlet source code, start a web browser and request the servlet). ○ Introducing Servlet API: ✓ (Reading databases/table records and displaying them using servlet.) ✓ javax.servlet Package ✓ javax.servlet.http Package (Handling HTTP Request and Response).

	✓ Working with GenericServlet and HttpServlet ○ Using cookies.
Module 4 (Credit 1)	
Learning Outcomes	After learning the module, learners will be able to
	1. Understand JSP with syntax and Semantics.
	2. Create web application using JSP Form input elements
Course Outline	• Java Server Pages ○ Introduction: ✓ Advantages of JSP, Life Cycle of JSP, JSP Architecture. ○ Components of JSP Page: ✓ Declarations, Page directives, Include directives, comments, Expressions, Scriptlets, Implicit Objects, JSP Actions, Tag Extensions, INPUT Tag, Form Tag.
Assignment/Activities towards Comprehensive Continuous Evaluation (CCE)	
Module 1 (Swing)	
• WAP to prompt user to enter first and last names in text fields and say hello to the person named. • WAP to enter username and password in text fields and a submit button to display the values. • WAP to print number of words and characters of sentence displayed in TextArea. • WAP to create checkboxes for different courses belonging to a university such that the course selected would be displayed. • WAP to create list of Programming languages for selection using checkbox control and print selection accordingly. • WAP to create Gender List (Male, Female, Transgender) using radio button control and display selection. • WAP to set the background color according to selection of button having name as Yellow, Cyan and Magenta. • WAP to accept text from user and display it as scrolling text. • WAP to demonstrate different Layout Managers.	
Module 2 (JDBC)	
• WAP that makes a connection with database using JDBC and prints metadata of this connection. • WAP using JDBC to display Student's record (rollNo, Name, Address, Mobile No) stored into table 'StudRec' of the database. • WAP using JDBC to edit (insert, update, delete) Student's record stored in the	

database.

- WAP to send data (insert) into Table (ex. "Students" table) in database using Prepared Statement and retrieve data from Table "Student" and display on screen.
- WAP to update data into Table (ex. "Students" table) in database using Prepared Statement and retrieve updated data from Table "Student" and display on screen.
- WAP in Java to demonstrate use of CallableStatement Interface.
- WAP in Java to demonstrate use of ResultSet interface.
- WAP in Java to demonstrate use of ResultSetMetaData interface.
- WAP to accept the details of students (rno, name, per) of at least 5 Records, store it into database and display the details of student having highest percentage. (Use Prepared Statement Interface)
- Note: for above JDBC programs, Use of MySql or MS-Access database is preferred

Module 3 (Servlet)

- Write a Servlet Program that Prints Hello World.
- Write a Servlet Program that Prints System Date.
- Write a Servlet Program to generate Multiplication Table for a Number Entered in HTML Page.
- Write a Servlet to display all the headers available from request.
- Write a Servlet Program to Implement and demonstrate Get() And Post() Methods (Using HTTP Servlet Class).
- Write a Servlet Program using doPost() to enter two numbers and find maximum among them.
- Write servlet which displayed following information of client:
- (Client Browser, Client IP address, Client Port No, Server Port No, Local Port No, method used by client for form submission).
- WAP to create HTML form accepting two numbers and create servlet using GenericServlet class to perform addition of two numbers as response.
- WAP to create HTML form accepting Rollno, name and create servlet using HttpServlet class to display the input values. (Use Get() and Post() methods)
- Create a HTML form to accept username and password (Login.html). Create a servlet (LoginServlet.java) to read username and password and display both values on web page.
- Create Servlet for login page, if the username and password is correct then prints message "Hello username" else a message "login failed".
- Write a Servlet which displays a message and also displays how many times the message has been displayed (how many times the page has been visited).
- Create Servlet that uses cookies to store the number of times a user has visited the servlet.

- Design a form to input details of an employee and submit the data to a servlet. Write code for servlet that will save the entered details as a new record in database table Employee with fields (EmpId, EName, Email, Age).

Module 4 (JSP)

- Write a JSP program to demonstrate use of all scripting elements (Scriptlet tag, Expression tag, declaration tag, comment tag).
- Create a JSP program that prints hello world.
- Create JSP program that prints current system date and time.
- Create a JSP Page that add and subtract two numbers.
- Create a JSP program calculates factorial values for an integer number, while the input is taken from an HTML form.
- Create a JSP page that counts how many times a user visits a web page.
- Create a JSP page that prints a message welcome <user>.
- Create a JSP page for login module.
- Create a JSP to demonstrate JSP Page Directives.
- Create a JSP to demonstrate Include Directives.
- Create a JSP to demonstrate implicit objects.

Textbooks:

1. Herbert Schildt. Java: The Complete Reference. 10th edition, McGraw-Hill
2. T. Budd. Understanding Object-Oriented Programming with Java, Pearson Education

Reference Books:

1. Santosh Kumar K. JDBC, Servlets and JSP, Black Book, Dreamtech publication
2. Kogent Learning Solutions. Java Server Programming, Java EE6 (J2EE 1.6), Black Book, Dreamtech
3. Uttam K. Roy. Advanced Java Programming. Oxford University Press

Assessment:

Internal Assessment: (50 Marks) Evaluation Scheme:

Depending on the activities mentioned above a project should be developed for 50 marks.

The internal assessment, which is a project evaluation, will be done by conducting a project presentation at the College level, where an External Examiner (Industry Expert or Subject Expert) appointed by the College will be evaluating the project depending on evaluation rubrics given below

The Rubric will have the following Evaluation Parameters:	
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Evaluation Parameters	Description / Evaluation Points	Marks
Core Functionality & Feature Coverage	- Implementation of all required modules and features (Swing, JDBC, Servlet, JSP) - End-to-end working logic - Effective data interaction with DB	20
Code Structure & Best Practices	- Well-organized code - Follows naming conventions and Java standards - Includes meaningful comments - Efficient use of Java APIs	10
User Interface & Design Consistency	- Clear, user-friendly GUI or web interface - Consistent layouts and styling - Use of appropriate components (buttons, forms, inputs, etc.)	10
Input Validation & Exception Handling	- Proper validation for user input - Error handling - Avoids program crashes due to invalid data or exceptions	5
Project Report & Technical Documentation	- Includes project overview, objectives, technologies used - Contains screenshots, DB schema, explanation of modules - Well-written and structured	5

Given below are two sample projects but it is expected to work on similar sort of projects

Project 1: - Develop a program using JDBC to edit (insert, update, delete) Student's profile stored in the database.

Project 2: - Develop a web form which processes servlet for user login functionality.

External Assessment: (50 Marks)

End Semester examination of 50 marks for 2 hours duration will be conducted

Semester – IV

.4.2 Major (Core)

Course Titles	Mobile Programming (Th+Pr)
Course Credits	4 Credit's (2 Th + 2 Pr)
Course Outcomes	After Completion of this Course, students will be able
	1. Recognize mobile development environments
	2. Develop effective Android code.
	3. Develop Android Applications
	4. Create database using SQLite Database.
	5. Apply designing and developing mobile applications using one application development framework.
Module 1 (Credit 1) Introduction to Android Programming Language and Android Application Layout	
Learning Outcomes	After learning the module, learners will be able to
	1. Build Simple Android Application
	2. Demonstrate the use of a Scroll View in an Android application
	3. Learn use string resources in Android.
	4. Organize UI components, design layouts
Course Outline	• Introduction to Android Programming Language: What is Android, History and Version, Software Stack, Core Building Blocks, Android Emulator, Internal Details, Dalvik VM, AndroidManifest.xml • Android Application Layout: Android Linear Layout, Android Relative Layout, Android TableLayout, ScrollView in Android, Android FrameLayout
Module 2 (Credit 1) Android UI widgets and Menus in Android	
Learning Outcomes	After learning the module, learners will be able to
	1. Develop android UI widgets
	2. Build Android Application with Web View, Menus in Android
Course Outline	• Android UI widgets: Working with Button, Toast, Toggle Button, Checkbox, Image View, ImageButton, AlertDialog, Spinner, AutoCompleteText View, Rating Bar, Date Picker, Date Picker, Time Picker, Progress Bar • Building Android Application with WebView: Building Simple WebView Application, Load HTML Data on WebView, Embed/Display YouTube Video in WebView, Convert Custom Design Website into Android App • Menus in Android: Option Menu, Context Menu, Popup Menu

Module 3 (Credit 1) Android Intent, Fragments and Android Database (SQLite) and Multimedia	
Learning Outcomes	After learning the module, learners will be able to
	1. Implicit Activities and android Fragments
	2. Build Database (SQLite) & Android Multimedia
Course Outline	• Android Activity & Intent, Android Fragments: Implicit Intent, Explicit Intent, Android Fragments • Android Database (SQLite) & Android Multimedia: Building Simple WebView Application, Load HTML Data on WebView, Embed/Display YouTube Video in WebView, Convert Custom Design Website into Android App • SQLite Example with GUI
Module 4 (Credit 1) Android Speech & Telephony API Android Material Design Using Design Support Library & Animation	
Learning Outcomes	After learning the module, learners will be able to
	1. Convert text into speech & Telephony API
	2. Design Using Design Support Library & Animation
Course Outline	• Android Speech & Telephony API: Speech API is used to convert text into speech, Text to Speech Example with Speed option, How to make a Phone Call, How to Send Email • Android Material Design Using Design Support Library & Animation: Navigation Drawer View, Splash Screen, Android animation enables you to rotate, slide and flip images and text, Fade In Animation in Android, Fade Out Animation in Android, Zoom In Animation in Android, Zoom Out Animation
Assignment/Activities towards Comprehensive Continuous Evaluation (CCE):	
Module 1	
• Android Program to Demonstrate the use of Scroll View • Android Program to Demonstrate the use of Linear Layout • Android Program to Demonstrate the use of Relative Layout • Android Program to Demonstrate the use of Table Layout. • Android Program to Demonstrate the use of Frame Layout	
Module 2	
• Android Program to Demonstrate Alert Dialog Box • Android Program to Demonstrate Toast in an Application • Android Program to Demonstrate the use of Checkbox • Android Program to Demonstrate the use of Image View • Android Program to Demonstrate the use of Rating bar	

- Android Program to Demonstrate the Option Menu
- Android Program to Demonstrate the Context Menu
- Android Program to Demonstrate the Popup Menu

Module 3

- Android Program to Demonstrate Explicit Intent
- Android Program to Demonstrate Implicit Intent
- Android Program to Demonstrate the SQLite Example with GUI
- Android Program to Demonstrate the Building Simple Web View Application
- Android Program to Demonstrate the Load HTML Data on Web View
- Android Program to Demonstrate the Embed/Display YouTube Video in Web View

Module 4

- Android Program to Demonstrate the Speech API is used to convert text into speech
- Android Program to Demonstrate the Telephony Manager
- Android Program to Demonstrate the How to make a Phone Call
- Android Program to Demonstrate the How to Send SMS
- Android Program to Demonstrate the How to Send Email
- Android Program to Demonstrate the Splash Screen
- Android Program to Demonstrate the Android animation enables you to rotate, slide and flip 10 images and text

Text Books/Reference Books:

1. Smyth, N. (2017). Android Studio 3.0 development essentials: Android 8 edition. Independently published
2. Big Nerd Ranch. (2022). Android programming: The Big Nerd Ranch guide (5th ed.). Big Nerd Ranch
3. Pradeep Kothari (2014). Android application development - Black book. Dreamtech Press
4. Ian F. Darwin (2017). Android cookbook (2nd Edition). O'Reilly Media
5. John Horton. (2015). Android Programming for Beginners. Packt Publishing
6. Griffiths, D., & Griffiths, D. (2021). Head First Android Development (3rd ed.). O'Reilly

Assessment:

Internal Assessment: (50 Marks) Evaluation Scheme:

Depending on the activities mentioned above a project should be developed for 50 marks.

The internal assessment, which is a project evaluation, will be done by conducting a project presentation at the College level, where an External Examiner (Industry Expert or Subject Expert) appointed by the College will be evaluating the project depending on

evaluation rubrics given below.

Evaluation Criteria	Description	Marks
1. Core Functional Implementation	- App performs expected operations (task CRUD in To-Do App / arithmetic operations in Calculator) - No major bugs or crashes	20
2. User Interface Design & Mobile Responsiveness	- Intuitive and responsive design for mobile - UI components are used appropriately (buttons, input fields, etc.) - Touch-friendly and consistent layout	10
3. Code Quality & Structure	- Code is well-structured and modular (organized in components/activities/fragments) - Proper naming and comments - Efficient logic implementation	10
4. Input Validation & Error Handling	- Prevents invalid inputs (e.g., empty task, divide by zero) - Shows meaningful error messages - Gracefully handles app exceptions or edge cases	5
5. App Documentation / Project Report	- Overview of app features and purpose - Tools/technologies used (e.g., Android Studio, Flutter) - Screenshots of UI- Summary of challenges/learning	5

Given below are two sample projects but it is expected to work on similar sort of projects

1. Develop a To-Do List App
2. Develop a Simple Calculator App

External Assessment: (50 Marks)

End Semester examination of 50 marks for 2 hours duration will be conducted

Semester – IV

.4.3 Minor Stream

Course Titles	Design & Analysis of Algorithm (Th+Pr)
Course Credits	4 Credit's (2 Th + 2 Pr)
Course Outcomes	1. Demonstrate fundamental concepts of algorithms and performance analysis.
	2. Analyze and evaluate the performance of various algorithmic approaches.
	3. Apply Divide and Conquer, Greedy, and Dynamic Programming techniques.
	4. Analyze graph algorithms for solving real-world problems.
	5. Implement limitations of algorithmic solutions and explore intractable problems.
Module 1 (Credit 1): Introduction to Analysis of Algorithm	
Learning Outcomes	After learning the modules, learners will be able to
	1. Define algorithm and basic terminologies
	2. Understand performance analysis of algorithm and Asymptotic notations
	3. Analyze sequential and recursive algorithms
Course Outline	• What is an algorithm? Design and performance analysis of algorithms, time complexity, space complexity. • Asymptotic notations (O, Ω, Θ) to measure growth of a function and application to measure complexity of algorithms. • Analysis of sequential search, bubble sort, selection sort, insertion sort, matrix multiplication. Recursion: Basic concept. Analysis of recursive algorithms
Module 2 (Credit 1): The Divide & Conquer & Greedy Design Techniques	
Learning Outcomes	After learning the modules, learners will be able to
	1. Apply divide and conquer technique to solve smaller subproblems to get solution of bigger critical problem
	2. Use of greedy technique for optimization by finding best local solution
Course Outline	• The Divide & Conquer Design Technique: The general concept. Binary search, finding the maximum and minimum, merge sort, quick sort. Best- and worst-case analysis for the mentioned algorithms. Strassen's matrix multiplication. Lower bound for comparison-based sorting. • The Greedy Design Technique: The general concept. Applications to general Knapsack problem, finding minimum

	weight spanning trees: Prim's and Kruskal's algorithms, Dijkstra's algorithm for finding single source shortest paths problem.
Module 3 (Credit 1): The Dynamic Programming Design Techniques	
Learning Outcomes	After learning the modules, learners will be able to
	1. Describe the dynamic-programming paradigm and explain when an algorithmic design situation calls for it.
	2. Recite algorithms that employ this paradigm. Synthesize dynamic-programming algorithms, and analyze them.
Course Outline	The general concept. Computation of Fibonacci series and Binomial coefficients, all pair shortest paths problem (Floyd-Warshall's algorithm), 0/1 Knapsack problem. Algorithms on Graphs: Breadth First Search, Depth First Search, finding connected components, depth first search of a directed graph, topological sorting.
Module 4 (Credit 1): Limitations of Algorithmic Power	
Learning Outcomes	After learning the modules, learners will be able to
	1. Understand technique of backtracking
	2. Solve various problems
	3. Understand non-deterministic algorithms
Course Outline	Backtracking Method: n-Queen problem; sum of subsets problem / Hamiltonian circuit problem / vertex cover problem. Computational Intractability: Overview of non-deterministic algorithms, P, NP, NP-Complete and NP-hard problems.
Assignment/Activities towards Comprehensive Continuous Evaluation (CCE)	
Module 1	
- What is an algorithm? Explain Design and performance analysis of algorithms. - Explain Asymptotic notations (O, Ω, Θ) to measure growth of a function - Analysis of sequential search, bubble sort, selection sort, insertion sort - Define term Recursion. Explain basic concept and analysis of recursive algorithms	
Module 2	
- Explain working of Binary search, finding the maximum and minimum - With examples explain Merge sort, quick sort - Discuss Best and worst-case analysis for Merge sort, quick sort - Describe Strassen's matrix multiplication - Find minimum weight spanning trees: Prim's and Kruskal's algorithms - Dijkstra's algorithm for finding single source shortest paths problem	

Module 3

- Explain the Dynamic Programming Design Technique
- Computation of Fibonacci series and Binomial coefficients
- With example explain shortest paths problem (Floyd-Warshall's algorithm)
- Algorithms on Graphs: Breadth First Search, Depth First Search
- Difference between BFS and DFS
- Working of topological sorting

Module 4

- Explain Backtracking Method: n-Queen problem
- Explain with example Hamiltonian circuit and vertex cover problems
- Write Overview of non-deterministic algorithms
- Write a short note on P, NP, NP-Complete and NP-hard problems

Text Books

1. Sharma, G. (n.d.). Design and analysis of algorithms. Khanna Publishing House
2. Cormen, T. H., Leiserson, C. E., Rivest, R. L., & Stein, C. (2009). Introduction to algorithms (3rd ed.). PHI Publication
3. Horowitz, E., Sahni, S., & Rajasekaran, S. (2012). Fundamentals of computer algorithms. University Press (I) Pvt. Ltd
4. Levitin, A. (2012). Introduction to design and analysis of algorithms (3rd ed.). Pearson

Reference Books

1. Aho, A. V., Hopcroft, J. E., & Ullman, J. D. (1983). The design and analysis of computer algorithms. Addison-Wesley Publications
2. Kleinberg, J., & Tardos, E. (2006). Algorithm design. Pearson Education

Assessment:**Internal Assessment: (50 Marks) Evaluation Scheme:**

Depending on the activities mentioned above a project should be developed for 50 marks

The internal assessment, which is a project evaluation, will be done by conducting a project presentation at the College level, where an External Examiner (Industry Expert or Subject Expert) appointed by the College will be evaluating the project depending on evaluation rubrics given below.

Evaluation Criteria	Description	Marks
1. Algorithm Design & Correctness	- Problem is correctly solved using appropriate approach (Divide & Conquer /	15

	Backtracking) - Logic is sound and handles edge cases	
2. Code Implementation & Structure	- Clean and modular implementation - Proper use of functions, loops, recursion, etc. - Code is syntactically correct and executable	10
3. Time and Space Complexity Analysis	- Clear and correct time complexity analysis (worst/best/average cases where applicable) - Space complexity explained in context of algorithm used	10
4. Input/Output Handling & Testing	- Program accepts valid input and produces correct output - Includes multiple test cases with varying input sizes	5
5. Code Readability & Comments	- Meaningful variable/function names - Proper indentation and formatting - Comments to explain logic or steps in algorithm	5
6. Report/Documentation	- Clearly explains problem statement, approach, and algorithm steps- Includes pseudocode, analysis, and test results- Neat formatting	5

Given below are two sample projects but it is expected to work on similar sort of projects

Project 1: Design an algorithm to find the kth smallest element in an unsorted array using the divide and conquer approach. Analyze its time complexity.

Project 2: Design an algorithm to solve the N-Queens problem using backtracking. Analyze its time and space complexity.

External Assessment: (50 Marks)

End Semester examination of 50 marks for 2 hours duration will be conducted

Semester – IV**. 4.4 A. Open Elective Courses/ Generic (OEC)**

Course Titles	Data Visualization (Th)
Course Credits	2 Credit's
Course Outcomes	Understand the principles and importance of data visualization
	1. Connect to and prepare data from various sources for visualization
	2. Develop and customize basic visualizations and dashboards
	3. Design advanced visualizations and apply complex calculations
	4. Apply storytelling principles and best practices in data visualization
Module 1 (Credit 1): Introduction of Data Visualization	
Learning Outcomes	After learning the module, learners will be able to
	1. Describe the key features and benefits of using Tableau/Power BI for data visualization
	2. Create basic visualizations (bar charts, line charts, scatter plots, etc.) using Tableau/Power BI to communicate data insights
	3. Design interactive dashboards using Tableau/Power BI, incorporating filters, parameters, and actions to facilitate data exploration
Course Outline	• Introduction to Data Visualization and Tableau/Power BI ○ Overview of data visualization and its importance ✓ Introduction to Tableau/Power BI and its features ✓ Setting up Tableau/Power BI and connecting to data sources ○ Connecting to Data Sources and Data Preparation ✓ Connecting to various data sources (Excel, CSV, SQL Server, etc.) ✓ Data preparation and cleaning ✓ Data modelling and data validation ○ Creating Basic Visualizations and Dashboards ✓ Creating basic visualizations (bar charts, line charts, scatter plots, etc.) ✓ Creating interactive dashboards ✓ Using filters, parameters, and actions
Module 2 (Credit 1): Advanced Data Visualization	
Learning	After learning the module, learners will be able to

Outcomes	1. Create advanced visualizations (maps, treemaps, word clouds, etc.) using Tableau/Power BI to communicate complex data insights
	2. Design interactive stories and presentations using Tableau/Power BI to communicate data insights effectively
Course Outline	• Advanced Visualizations and Calculations ○ Creating advanced visualizations (maps, treemaps, word clouds, etc.) ○ Using calculations and formulas in Tableau/Power BI ○ Creating custom calculations and data blending • Storytelling and Presentation ○ Principles of storytelling and presentation ○ Creating interactive stories and presentations ○ Using annotations, labels, and tooltips • Advanced Topics and Best Practices ○ Advanced topics (data densification, data visualization best practices, etc.) ○ Data visualization best practices ○ Creating reusable dashboards and templates
Assignment/Activities towards Comprehensive Continuous Evaluation (CCE):	
Module 1: Introduction to Data Visualization Assignment 1: Basic Visualization Project • Create basic visualizations (bar charts, line charts, scatter plots, etc.) using Tableau/Power BI to communicate data insights • Use a sample dataset to create 3-4 basic visualizations and submit a report explaining the insights gained from each visualization Assignment 2: Interactive Dashboard • Design an interactive dashboard using Tableau/Power BI, incorporating filters, parameters, and actions to facilitate data exploration • Task: Create an interactive dashboard using a sample dataset and submit a report explaining the design decisions and functionality Activity: Data Visualization Quiz • Assess understanding of data visualization concepts and Tableau/Power BI features • Complete a quiz on data visualization concepts, Tableau/Power BI features, and best practices • explaining the insights gained from each visualization	

Module 2: Advanced Data Visualization

Assignment 1: Advanced Visualization Project

- Create advanced visualizations (maps, treemaps, word clouds, etc.) using Tableau/Power BI to communicate complex data insights
- Use a sample dataset to create 2-3 advanced visualizations and submit a report explaining the insights gained from each visualization

Assignment 2: Interactive Storytelling

- Design an interactive story using Tableau/Power BI to communicate data insights effectively
- Create an interactive story using a sample dataset and submit a report explaining the narrative and design decisions

Textbooks:

1. Chaturvedi, A., & Malik, P. (2024). Mastering data visualization with Tableau. BPB Publications
2. Kumar, P. (2020). Data visualization with Tableau. Notion Press
3. Roy, S. (2023). Data visualization using Power BI, Orange, and Excel. Notion Press

Assessment:

External Assessment: (50 marks)

End Semester examination of 50 marks for 2 hours duration will be conducted

Semester – IV

.4.4 B. Open Elective Courses/ Generic (OEC)

Course Titles	Web Content Management Systems Design (Th)
Course Credits	2 Credit's
Course Outcomes	1. Understand the fundamental concepts and architecture of Web Content Management Systems (WCMS)
	2. Develop skills in creating, designing, and maintaining websites using popular WCMS platforms like WordPress
	3. Manage digital content effectively using themes, plugins, and content blocks
	4. Collaborate and publish content on a CMS-driven website
	5. Apply SEO and web usability principles in a CMS environment
Module 1 (Credit 1): Introduction to Web Content Management Systems Design (WCMS)	
Learning Outcomes	After learning the module, learners will be able to
	1. Describe key components and advantages of WCMS
	2. Install and configure a basic WordPress site on a local server
	3. Create and manage content using posts, pages, and media in a CMS
Course Outline	• Introduction to WCMS • Types and features of CMS platforms (WordPress, Joomla, Drupal) • WCMS architecture and core components • Installing WordPress on local server (XAMPP) • Overview of WordPress dashboard and settings • Creating and managing posts and pages • Media library management and content organization
Module 2 (Credit 1): Design and Functional Customization in WordPress	
Learning Outcomes	After learning the module, learners will be able to
	1. Design a simple website layout using themes and plugins
	2. Manage user roles and implement basic site security
	3. Demonstrate understanding of SEO, widgets, and responsive design
Course Outline	• Customizing WordPress themes and layout • Installing and configuring plugins • Using widgets and menus

	• Understanding user roles and permissions • SEO basics and permalinks • Website backup and basic security tips • Responsive design principles
Assignment/Activities towards Comprehensive Continuous Evaluation (CCE):	
Module 1: • Install and set up a WordPress site using XAMPP • Create a 3-page website with homepage, about, and contact sections using a theme and plugins	
Module 2: • Customize menu, sidebar, and add a gallery plugin • Submit a working folder and a video walkthrough of your site	

References:

1. Singh, S. (2019). Web Designing and Development. Katson Books
2. Xavier, C. (2018). Web Technology and Design. New Age International Publishers
3. Williams, A. (2023). WordPress for Beginners 2023. Independently Published
4. Sipos, D. (2021). Drupal 9 Module Development. Packt Publishing
5. Pisa, L. (2022). Joomla! 4 Masterclass. Independently Published

Assessment:

External Assessment: (50 marks)

End Semester examination of 50 marks for 2 hours duration will be conducted

Semester – IV

4.4 C. Open Elective Courses/ Generic (OEC)

Course Titles	Introduction to Graphic Design (Th)
Course Credits	
Course Outcomes	1. Understand the core principles of graphic design and digital visual communication
	2. Use Canva to design professional and engaging graphics for social media, print, and branding
	3. Explore and apply open-source tools like GIMP, Inkscape, and Photopea for advanced editing and illustration
	4. Create digital designs using principles of composition, layout, and color theory
	5. Build a portfolio of creative work using both browser-based and open-source tools
Module 1 (Credit 1): Design with Canva	
Learning Outcomes	After learning the module, learners will be able to
	1. Recognize and apply design principles using Canva's interface and templates
	2. Create marketing materials like flyers, infographics, social media posts, and brochures
	3. Customize templates using color, typography, layout, and brand assets
	4. After learning the module, learners will be able to
Course Outline	• Introduction to Graphic Design and Canva ○ Elements and Principles of Design ○ Canva interface overview and templates ○ Brand Kit and design identity • Designing for Real-World Applications ○ Posters, flyers, infographics ○ Instagram, Facebook, and YouTube graphics ○ Resume and business card designs • Collaboration and Export ○ Team design, comment and share features ○ Export formats and printing guidelines
Module 2 (Credit 1): Graphic Design with Open-Source Tools	
Learning Outcomes	After learning the module, learners will be able to
	1. Use open-source tools like GIMP and Inkscape for photo editing

	and vector illustration
	2. Apply advanced features like layers, masks, and blending modes
	3. Create UI design, logos, icons, and mockups using open-source environments
Course Outline	• Introduction to Open-Source Design Tools ○ Overview of GIMP, Inkscape, Photopea ○ Installation and interface navigation • Advanced Design Techniques ○ Image manipulation and photo retouching (GIMP) ○ Vector design and logo creation (Inkscape) ○ Working with layers, gradients, paths, and filters • Cross-Tool Integration ○ Exporting between tools (SVG, PNG, PSD formats) ○ Preparing assets for web and print ○ Introduction to collaboration tools and versioning
Assignment/Activities towards Comprehensive Continuous Evaluation (CCE):	
Module 1: Design with Canva	
• Assignment 1: Create a campaign poster, an Instagram post, and a business card using Canva • Assignment 2: Collaborate on a brochure project using Canva Team. Submit final designs and peer feedback	
Module 2: Open-Source Tools	
• Assignment 1: Create a logo and a multi-layered digital illustration using GIMP or Inkscape • Assignment 2: Submit a branding kit (logo, icons, typography samples) using only open-source tools. Include export files and process documentation	

References:

1. Chapman, C. (2023). The Non-Designer's Guide to Canva. Independently Published
2. Lobster, T. (2021). GIMP 2.10 Cookbook. Packt Publishing
3. Bah, O. (2022). Mastering Inkscape for Graphic Design. TechPress
4. Smith, A. (2023). Design with Open Tools: GIMP, Inkscape, and Photopea. Open Source Visuals
5. Canva Design School: <https://www.canva.com/learn>

Assessment:

External Assessment: (50 marks)

End Semester examination of 50 marks for 2 hours duration will be conducted

Semester – IV

.4.5 Skill Enhancement Courses (SEC)

Course Titles	Introduction to Microprocessor and Microcontroller (Th)
Course Credits	2 Credit's
Course Outcomes	1. Familiarise the architecture and operation of microprocessors 8085 and 8086
	2. Explain addressing modes and instruction sets of 8085 and 8086
	3. Develop assembly language programs using 8085 instruction set
	4. Analyse the functionality of peripheral devices like 8259, 8257, and 8251
	5. Implement the concepts of interrupts, memory interfacing, and serial communication
Module 1 (Credit 1): Fundamentals of 8086 Microprocessor Architecture and 8085 overview	
Learning Outcomes	After learning the module, learners will be able to
	1. Get knowledge of microprocessor 8086 and overview of 8085
	2. Write an Assembly level programming language using 8085 instructions Set
Course Outline	• Fundamentals of Microprocessor 8086 Architecture: Definition of Microprocessor, basics of 8085, 8086 architecture, Functions of microprocessor, EU and BIU functions - 8086, Flag register 8086, Addressing modes of 8086, Pin Diagram of 8086. Instruction set of 8086. Instruction set of 8085 - For practical
Module 2 (Credit 1): Study of Microcontrollers such as 8257, 8259 and 8251	
Learning Outcomes	After learning the module, learners will be able to
	1. Understand 8259 PIC, its advantages
	2. Get knowledge of 8251 USART and 8257 DMA Controller and its Usage
	3. To develop assembly language programming of using 8085
Course Outline	• Definition interrupts, purpose of interrupt, types of interrupts, 8259 PIC block diagram (architecture), advantages and disadvantages of 8259 • Concept of memory and I/O interface, Serial data transmission, Block Diagram of 8251 USART, Block diagram of 8257 DMA controller architecture, advantages and disadvantages of 8257
Assignment/Activities towards Comprehensive Continuous Evaluation (CCE):	
Module 1	
• 8085 microprocessor program to perform addition of two 8-bit numbers	

- 8085 microprocessor program to exchange numbers stored at memory locations D000 & D001
- 8085 assembly language program to add two 16-bit numbers
- 8085 program to find 1's and 2's complement of 8-bit number where the number is stored at 2500 memory address and store result into 2501 and 2502 memory address
- 8085 microprocessor program to perform subtraction of two 8-bit numbers
- 8085 assembly language program to subtract two 16 bit numbers
- 8085 program to find multiplication of two 8-bit numbers using successive addition method
- 8085 program to transfer a block of N bytes from source to destination
- 8085 program to find maximum number in the array
- 8085 program to find minimum number in the array
- 8085 program to sort numbers in ascending order
- 8085 program to sort numbers in descending order
- 8085 program to generate Fibonacci series
- Assembly language program in 8085 to find square of 8-bit number

Module 2

- Study of 8257 DMA Controller
- Study of 8251 USART
- Study of 8259 PIC

Textbooks:

1. Microprocessor Architecture Programming ~ Application, with 8080/8085 by Ramesh S. Gaonkar

References:

1. Microprocessor and Digital Systems by D.V. Hall
2. 16 bit Microprocessor by Triebel and A. Singh
3. 16 bit Microprocessor by Liu and Gibson

Assessment:

External Assessment: (50 marks)

End Semester examination of 50 marks for 2 hours duration will be conducted

Semester – IV

.4.7 Community Engagement and Service (CE)

Course Titles	Digital Literacy and E-waste management (Th)
Course Credits	2 Credit's
Course Outcomes	1. Create awareness to educate community members on digital literacy, computer skills and online safety
	2. Demonstrate e-governance and digital inclusion
	3. Describe e-waste management hierarchy
	4. Apply e-waste recycling practices, including proper disposal and recycling of electronic devices
	5. Create awareness to educate community members on digital literacy, computer skills and online safety
Module 1 (Credit 1): Digital Literacy	
Learning Outcomes	1. Understand the importance of digital literacy for community empowerment
	2. Identify and describe e-governance services and their benefits
Course Outline	• Introduction to digital literacy • Basic computer skills - Hardware, Software, File Management, Internet and Email, Security and Safety • Online safety and etiquette • Accessing government services online (e-governance)
Module 2 (Credit 2): E-waste management	
Learning Outcomes	1. Explain the e-waste management hierarchy, including reduction, reuse, recycling, and disposal
	2. Implement e-waste recycling practices
Course Outline	• Introduction to E-waste ○ Definition and scope of e-waste ○ Environmental, health, and economic impacts of e-waste ○ Overview of e-waste management ○ E-waste Education and Awareness ✓ Importance of e-waste education and awareness ✓ Strategies for promoting e-waste awareness ○ Community engagement and participation
Assignment/Activities towards Comprehensive Continuous Evaluation (CCE):	
• Training manuals and handouts • Digital literacy and cyber security resources (e.g., videos, infographics, etc.)	

- E-governance service guides and tutorials

Assessment:

Internal Assessment: (50 Marks) Evaluation Scheme:

Depending on the activities mentioned above a project should be developed for 50 marks

The internal assessment, which is a project evaluation, will be done by conducting a project presentation at the College level, where an External Examiner (Industry Expert or Subject Expert) appointed by the College will be evaluating the project depending on evaluation rubrics given below.

Evaluation Criteria	Description	Marks
1. Content Accuracy & Relevance	- Information is correct, up-to-date, and aligns with the topic (e.g., cyber security best practices, e- governance steps) - Avoids technical misinformation	15
2. Clarity & Simplicity of Communication	- Language is easy to understand for the target audience - Jargon is minimized or explained - Clear step-by-step explanations where needed	10
3. Design & Visual Presentation	- Effective use of layout, formatting, images, color, and fonts - For videos/infographics: engaging visuals and flow - Manuals: readable, clean layout	10
4. Structure & Organization	- Well-structured sections (e.g., introduction, objectives, instructions, summary) - Logical flow of topics	5
5. Creativity & Engagement	- Innovative use of tools or visuals (animations, icons, real-life scenarios) - Keeps user interest high	5
6. Supporting Material & Resources	- Inclusion of screenshots, examples, links to relevant services, references, or FAQs - Accessibility features (e.g., captions, alt text, translations)	5