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

Abbreviation	Full-form	Remarks	Related to Major and Minor Courses
Major (Core)	Main Discipline		
Major (Elective)	Elective Options		Related to the Major Discipline
Minor Stream	Other Disciplines (Inter/Multidisciplinary) Non related the Major	either from the same Faculty or any other faculty	
OEC	Open Elective Courses/ Generic		Not Related to The Major and Minor
VSEC	Vocational and Skill Enhancement Courses		
VSC	Vocational Skill Courses		Not Related to The Major and Minor
SEC	Skill Enhancement Courses		Not Related to The Major and Minor
AEC	Ability Enhancement Courses	Communication skills, critical reading, academic writing, etc.	Not Related to the Major and Minor
VEC	Value Education Courses	Understanding India, Environmental science /Education, Digital and technological solutions, Health & Wellness, Yoga education, sports, and fitness	Not Related to the Major and Minor
IKS	Indian Knowledge System	I. Generic IKS Course: basic knowledge of the IKS II. Subject Specific IKS Courses: advanced information pertaining to the subject: part of the major credit.	Subject Specific IKS related to Major
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	Not Related to the Major and Minor

CE	Community Engagement and service		Not Related to the Major and Minor
RP	Research Project	Corresponding to the Major Subject	Related to the Major

Program Details

Programme Degree		**Bachelor of Computer Application (BCA)**
Specialization		
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 Outcomes (POs)		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.
Intake (For SNDT WU Departments and Conducted Colleges)		As per AICTE approval process

Structure with Course Titles

Bachelor of Computer Application (BCA)

Semester – III

SN	Courses	Type of Course	Credits	Marks	Int	Ext
	Semester III					
30135411	Probability & Statistics	Major (Core)	4	100	50	50
30135412	Database Management System	Major (Core)	4	100	50	50
30135413	Advanced Web Designing	Major (Core)	4	100	50	50
30335411	Design Thinking & Innovation	Minor Stream	2	50	0	50
30435411	Basics of Data Analysis using spreadsheet	OEC **(Any One)**	2	50	0	50
30435412	AI Tools					
30435413	E-commerce Technologies					
	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
30810301	रचनात्मक लेखन (Hindi)					
30810401	मराठी भाषेचा परिचय - भाग १ (Marathi)					
30810501	Contemporary Sanskrit Nyaya (Sanskrit)					
30810201	શીખો ગુજરાતી – પ્રાથમિક ભાગ ૧: લિપિ પરિચય, શ્રવણ અને વાચન કૌશલ્ય (Gujarati)					

31335401	Field Project	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

SN	Courses	Type of Course	Credits	Marks	Int	Ext
	Semester IV					
40135411	Adv. Java Programming	Major (Core)	4	100	50	50
40135412	Mobile Programming	Major (Core)	4	100	50	50
40335411	Design & Analysis of Algorithm	Minor Stream	4	100	50	50
40435411	Data Visualization	OEC **(Any One)**	2	50	0	50
40435412	Web Content Management Systems					
40435413	Graphic Design					
40735411	Introduction to Microprocessor and Microcontroller	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
40810411	मराठी भाषेचा परिचय - भाग २ (Marathi)					
40810411	सूचना प्रौद्योगिकी और हिंदी भाषा (Hindi)					
40810511	वाल्मिकीकिरामयणे अयोध्याकाण्ड: (Sanskrit)					
40810211	શીખો ગુજરાતી - ભાધ્મમિક (Gujarati)					

41735401	Digital Literacy and E-waste management	CEP	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
41450122	Personality and Leadership Development through National Service Scheme					
41450121	NSS Volunteers under National service scheme special camp					
41450221	National Cadets Corps. (NCC) Studies – IV					
41450421	Theatre & Dance					
			22	**550**	**250**	**300**

Course Syllabus

Semester - III

.3.1 Major (Core)

Course Title	**Probability and Statistics**
Course Credits	**4 Credits**
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**
	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**
	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**
	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**
	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 – Correlation & regression	10
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 (where 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 wining or loosing 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

.3.2 Major (Core)

Course Title	**Data Base Management System**
Course Credit	**4 Credits**
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**
	Define Database, DBMS and its applications.
	Differentiate between Traditional file system and Database system
	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-ServerArchitecture
Module 2 (Credit 1)	**Introduction to Data Models, RDBMS and Database Design**
Learning Outcomes	**After learning the module, learners will be able to**
	Define Data Model and its different types
	Relate Relational Database Management Systems
	Utilize different Keys used in database, constraints applied on attributes and developing ER diagrams
Content Outline	**DataModels:** TypesofDataModels(Hierarchical,Network, Relational, Object-oriented),Importance of Data Models in DBMS **Introduction to RDBMS**, Object-oriented database, Distributed Database, No SQL **DatabaseDesign**: Keys:PrimaryKey,CandidateKey,SuperKey,ForeignKey,CompositeKey,

	Alternate Key, Unique Key, Surrogate **Key Constraints in a table:** Primary Key, Foreign Key, UniqueKey,NOTNULL,CHECK,Entity-Relationship (ER) Model, Entities and Entity Sets, AttributesandRelationships, ERDiagrams, KeyConstraintsandWeakEntitySets,ExtendedER 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**
	Importance of functional dependencies, Normalization and its implications with the database
	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**
	The importance of Transaction Processing System
	Techniques of Concurrency Control system
	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 ConcurrencyControl 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	

- Database Applications

2. Compare and contrast:
   - 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:
   - Three-Tier Architecture
   - 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:
   - Hierarchical
   - Network
   - Relational
   - Object-oriented data models
2. Write a short note on:
   - RDBMS
   - NoSQL vs Traditional Databases
   - Distributed Database
3. Explain with examples:
   - Primary Key
   - Foreign Key
   - Composite Key
   - Surrogate Key
4. Design an ER Diagram for a college database with entities: Student, Course, Faculty, Enrollment. Include:
   - Attributes
   - Keys
   - Relationships
   - 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:
   - Functional Dependencies
   - Normal Forms (1NF to BCNF)
2. Normalize the given unnormalized table to 3NF.
   (Provide sample unnormalized data: e.g., student info with repeating groups.)
3. Write SQL queries for the following tasks:
   - Create a table for "Employee" with at least 5 fields and constraints.
   - Insert 3 rows of data.
   - Write a query to display the highest salary.
   - Display employees in ascending order of joining date.
   - List departments with more than 5 employees (use GROUP BY & HAVING).
   - 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:
    - 2PL
    - Timestamp Ordering
    - Optimistic Concurrency Control
4. Describe the steps of Database Recovery:
    - Checkpoints
    - Caching
    - 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:		
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

.3.3 Minor (Core)

Course Title	**Advanced Web Designing**
Course Credits	**4Credits**
Course Outcomes	1. Familiarize advanced concept soft Web designing
	2. Gain proficiencyincreating dynamicwebpagesusingHTML5, JavaScript
	3. Develop data-driven web applications, combining client- side interactivity with server-side processing for robust web functionality.
	4. DesignandDevelopaFullyFunctionalResponsiveWebsite
	5. Create web pages with the advanced Web Design Tools
Module1 (Credit1)	**HTML5 and CSS3 for Advanced Web Design**
Learning Outcomes	**Afterlearningthemodule,learnerswillbeableto**
	UseadvancedHTML5featuressuchassemanticelements,multimedia Integration, and web storage to create modern, dynamic web pages.
	GainexpertiseinCSS3techniques,includingFlexbox,CSSGrid, animations,transitions,andmediaqueries,todesignresponsiveandvisuall y engaging websites.
	Learn to useCSSpreprocessorslikeSASSandLESS,enablingthem to streamline and enhance their CSS workflows for scalable and maintainable designs
Content Outline	**HTML5andCSS3forAdvancedWebDesign HTML5 Advanced Features** o SemanticHTML,Multimedia(audio,video),Canvas,SVG o WebStorageand Local Storage • **CSS3 Advanced Techniques** o Flexbox andCSSGridLayout o AdvancedCSSAnimationsandTransitions o MediaQueries forResponsive Design o CustomProperties(CSS Variables) • **CSSPreprocessors** o IntroductiontoSASS andLESS o Benefitsandfeaturesof CSSpreprocessing
Module2 (Credit1)	**Web Development with JavaScript and PHP**
Learning Outcomes	**After learning the module, learners will be able to**
	Learn foundational concepts of Java Script and to build Interactive client-side web application and validate forms effectively.
	Learn PHP for server-sides cripting, including embedding PHP within HTML

Content Outline	**WebDevelopmentwithJavaScriptandPHP** ○ **JavaScriptProgramming Basics** ○ IntroductiontoClient-SideJavaScript, variablesand datatypes, Operators ○ ControlFlow:ConditionalStatements(if,switch), Loops(for,while) ○ Functions, eventbubblinganddelegation ○ **JavaScriptFormsand Validation** ○ Validatingformdata ontheclient-side ○ Handlingtextfields,checkboxes,radio buttons ○ Preventingformsubmissionwithvalidation ○ Modifyingformvaluesdynamically ○ **IntroductiontoPHPandServer-Side Scripting** ○ Introductiontoserver-sidescripting,EmbeddingPHPwithinHTML documents ○ BasicPHPsyntax:Variables,DataTypes,Constants,conditional statements, loops ○ **PHPFunctionsandFormHandling** ○ DefiningPHPfunctions:Argumentsandreturnvalues ○ Handlingformdata in PHP:Using$_GET, $_POST, $_REQUEST ○ FormvalidationandsanitizationinPHP
Module3 (Credit1)	**Bootstrap**
Learning Outcomes	**Afterlearningthemodule,learnerswillbeableto**
	UseoftheBootstrapgridsystemtocreateflexible,responsivelayouts.
	gaintheabilitytoutilizeBootstrap components
Content Outline	• **BootstrapGrid System** ○ OverviewofBootstrap Framework ○ Understandingthegridsystem:RowsandColumns ○ Creatingresponsivelayoutswiththegridsystem(e.g.,12-column layout) ○ Breakpointsandresponsivedesign(xs,sm,md,lg,xl) • **Bootstrap Components** ○ **NavigationBar**:CreatingresponsivenavigationmenuswithNavbar ○ **Buttons**:Stylingbuttonswithdifferentsizes,colors,andeffects ○ **Forms**:UsingBootstrap'sformelementsandvalidationstyles ○ **Cards**:Implementingcardcomponentsforcontentdisplay ○ **Modals**:Creatingandusingmodalsforinteractivecontent
Module4 (Credit1)	**Introduction to Advanced Web Design**
Learning Outcomes	Design modernwebdesigntrends,includingresponsiveandmobile-firstdesign principles, as well as the fundamentals of Progressive Web Apps (PWAs).

	UX and UI design principles to create user-centered, intuitive web experiences, using web design frameworks like Bootstrap and Foundation to build efficient layouts.
	Understand basics of design tools such as Adobe XD, Figma, Sketch, and In Vision to prototype and visualize their web design concepts.
Content Outline	**IntroductiontoAdvancedWebDesign** • **OverviewofModernWebDesign Trends** o ResponsiveDesign,Mobile-firstDesign,ProgressiveWebApps(PWAs) o UserExperience(UX)andUserInterface(UI)DesignPrinciples • **Design ToolsandSoftware:** AdobeXD,Figma,Sketch,and In Visionforprototyping
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: 1. 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>. 2. 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. 3. Canvas or SVG: Design a simple animation or logo using <canvas> or SVG. 4. Web Storage: Demonstrate the use of local Storage to store user preferences like dark/light theme. 5. CSS3: o Apply Flexbox or Grid to layout the page. o Include CSS animations/transitions (e.g., fade in navigation, hover effects). o Add media queries for responsiveness. o 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: 1. JavaScript Basics: o Write a script that uses variables, data types, loops, and conditionals to display a greeting based on the time of day. 2. Form Validation (JavaScript): o Create a contact form with at least 5 fields (e.g., name, email, phone, message). o Validate the form using JavaScript (e.g., required fields, email format, character limits). 3. Event Handling: o Use event bubbling and delegation to create a dynamic list where new	

items can be added or removed.

4. PHP Basics:
    - Embed PHP in an HTML form to handle submissions.
    - Validate and sanitize form inputs using $_POST, is set (), filter Var (), etc.
5. 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:

1. Grid System:
    - Build a responsive 3-section layout (e.g., homepage) using Bootstrap's 12-column grid.
    - Implement responsive breakpoints (xs, sm, md, lg).
2. 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.
3. 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:

1. Trends Report:
    - Write a 1-page report on modern web design trends, including PWA features, mobile-first design, and current UI/UX patterns.
2. 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.
3. 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. WebprogrammingwithHTML5, CSS3, and Java Script.

2. Nixon, R. Learning PHP, My SQL& JavaScript.
3. Shenoy, A. Learning Bootstrap4.

Reference Books:
1. Frain, B. ResponsivewebdesignwithHTML5and CSS3.
2. KS, R .Modernweb 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

.**3.4 Minor Stream**

Course Title	**Design Thinking & Innovation**
Course Credit	**2 Credits**
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**
	Learn the Fundamentals of Innovation and Design Thinking
	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**
	Master the Design Thinking Process and Its Applications
	Apply Design Thinking to Real-World Business Problems
	Develop Practical Skills in Design Thinking
Content 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

Assignment/Activities towards Comprehensive Continuous Evaluation (CCE):

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.

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

Course Title	**Basics of Data Analysis using Spreadsheet**
Course Credits	**2 Credits**
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**
	● Identify the different types of data analysis (descriptive, inferential, predictive) ● Understand the basic features and functions of spreadsheet software (cells, rows, columns, formulas, functions) ● Learn how to use spreadsheet software to perform basic data manipulation tasks (e.g., calculating sums, averages, counts) ● Understand the importance of data cleaning and preprocessing in data analysis ● Define data visualization and its importance in communicating data insights
Content 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** ● Calculate and interpret basic statistical measures ● Analyze and interpret data results ● Communicate data insights effectively ● Apply data analysis concepts to real-world scenarios ● Create informative and interactive reports and dashboards

Content Outline	**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, Cegage learning asia pet. (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

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

Course Title	**AI Tools**
Course Credits	**2 Credits**
	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**
	Remember and define basic concepts and types of Artificial Intelligence.
	Understand how no-code AI tools work and their relevance in real-life applications.
	Apply simple AI tools like Teachable Machine, Canva AI, and ChatGPT to perform tasks such as image classification, content generation, and design.
Content 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**
	Apply user-friendly AI tools to create original content and designs
	Analyze the features, strengths, and limitations of various AI applications
	Create a mini project using one or more AI tools to solve a simple problem or create digital content

Content 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.
– A practical guide for students, covering simple AI tools and their ethical implications in the Indian context.
3.**Markiewicz, T., & Zheng, J.** (2017). *Getting Started with Artificial Intelligence*. O'Reilly Media.– Focuses on applying AI services in real-life scenarios using cloud-based tools.
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

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

Course Title	**E-Commerce Technologies**
Course Credits	**2 Credits**
	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 store**s**
	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**
	Understand the scope and types of e-commerce models
	Identify key components of an e-commerce platform
	Apply simple tools to set up a basic e-commerce website
Content 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**
	Explain digital payment systems and gateway integration basics
	Identify security measures in online commerce
	Apply simple digital marketing tools for product promotion
Content 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

.3.7 Field Project (FP)

Course Title	**Field Project**
Course Credit	**2 Credits**
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.
Content Outlines	1. Identifying potential project ideas 2. Defining project scope and objectives 3. 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.
Content Outlines	1. Outlining project title, objectives, scope, and timeline 2. Creating a detailed project plan 3. 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

Semester - IV

.4.1 Major (Core)

Course Title	**Advanced Java**
Course Credits	**4Credits**
Course Outcomes	**1.** Demonstrate GUIapplicationusingSwingcomponents.
	2. Access databases using Java Database Connectivity (JDBC).
	3. Develop WebApplicationsusingServletsanddeploy themonpopularserverslikeTomcat
	4. ConnectJSPbasedapplicationswithdatabases
	5. Create web application using JSP Form inputelements
Module1(Credit1)	
Learning Outcomes	**Afterlearningthemodule,learnerswillbeableto**
	DifferentiatebetweenAWT and Swing
	DevelopGUIprogramsusing SwingComponents.
	Developsimpleeventdriven programs using event class and event listener interface.
Content 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(), setSize(), setLayout(), and setVisible()), JApplet, JFrame, JLabel, JTextField, JTextArea, JButton, JCheckBox, JRadioButton, JComboBox, JMenu • **Layout Management:** FlowLayout, BorderLayout, CardLayout, BoxLayout, GridLayout, GridbagLayout. • **Event Handling:** Introduction, Action Events, Key Events, Focus Events, Window Event, Mouse Event, Item Events • **EventListner Interface:** ActionListener, KeyListener, FocusListener, WindowListener, MouseListener, MouseMotionListener, ItemListener
Module2(Credit1)	
Learning Outcomes	**Afterlearningthemodule,learnerswillbeableto**
	Understand JDBC Architecture, its components and the basics ofJDBC.
	Understand different types of JDBC drivers and use of these drivers for connecting different databases.
	Storing, retrieving, and modifying the data in the database using different prepared statements. Develop program using JDBC to query a database and modify it.
Content 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.
Module3(Credit1)	
Learning Outcomes	**Afterlearningthemodule,learnerswillbeableto**
	understand the Life Cycle of Servlet & will be able to create a simple Servlet.
	Read databases/table records and display them using servlet.
	Developwebapplication using javax.servlet & javax.servlet.http Package
Content 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**.
Module4(Credit1)	
Learning Outcomes	**Afterlearningthemodule,learnerswillbeableto**
	Understand JSP with syntaxand Semantics.
	Create web application using JSP Form inputelements
Content 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, Scriplets, 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 tocreatecheckboxesfordifferentcoursesbelonging 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.
- WAPusingJDBCtodisplayStudent'srecord(rollNo, Name, Address, Mobile No) stored into table 'StudRec' of the database.
- WAPusingJDBCtoedit(insert,update,delete)Student's record stored in the database.
- WAP to **send data (insert)** in to Table (ex. "Students" table) in database using **Prepared Statement** and retrieve data from Table "Student" and display on screen.
- WAP to **update data** in to 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, PearsonEducation

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:		
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	5

	modules - Well-written and structured	

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

.**4.2 Major (Core)**

Course Title	**Mobile Programming**
Course Credits	**4 Credits**
Course Outcomes	**After Completion of this Course, students will be able**
	1.Recognizesmobiledevelopment environments
	2.Develop effectiveAndroidcode.
	3. Develop Android Applications
	1. Create database using SQLite Database.
	2. Apply designingand developing mobile applicationsusingone applicationdevelopmentframework.
Module 1 (Credit 1)	**IntroductiontoAndroidProgrammingLanguage and AndroidApplicationLayout**
Learning Outcomes	**After learning the module, learners will be able to**
	• Build Simple Android Application • Demonstrate the use of a Scroll View in an Android application • Learn use string resources in Android. • Organize UI components, design layouts
Content Outline	**IntroductiontoAndroidProgrammingLanguage:** WhatisAndroid,HistoryandVersion,SoftwareStack,Core BuildingBlocks,AndroidEmulator, Internal Details, Dalvik VM, AndroidManifest.xml **AndroidApplicationLayout:** Android Linear Layout, Android Relative Layout, Android TableLayout,ScrollViewinAndroid,AndroidFrameLayout
Module 2 (Credit 1)	AndroidUIwidgets and MenusinAndroid
Learning Outcomes	**After learning the module, learners will be able to**
	• Develop android UI widgets • Build Android Application with Web View, Menus in Android
Content Outline	**AndroidUIwidgets:** Working with Button,Toast,Toggle Button, Checkbox, Image View,ImageButton,AlertDialog,Spinner,AutoCompleteText View, Rating Bar, Date Picker, Date Picker, Time Picker, Progress Bar **BuildingAndroidApplicationwithWebView:** BuildingSimpleWebViewApplication,LoadHTMLDateon WebView, Embed/DisplayYouTubeVideo inWebView, ConvertCustomDesignWebsiteintoAndroidApp **MenusinAndroid:** Option Menu,Context Menu,Popup Menu
Module 3 (credit 1)	**AndroidIntent,Fragments and AndroidDatabase(SQLite) and Multimedia**
Learning Outcomes	**After learning the module, learners will be able to**
	• Implicit Activities and android Fragments • Build Database (SQLite) & Android Multimedia

Content Outline	**AndroidActivity&Intent,AndroidFragments:** ImplicitIntent,ExplicitIntent,Android Fragments **AndroidDatabase(SQLite)&AndroidMultimedia:** BuildingSimpleWebViewApplication,LoadHTMLDateon WebView, Embed/DisplayYouTubeVideo inWebView, ConvertCustomDesignWebsiteintoAndroidApp SQLiteExamplewithGUI
Module 4 (Credit 1)	**AndroidSpeech&TelephonyAPI AndroidMaterialDesignUsingDesignSupportLibrary &Animation**
Learning Outcomes	**After learning the module, learners will be able to**
	• Convert text into speech & Telephony API • Design Using Design Support Library & Animation
Content Outline	**AndroidSpeech&TelephonyAPI:** SpeechAPIisusedtoconverttextintospeech,TexttoSpeech ExamplewithSpeedoption, HowtomakeaPhoneCall,How to Send Email. **AndroidMaterialDesignUsingDesignSupportLibrary &Animation:** Navigation Drawer View, Splash Screen, Android animation enables you to rotate, slide and flip images and text, Fade In AnimationinAndroid,FadeOutAnimationinAndroid,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 Liner 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 Date 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

.4.3 Minor Stream

Course Title	**Design & Analysis of Algorithm**
Course Credit	**4 Credits**
Course Outcome	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.
Module1(Credit1)	**IntroductiontoAnalysisofAlgorithm**
Learning Outcome	**After learning the modules, learners will be able to**
	Define algorithm and basic terminologies
	UnderstandperformanceanalysisofalgorithmandAsymptotic notations
	Analyze sequential and recursive algorithms
Content Outline	Whatisanalgorithm?Designandperformanceanalysisof algorithms, time complexity, space complexity. Asymptoticnotations(O,Ω,Θ)tomeasuregrowthofafunction and application to measure complexity of algorithms. Analysis of sequential search, bubble sort, selection sort, insertionsort,matrixmultiplication.Recursion:Basicconcept. Analysis of recursive algorithms
Module2(Credit1)	**TheDivide& Conquer& GreedyDesign Techniques:**
Learning Outcome	**After learning the modules, learners will be able to**
	Apply divide and conquer technique to solve smaller subproblems to get solution of bigger critical problem
	Useofgreedytechniqueforoptimizationbyfindingbestlocal solution
Content 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.
Module3(Credit1)	**TheDynamicProgrammingDesignTechniques:**
Learning Outcome	**After learning the modules, learners will be able to**
	Describethedynamic-programmingparadigmandexplainwhen an algorithmic design situation calls for it.
	Recitealgorithmsthatemploythisparadigm.Synthesize

	dynamic-programming algorithms, and analyze them.
Content Outline	Thegeneralconcept.ComputationofFibonacciseriesand Binomial coefficients, all pair shortest paths problem (Floyd-Warshall'salgorithm),0/1Knapsackproblem. Algorithms on Graphs: Breadth First Search, Depth First Search, finding connected components,depthfirstsearchofadirectedgraph,topological sorting.
Module4(Credit1)	**Limitations of Algorithmic Power**
Learning Outcome	**After learning the modules, learners will be able to**
	Understand technique of backtracking
	Solve various problems
	Understand non-deterministic algorithms
Content Outline	Backtracking Method: n-Queen problem; sum of subsets problem/Hamiltoniancircuit, problem/vertexcoverproblem.
	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 / Backtracking) - Logic is sound and handles edge cases	**15**
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

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

Course Title	**Data Visualization**
Course Credit	**2 Credits**
Course Outcomes	1. Understand the principles and importance of data visualization
	2. Connect to and prepare data from various sources for visualization.
	3. Develop and customize basic visualizations and dashboards.
	4. Design advanced visualizations and apply complex calculations
	5. 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**
	Describe the key features and benefits of using Tableau/Power Bi for data visualization Create basic visualizations (bar charts, line charts, scatter plots, etc.) using Tableau/Power Bi to communicate data insights. Design interactive dashboards using Tableau/Power Bi, incorporating filters, parameters, and actions to facilitate data exploration.
Content 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 Outcomes	**After learning the module, learners will be able to**
	Create advanced visualizations (maps, treemaps, word clouds, etc.) using Tableau/Power Bi to communicate complex data insights. Design interactive stories and presentations using Tableau/Power Bi to communicate data insights effectively.

Content 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.

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 thenarrative 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

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

Course Title	**Web Content Management Systems Design**
Course Credit	**2 Credits**
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**
	Describe key components and advantages of WCMS.
	Install and configure a basic WordPress site on a local server.
	Create and manage content using posts, pages, and media in a CMS.
Content 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**
	Design a simple website layout using themes and plugins.
	Manage user roles and implement basic site security.
	Demonstrate understanding of SEO, widgets, and responsive design.
Content 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. Covers HTML, CSS, WordPress basics, and CMS concepts in simple language.
2. **Xavier, C. (2018).** *Web Technology and Design.* New Age International Publishers. Comprehensive overview of web technologies including CMS fundamentals.
3. **Williams, A. (2023).** *WordPress for Beginners 2023.* Independently Published. Step-by-step guide to building WordPress websites.
4. **Sipos, D. (2021).** *Drupal 9 Module Development.* Packt Publishing. Focused on module development and customization in Drupal-based WCMS.
5. **Pisa, L. (2022).** *Joomla! 4 Masterclass.* Independently Published. Covers site creation and content publishing using Joomla CMS.

Assessment:
External Assessment: (50 marks)
End Semester examination of 50 marks for 2 hours duration will be conducted

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

Course Title	**Introduction to Graphic Design**
Course Credit	**2 Credits**
Course Outcomes	• Understand the core principles of graphic design and digital visual communication.
	• Use Canva to design professional and engaging graphics for social media, print, and branding.
	• Explore and apply open-source tools like GIMP, Inkscape, and Photopea for advanced editing and illustration.
	• Create digital designs using principles of composition, layout, and color theory.
	• 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**
	• Recognize and apply design principles using Canva's interface and templates.
	• Create marketing materials like flyers, infographics, social media posts, and brochures.
	• Customize templates using color, typography, layout, and brand assets.
Content 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**
	• Use open-source tools like GIMP and Inkscape for photo editing and vector illustration.
	• Apply advanced features like layers, masks, and blending

	modes.
	• Create UI design, logos, icons, and mockups using open-source environments.
Content 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

.4.5 Skill Enhancement Courses (SEC)

Course Title	**Introduction to Microprocessor and Microcontroller**
Course Credits	**2 Credits**
	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**
	• Get knowledge of microprocessor 8086 and overview of 8085 • Write an Assembly level programming language using 8085 instructions Set
Content 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**
	• Understand 8259 PIC, it's advantages • Get knowledge of 8251 USART and 8257 DMA Controller and its Usage
	To develop assembly language programming of using 8085.
Content 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

.4.7 Community Engagement and Service (CE)

Course Title	**Digital Literacy and E-waste management**
Course Credit	**2 Credits**
Course Outcomes	**1.** Create awareness to educatecommunitymembersondigitalliteracy, computer skillsand online safety
	2. Demonstrate e-governanceanddigitalinclusion
	3. Describe e-waste management hierarchy
	4. Apply e-waste recycling practices, including proper disposal and recycling of electronic devices
Module1(Credit1)	**Digital Literacy**
Learning Outcomes	Understand theimportanceofdigitalliteracyforcommunity empowerment.
	Identifyanddescribee-governanceservicesandtheir 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)
Module2(Credit2)	**E-waste management**
Learning Outcomes	Explain the e-waste management hierarchy, including reduction, reuse, recycling, and disposal.
	Implement e-waste recycling practices
Course Outline	**1. 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):	
1. Training manuals and handouts 2. Digital literacy and cyber security resources (e.g., videos, infographics, etc.) 3. 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**