SNDT Women's University, Mumbai

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

Bachelor of Science (Information Technology)

B.Sc. In IT

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 Majoror 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 andtechnological solutions, Health & Wellness, Yoga education, sports, and fitness	NA
IKS	Indian Knowledge System	Generic IKS Course: basicknowledge 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 MajorSubject	Related to the Major
FP	Field projects	Corresponding to the MajorSubject	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 andservice		Related to Major
RP	Research Project	corresponding to the MajorSubject	Related to Major

Program Template

Programme Degree		Bachelor of Computer Application (BCA)
Specialization		
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.
Eligibility Criteria for Programme		B. Sc I Year: A candidate for being eligible for admission to the three year course leading to the degree of Bachelor of Science must have passed the Higher Secondary School Certificate (Std. XII) examination conducted by the different Divisional Boards of the Maharashtra State Board of Secondary and Higher Secondary Education with the following subjects : - English Any one of the Modern Indian Languages or Modern Foreign Languages or any classical Language or Information Technology Any four Science subjects carrying 100 marks each. OR English Any one vocational subject carrying 200 marks Any three Science subjects carrying 100 marks each OR Must have passed an examination of any other recognised Board or Body Recognized as equivalent . Students who have not done Mathematics at 12 th Std. are needed to take a bridge course in Mathematics and pass a university conducted test before Semester I

		examination.
		B.Sc (IT) II Year: For a student from our University - should have cleared or has ATKT as admissible in first year in the same subject. For a student from another university - studied at least two courses of four credits each in the I year in the same subject. Passed I year without ATKT. Passed three year full time Diploma in Engineering with an aggregate of not less than 60% (Open Category) and 55% (Reserved Category) OR Must have passed any three year Diploma in Engineering Course. B.Sc (IT) III Year: For a student from our University- should have cleared second year in the same subject or has passed with admissible ATKT. For a student from another university– should have completed at least six courses of 4 credits each or 24 credits in the I and
Intake (For SNDTWU Departments and Conducted Colleges)		As Per University Affiliation Letter

Structure With Course Titles

B.Sc. In Information Technology

Semester - III

SN	Courses	Type of Course	Credits	Marks	Int	Ext
	Semester III					
30135211	Java Programming	Major (Core)	4	100	50	50
30135212	Database Management System	Major (Core)	4	100	50	50
30135213	Mathematics – II	Major (Core)	4	100	50	50
30335211	Data Analytics using Automated tools	Minor Stream	2	50	0	50
30435211	Intellectual Property Rights and Cyber Law	OEC **(Any One)**	2	50	0	50
30435212	Digital Marketing					
30435213	E-Commerce					
	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 (Gujrati)					
31335201	Field Projects	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					
40135211	Python Programming	Major (Core)	4	100	50	50
40135212	Advanced Java	Major (Core)	4	100	50	50
40335211	Web Technology	Minor Stream	4	100	50	50
40435211	Introduction to Canva	OEC **(Any One)**	2	50	0	50
40435212	Management Information System					
40435213	Introduction to Entrepreneurship					
40735211	Introduction to Microprocessor	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)					
41735201	Green Computing	CEP	2	50	50	0
	Co-Curricular Course (CC)	CC	2	50	50	0

	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)	**(Any One)**				
41450122	A. Personality and Leadership Development through National Service Scheme					
41450121	B. NSS Volunteers under National service scheme special camp					
41450221	C. National Cadets Corps. (NCC) Studies – IV					
41450421	D. Theatre & Dance					
			22	**550**	**250**	**300**

Exit with UG Diploma with 10 extra credits (44 + 10 credits)

Course Syllabus

Semester - III

.3.1 Major (Core)

Course Title	Java Programming
Course Credits	**4 Credits**
Course Outcomes	1. Apply logic to develop programs in Java
	2. Evaluate the History and Features of Java.
	3. Apply and implement the various concepts of OOP in Java
	4. Analyze and implement the relationships of classes through inheritance and polymorphism.
	5. Implement Java FX programming in Java.
Module 1 (Credit 1)	**Basics of Java**
Learning Outcomes	**After learning the module, learners will be able to**
	1. Apply basic Java syntax to write simple programs using variables, data types, operators, and control structures.
	2. Implement object-oriented programming principles by creating classes and objects
	3.Demonstrate method overloading to enhance program modularity and readability.
	4. Write, compile, and debug Java programs using industry-standard tools and best practices.
Course Outline	**Evolution of Java:** Java History, Java Features,Comparison of Java with C and C++,Java Support Systems, Java Environment.
	Overview of Java: Introduction, Java Statements, Java Virtual Machine, main (), public, static, void, string [] args, statements, Command Line Arguments in Java**.**
	Arrays, Strings and Vectors: One and two dimensional arrays, Strings, Vectors, Wrapper Classes.
	Classes, Objects and Methods in Java: Defining a Class ,Fields Declaration, Creating Objects, Accessing Class Members, Constructors, Method Overloading, Static Members and Methods.
Module 2 (Credit 1)	
Learning Outcomes	**After learning the module, learners will be able to**
	1. Demonstrate method overriding to achieve runtime polymorphism.
	2. Develop programs using abstract methods and abstract classes.

	3. Apply visibility control using access specifiers (public, private, protected, default) to ensure encapsulation.
	4. Create threads by extending the Thread class and implementing the Runnable interface.
Course Outline	**Inheritance:** Extending a Class, Overriding methods, Final variables and methods, Final classes, Finalizer Methods, Abstract Methods and Classes, Visibility Control. **Interfaces:** Defining Interfaces, Extending Interfaces, Implementing Interfaces, Accessing Interface Variables. **Packages:** Java API Packages, Using System Packages, Naming Conventions, Creating Pakages, Accessing a Package. **Multithreading in Java**: Introduction, Creating Thread, Extending the thread class, Life Cycle of a Thread, using Thread methods, Thread Exceptions, Thread Priority, Thread Synchronization, Implementing the Runnable interface.
Module 3 (Credit 1)	
Learning Outcomes	**After learning the module, learners will be able to**
	Learn Basics of Statistics, Measure Central Tendency and Dispersion.
Course Outline	**Introduction to collection framework.** Interfaces of collection , Describe the collection framework and its importance in Java Programming,Implement and use various collection classes,Apply generics in classes,methods and collections to eliminate runtime type errors.,implement Exception handling using Try,catch ,Throw and finally block.
Module 4 (Credit 1)	
Learning Outcomes	**After learning the module, learners will be able to**
	1. Create a basic JavaFX application using the standard application lifecycle.
	2. Implement standard JavaFX controls.
	3.Apply the concepts of event-driven programming in JavaFX.
	4. Implement user input validation techniques within JavaFX applications.

Course Outline	**JavaFX architecture** (Stage, Scene, Nodes, Controls) Creating a basic JavaFX application. **JavaFX UI controls:** (Button, Label, TextField, TextArea,CheckBox, RadioButton, ProgressBar). Working with containers (Panes, AnchorPane, BorderPane, HBox, VBox, GridPane,StackPane) layout management. Handling form inputs. **Event-driven programming in JavaFX:**
	Handling mouse and keyboard events Using EventHandler and EventFilter. **Handling user input validations:** Handling form inputs. Handling user input validations. Using CSS with JavaFX (stylesheets, selectors, properties). **Customizing UI components with CSS:**. Working with Font and Color API

Activities to be done in the class towards Comprehensive Continuous Evaluation

Module 1:

1. Introduction and Use of Software and Basic Programs to implement conditional statements, looping and control statements
2. Create programs to implement creation of Classes and Objects
3. Programs to implement Arrays, Vectors.
4. Implement programs to demonstrate use of String Class in Java

Module 2:

1. Programs to implement different types of inheritance with visibility scope specifiers.
2. Programs to implement the concept of interfaces
3. Implement the concept of Multithreading.
4. Programs to create and use an user defined package.

Module 3:

1. Write a Java program that does the following: Creates an ArrayList of integers. Adds five numbers to the list. Sorts the list in ascending order. Removes the third element. Prints the updated list.
2. Write a Java program that:Stores a list of student names in a HashSet. Adds duplicate values and checks whether they are stored. Prints the elements of the HashSet.
3. Write a Java program that: Uses a HashMap to store employee ID and names. Allows searching for an employee by ID.
4. Create a generic class Box<T> that can store any type of object. Implement set() and get() methods. Demonstrate its usage with Integer and String types.
5. Write a Java program with a generic method that Accepts an array of any type (Integer, String, etc.). Prints all elements of the array.
6. Write a Java program that:Takes two numbers as input. catches ArithmeticException (division by zero) and InputMismatchException (wrong input type). Uses a finally block to print "Execution Complete."
7. Create a custom exception InvalidAgeException that:Throws an error if age is below Demonstrates it in a checkAge(int age) method.

Module 4:
1. Write a JavaFX program that creates a Stage with a Scene. Adds a Button
and Label. Displays "Hello, JavaFX!" when the button is clicked.
2. Create a JavaFX form that has TextField for name input, Button to submit &
displays inputted text in a Label on button click.

Reference Books:

1. Balaguruswamy, E. (2023). Programming with Java: A Primer (7th ed.). McGraw Hill
   Education.
2. Schildt, H. (2022). Java: The Complete Reference (12th ed.). McGraw-Hill Education.
3. Goyal, A. (2012). The Essentials of JAVA. Khanna Book Publishing Company Private
   Limited.
4. Alam, T. (2015). Core JAVA. Khanna Book Publishing Company Private Limited.
5. Liang, Y. D. (2008). Introduction to Java Programming (7th ed.). Pearson.
6. Malhotra, S., & Choudhary, S. (2014). Programming in Java (2nd ed.). 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 core features: OOP principles, control structures, arrays, strings, inheritance, interfaces, exception handling, and packages.	10
Code Structure & Best Practices	Clean, well-structured, modular code following Java naming conventions, and DRY (Don't Repeat Yourself) principles.	15
User Interface & Design Consistency	Intuitive, consistent, user-friendly (even if CLI) UI. Attention to layout, color, and message clarity if GUI is implemented.	5
Input Validation & Exception Handling	Proper validation for user input Exception handling gracefully using try-catch blocks and custom exceptions where appropriate.	10
Project Report & Technical Documentation	Detailed report including objective, methodology, code explanation, screenshots, challenges faced, and conclusion. Documentation of all classes and methods.	10

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

Project 1: Student Management System (Console-based) Project Description:
This project involves creating a simple student management system where users can add, delete, update, and display information about students. The system will store student details (e.g., name, roll number, course, and marks) in memory (using collections or arrays). The application will be text-based and will provide a simple user interface for interaction.

Project 2: Online Quiz Application (Java Console-Based) Project Description:
Develop a console-based application where users can take multiple-choice quizzes on various topics (e.g., general knowledge, programming, history, etc.). The system should allow administrators to add, edit, and delete questions. Users will take the quiz, and at the end, they will receive their score.

External Assessment: (50 Marks)

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

Course Title	Database Management System
Course Credit	4 Credits
Course Outcomes	1. Apply the fundamental architecture, data models, and user roles of database management systems to real-world scenarios.
	2. Analyze entity relationships and map conceptual models into relational schemas for structured database design.
	3. Evaluate complex SQL and relational algebra queries for accuracy, performance, and business logic implementation.
	4. Apply normalization techniques and transaction management principles to maintain database consistency and reduce anomalies.
	5. Create optimized database solutions with appropriate concurrency control and indexing mechanisms based on application needs.
Module 1 (Credit 1)	Introduction to Database Management system and Database Systems Architecture
Learning Outcomes	After learning the module, learners will be able to
	Apply the core concepts of data, information, and knowledge to distinguish database use-cases.
	Analyze the advantages of DBMS over file systems.
	Describe real-world DBMS applications across domains.
	Understand 2-tier and 3-tier architectures and abstraction levels.
	Identify different database models and users.

Content Outline	**Introduction to Database Systems**
	Basic Concepts:Data, Information, and Knowledge,Database and Database Management System (DBMS),Characteristics & Advantages of DBMS,Applications of DBMS in Real-World Scenarios
	Database System Architecture: 2-Tier Architecture & 3-Tier Architecture ,Data Abstraction Levels (Physical, Logical, View),Database Users: DBA, Developers, End Users
	Types of Database Models : Hierarchical Model,Network Model,Relational Model (RDBMS),Object-Oriented Model
Module 2 (Credit 1)	**Introduction to Data Models, RDBMS and Database Design**
Learning Outcomes	**After learning the module, learners will be able to**
	Apply ER modeling to visualize data systems.
	Analyze attributes, relationships, and keys to construct ER diagrams.
	Convert ER models into relational schemas.
	Evaluate integrity constraints in relational designs.
Content Outline	**Entity-Relationship (ER) Model & Relational Model**
	Entity-Relationship (ER) Model : Entities, Attributes, Relationships,Types of Attributes (Simple, Composite, Derived, Multi-Valued),Relationship Types (One-to-One, One-to-Many, Many-to-Many),Keys: Primary, Foreign, Super, Candidate,ER Diagram Notations,Mapping ER Model to Relational Model
	Relational Model Concepts : Tables, Tuples, Attributes, AttributesRelational Schema & Constraints,Domain, Entity, Referential Integrity Constraints
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**
	Apply relational algebra operations to retrieve and manipulate datasets.

	Create and execute SQL queries for DDL, DML, DCL, and TCL operations.
	Evaluate query outcomes using aggregate functions, grouping, and joins.
	Analyze indexing and views to improve performance.
Content Outline	**Structured Query Language (SQL) & Relational Algebra** **Relational Algebra** : Basic Operations: Selection (σ), Projection (π), Union (∪), Intersection, Difference, Cartesian Product (×),Joins (Inner, Outer, Natural, Equi-Join),Division and Assignment Operations **SQL (Structured Query Language)** **Data Definition Language (DDL):** CREATE, ALTER, DROP **Data Manipulation Language (DML):** INSERT, UPDATE, DELETE **Data Control Language (DCL):** GRANT, REVOKE **Transaction Control Language (TCL):** COMMIT, ROLLBACK, SAVEPOINT Aggregate Functions: COUNT, SUM, AVG, MIN, MAX GROUP BY, HAVING, ORDER BY Joins: INNER, LEFT, RIGHT, FULL Subqueries & Nested Queries Views and Indexing
Module 4 (Credit 1)	**Transaction Processing System, Concurrency Control Techniques and Database Recovery System**
Learning Outcomes	**Learners will be able to understand**
	Apply functional dependency rules to detect anomalies.
	Analyze relations to achieve appropriate normal forms.
	Evaluate transaction properties and implement basic control mechanisms.
	Create database systems with concurrency solutions and deadlock strategies.

Content Outline	**Normalization, Database Design, Transaction Management & Concurrency Control**
	Concept of Normalization : Functional Dependencies,Anomalies in Unnormalized Relations
	Normal Forms: First Normal Form (1NF),Second Normal Form (2NF),Third Normal Form (3NF),Boyce-Codd Normal Form (BCNF),Fourth (4NF) & Fifth Normal Form (5NF),Lossless Join Decomposition & Dependency Preservation
	Transactions and ACID Properties
	Atomicity, Consistency, Isolation, Durability (ACID),Transaction States: Active, Partially Committed, Failed, Aborted, Committed
	Concurrency Control Techniques
	Problems in Concurrency: Dirty Read, Lost Update, Phantom Read,Locking Mechanisms (Shared & Exclusive Locks),Two-Phase Locking (2PL),Timestamp-Based Protocols,Deadlock Handling: Prevention, Detection, Recovery

Activities to be done in the class 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.)
3. 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

Reference Books:

1. Korth, H. F., & Silberschatz, A. (2010). Database system concepts (6th ed.). McGraw-Hill.
2. Elmasri, R., & Navathe, S. B. (2010). Fundamentals of database systems (6th ed.). McGraw-Hill.
3. Bayross, P. (n.d.). Oracle: The complete reference. BPB Publications.
4. Datapro InfoWorld Ltd. (n.d.). Upgrade to Oracle 8.
5. 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	Attempting original examples. Uses SQL screenshots, ER tools, or explains business cases practically.	5
Timely Submission	Submitted within the 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 sorts of projects. (ER Diagrams, Tables and SQL Queries)

Project 1: Inventory Management System (Console-based)

Project Description:

This project is about creating a console-based Inventory Management System for a small store or warehouse. The system will help manage product details, stock levels, and sales. Users can add new products, update stock quantities, and generate reports on current inventory and sold items. The application will store data using collections like arrays or lists, and ensure data consistency through input validation.

Project 2: Library Management

System (Console-based) Project

Description:

This project involves building a console-based Library Management System to manage books, borrowers, and transactions. The system will allow the librarian (admin) to add, delete, update, and search for books. It will also manage borrowing and returning books, tracking due dates, and checking the availability status of each book.
The data will be stored in memory using collections such as arrays, lists, or dictionaries.

External Assessment: (Marks 50)

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

.3.3 Major (Core)

Course Title	Mathematics – II
Course Credits	**4 Credits**
Course Outcomes	1. To Study error estimation in numerical methods
	2. To study different methods of numerical methods
	3. To enable the students to use nonlinear and linear methods to analyze and understand problems in the same
	4. To demonstrate how the numerical methods help to develop thinking ability
	5. To demonstrate how the interpolation helps to develop thinking ability
Module 1 (Credit 1)	**Floating Point Arithmetic and Errors:**
Learning Outcomes	**After learning the module, learners will be able to**
	1. To Understand the error and floating point representation to facilitate numerical computing.
Content Outline	Floating Point Arithmetic and Errors: Floating Point Representation, Sources of Errors . Propagated Errors
Module 2 (Credit 1)	**Solution to linear equation**
Learning Outcomes	**After learning the module, learners will be able to**
	1. To Understand the methods of linear equation
Content Outline	Solution to linear equation: Matrix inversion method, Gauss Elimination method.
Module 3 (Credit 1)	**Solution to nonlinear equation**
Learning Outcomes	**After learning the module, learners will be able to**
	1. To Understand the methods of non linear equation
Content Outline	Solution to nonlinear equation : Bisection method , Newton Raphson Method, Regula Falsi method
Module 4 (Credit 1)	**Interpolation**
Learning Outcomes	**After learning the module, learners will be able to**
	1. To understand basics of interpolation

Content Outline	Interpolation: Operator Δ ∇, E and their relations. Newton's Interpolation Formula (Forward and Backward). Lagrange's Interpolation Formula. Divided difference Newton's divided difference formula.

Assignments towards Comprehensive Continuous Evaluation

Module 1:

1. Solve a set of problems related to error estimation and propagated errors.

2. Solve examples of linear equations using the Matrix inversion and Gauss Elimination method.

3. Solve a set of problems using the Bisection method and Newton-Raphson method.

Module 2:

1. Solve numerical problems using Newton's Forward and Backward Interpolation methods.

2. Solve examples to interpolate values using Lagrange's interpolation formula.

Module 3:

1. Solve problems using numerical methods and compare results with analytical solutions.

2. Solve examples using the Trapezoidal and Simpson's rules.

Module 4:

1. Solve numerical differentiation problems using first and second-order derivatives.

Reference Books:

1. S.S. Sastry; Introductory Methods of Numerical Analysis, 3rd edition, Prentice Hall of India.
2. H.C. Saxena; Finite differences and Numerical Analysis, S. Chand and Company.
3. JAIN M K_NUMERICAL METHODS FOR 8ED.(699)
4. Numerical Methods for Scientists and Engineers Richard Hamming
5. A First Course in Numerical Methods Uri M. Ascher Chen Greif

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 deep understanding of core concepts with insightful analysis.	10
Technical Accuracy	All technical content is accurate and complete; terminology is used correctly.	15
Practical Application	Concepts are effectively applied in real-world or simulated scenarios.	10
Presentation & Documentation	Information is well-organized; formatting, visuals, and documentation are clear.	5
Creativity and Design Skills	Demonstrates innovation, originality, and thoughtful design.	5
Timely Submission	Submitted before or on time with all required elements.	5

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

Project 1: Write a program to demonstrate linear solutions methods.

Project 2: Find real world the applications of interpolation

External Assessment: (Marks 50)

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

Course Title	Data Analytics using Automated Tools
Course Credit	2 Credits
Course Outcomes	1. Apply and Evaluate about Data Analytics, process and tools. 2. Apply Automated tools like Excel to build models for financial forecasting, budgeting. 3. Apply Automated tools like excel to build data-driven and decision-making. 4. Evaluate and create interactive dashboards and reports using Automated Tools like Power BI. 5. Apply automated tools like Power BI for using visuals like charts, graphs, and maps to communicate insights.
Module 1 (Credit 1)	**Introduction to Design Thinking**
Learning Outcomes	**After learning the module, learners will be able to**
	1.Understand how to gather data from multiple sources and prepare it by cleaning and organizing for analysis.
	2.Develop a problem-solving mindset to translate business or research questions into analytical tasks.
	3.Develop skills in sorting, filtering, and organizing large datasets efficiently using Excel tools.
Content Outline	**Data Analytics –** What is Data Analytics. Process, Types, Methods, Benefits, Importance of Data Analytics. **Data Analytics using Excel & Advance Excel–** **-Introduction & Uses:** Introduction of Basic Excel. Use of Sorting, Filtering, Conditional Formatting, Using different types Charts, Use of Tables, Ranges. **-Creating Formulas:** **Basic Formula:** – Sum, Average, if, Count, Max, Min, Proper, pper, Lower, Using AutoSum. Text Functions, Logical Functions, Statistical Functions. **-Advance Formulas:** Concatenate, Vlookup, Hlookup, Index, Match, Countif, if, Sumif, Text, Trim, Conditional Formatting, Data Validation for error free data entry, Advance Filtering Techniques, Use of Pivot table, Macros, Excel integration with other application like PDF, Power BI etc.
Module 2 (Credit 1)	
Learning	**After learning the module, learners will be able to**

Outcomes	1. Discover how to combine Power BI with Excel, SQL databases, and other tools for more extensive analytics capabilities.
	2. Learn to connect Power BI to live data sources for real-time analytics and monitoring.
	3. Understand how to build and manage data models, relationships, and hierarchies in Power BI.
Content Outline	**Power BI:** What is Power BI. Features, Uses, Advantages of Power BI and Setup of Power BI Desktop. Difference between MS Excel & Power BI.
	Data Analytics Using Power BI: Interface of Power BI, Use of Report view, Data View, Model View. Use of Filters Pane, Visualization Pane, Data Pane. Exporting data from Get Data option, Excel Sheet**,** SQL, MS Access etc.
	Power Query Editor: Use of Power Query Editor, Use of 'M' language in power Query editor.
	Power BI Report/Dashboard: Dashboard Action, Adding reports & live Data reports, Use of various charts for data, Use of theme, etc.
	Introduction to DAX in Power BI: Create Calculated Columns, Functions, DAX Window Function, DAX Index Function, DAX Counting Functions.

Activities to be done in the class towards Comprehensive Continuous Evaluation

Module 1:
Define Data Analytics. Describe the process, types, and benefits of data analytics in modern business environments.
Differentiate between Excel and Power BI in terms of features, use cases, and analytical capabilities. Explain the importance of using advanced Excel functions like VLOOKUP, INDEX, MATCH, and SUMIF in data analysis.
What is Power Query Editor in Power BI? Explain its role and the purpose of using the 'M' language. What is DAX (Data Analysis Expressions)? List and explain three commonly used DAX functions and their practical use.

Module 2:
1..Create a dataset in Excel and
demonstrate the use of Conditional
Formatting
Pivot Tables
Charts (e.g., Column, Line, Pie)
2. Design a spreadsheet using advanced formulas
that includes: VLOOKUP/HLOOKUP
IF and Nested IF
COUNTIF/SUMIF
3. Explain how to integrate Excel with Power BI. Import an Excel dataset into Power BI
and create a basic report with visuals like bar charts and slicers.
4. Describe the process of creating a Power BI dashboard using a dataset from an
external data source (e.g., SQL, Excel, or MS Access). Include steps for adding
filters, themes, and multiple visuals.
5. Using   Power   BI,
demonstrate how to: Create
a calculated column using
DAX   Build   a   relationship
between two tables
Use slicers and filters to interact with the report

Reference: -

Data Analytics: Principles, Tools, and Practices: A Complete Guide for Advanced
Data Analytics Using the Latest Trends, Tools, and Technologies.
Data Analytics The Ultimate Beginners Guide to Data Analytics.
Excel 2021 Bible by Michael Alexander, Dick Kusleika, and
John Walkenbach. 4.Microsoft Excel 365 Step by Step by
Curtis Frye.
5.Excel Data Analysis: Your visual blueprint for analyzing data, charts, and PivotTables
by Jinjer Simon.

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 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	Develops functional empathy maps, prototypes, and testing results.	10
Team Collaboration & Participation	Actively participates in group tasks and discussions. Demonstrates collaborative effort	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 data analytics	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:Employee Attendance and Productivity Dashboard:

Description:

In this project, Excel is used to track and analyze employee attendance, working hours, and productivity metrics across departments. Conditional formatting highlights absenteeism patterns, while pivot tables and bar charts provide insights into employee performance and department-level efficiency. The dashboard helps HR and management monitor workforce engagement, reduce absenteeism, and optimize resource allocation.

Project 2: Sales Performance Dashboard for a Retail Chain:

Description:

This project analyzes transactional data from a multi-store retail chain to track sales performance across
regions, products, and time periods. Using Power BI, you create interactive dashboards showing KPIs
like total sales, profit, and discount impact, while visualizing trends with line charts, heat maps, and bar charts. The analysis helps identify top-performing products, high-revenue regions, and seasonal sales patterns, enabling strategic decisions for marketing and inventory management.

Course Title	Intellectual Property Rights and Cyber Law
Course Credits	2 Credits
Course Outcomes	After Completion of this Course, students will be able
	1. Evaluate the importance of Intellectual property.
	2. Apply knowledge of Intellectual property to protect creative work.
	3. Apply Patent Registration Procedure.
	4. Evaluate how to protect intellectual property.
	5. Evaluate the concept of cyber law and IT Act.
Module 1 (Credit 1)	
Learning Outcomes	After learning the module, learners will be able to
	● Identify the use of Intellectual Property. ● Ability to use Intellectual property to protect their work.
Content Outline	**Intellectual Property Rights:** Intellectual Property Rights and its types. Basic principles, objectives of Copyrights, Trademark, Design Rights, Patent & Patent Registration Procedure. International Background of Intellectual Property. **Ownership and Enforcement:** Copyrights, Patent, Trademark, Design Right. **Practical Aspects of Licensing**: Benefits, important clauses, licensing clauses.
Module 2 (Credit 1)	
Learning Outcomes	After learning the module, learners will be able to ● Identify Cyber Law and Cyber Crime in detail. ● Identify Objective of IT Act 2000

Content Outline	**Cyber Law:** Introduction, Basic Concepts of Cyber Law, Scope of Cyber Laws, Cyber Jurisprudence. Cyber Security Regulations, Role of International Law, Cyber Security Standards, Indian Cyber Space, National Cyber Security Policies.
	Law of Digital Contracts: The Essence of Digital Contracts, The System of Digital Signatures, The Role and Function of Certifying Authorities,
	Information Technology Act 2000: Objectives of IT Act 2000.Following sections to be explained in detail Sections 43(Penalty for damage to the computer), Section 66(Hacking of computer systems), Section 67(publishing of obscene information), Section 72(penalty for breach of privacy), Section 73(penalty for publishing false digital signature certificates).
	Cyber Crimes: Cyber Crimes and Types of Cyber Crimes
	Ethical hacking: Introduction to Ethical Hacking.

Activities to be done in the class towards Comprehensive Continuous Evaluation

Module 1:
Define Intellectual Property Rights (IPR). Explain the major types of IPR with real-world examples.
Discuss the objectives and basic principles of Copyright, Trademark, Design Rights, and Patent. How do they protect creative and commercial work?
Explain the Patent Registration Procedure in India. Include the steps and authorities involved. Evaluate the practical aspects of licensing intellectual property. What are the key clauses in a typical licensing agreement?
Analyze the international framework of intellectual property protection. How do treaties like TRIPS influence national IPR laws?

Module 2:
Explain the scope and significance of Cyber Law in India. How does it address challenges in the digital world?
Discuss the objectives and key provisions of the Information Technology Act, 2000. Explain the relevance of Sections 43, 66, 67, 72, and 73.
Differentiate between various types of cybercrimes with examples. What are the possible legal remedies?
Explain the concept of digital contracts and the role of digital signatures. How do certifying authorities ensure trust and security?
What is ethical hacking? How can it be used as a tool in cybercrime prevention and cybersecurity enhancement?

Reference Books

1. A Complete Manual on Intellectual Property Rights & Cyber Laws in India by by Dr. Anusuya Yadav
2. Essential Reading: Title: "Cyber Crimes and Laws: An Introduction" by Dr. Pavan Duggal, Publisher: Universal Law Publishing , 2022 edition.

3. Supplementary Reading: Title: "Cyber Crime and Cyber Laws" by: V. K. Ahuja , Publisher: Taxmann Publications 2021 edition
4. Title: "Cyber Laws: A Comprehensive Guide" by Rohas Nagpal , Publisher: McGraw Hill Education , 2020 edition.
5. Title: "Cyber Crime and the Law: Challenges, Issues, and Response" by Yogesh K. Dwivedi, Himanshu Gupta, and Matthew K. O. Lee , Publisher: Springer India , 2019 edition.

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	Digital Marketing
Course Credits	2 Credits
Course Outcomes	After Completion of this Course, students will be able
	1. Understand the fundamentals of digital marketing and its role in the business environment
	2. Develop digital strategies including SEO, SEM, email, and content marketing
	3. Design and execute performance-based digital ad campaigns
	4. Analyze campaign metrics using web and social analytics.
	5. Use social media tools and analytics platforms to plan and measure marketing campaigns
Module 1 (Credit 1)	
Learning Outcomes	After learning the module, learners will be able to
	1. Describe the evolution and scope of digital marketing 2. Identify key components of a digital marketing strategy 3. Apply the basics of search engine optimization (SEO) and search engine marketing (SEM). 4. Use tools like Google Ads and Google Analytics
Content Outline	**Introduction to Digital Marketing**: Definition, Importance, Traditional vs. Digital Marketing, Latest Trends **Digital Marketing Channels**: Owned, Earned, and Paid Media **Search Engine Optimization (SEO)**: On-page & Off-page SEO, Keywords, Backlinks, SEO tools **Search Engine Marketing (SEM)**: Google Ads, PPC, Keyword Planning, Ad Creation, Bidding Strategies **Digital Marketing Tools**: Introduction to Google Analytics, Google Search Console, SEMrush

Module 2 (Credit 1)	
Learning Outcomes	**After learning the module, learners will be able to** 1. Create effective content and email marketing campaigns 2. Develop marketing strategies using customer segmentation 3. Automate digital communication using CRM tools 4. Comply with ethical and legal standards in digital marketing
Content Outline	**Content Marketing**: Blogging, Video Marketing, Influencer Marketing, Content Strategy **Email Marketing**: Campaign Planning, Tools (Mailchimp), A/B Testing, GDPR Compliance **Customer Relationship Management (CRM)**: Email Automation, Segmentation, Lead Scoring **Digital Ethics and Laws**: Data Privacy, Intellectual Property, Digital Advertising Laws

Activities to be done in the class towards Comprehensive Continuous Evaluation

Module 1:
Define Digital Marketing. How does it differ from traditional marketing in terms of reach, measurability, and cost?
Explain the three types of digital marketing channels: Owned, Earned, and Paid Media. Provide examples of each.
Discuss the importance of SEO in digital marketing. Differentiate between On-page and Off-page SEO with techniques used in each.
What is Google Ads and how does Pay-Per-Click (PPC) advertising work? Explain the process of keyword planning and bidding strategies.
Identify and explain the role of three major digital marketing tools (e.g., Google Analytics, Google Search Console, SEMrush) in campaign performance evaluation.

Module 2:
Design a sample content marketing strategy for a new product launch using blogging, video marketing, and influencer outreach.
Create an outline for an email marketing campaign using tools like Mailchimp. Include segmentation, A/B testing, and GDPR compliance considerations.
What is CRM in digital marketing? Explain how email automation and lead scoring improve customer engagement.
Evaluate the ethical and legal issues in digital marketing. How do data privacy laws like GDPR affect online advertising practices?
Explain how customer segmentation can enhance marketing strategies. Provide an example of segmentation based on demographics or behavior.

◻Reference Books

1. Digital Marketing: Strategy, Implementation, and Practice – Dave Chaffey & Fiona Ellis-Chadwick
2. Marketing 5.0: Technology for Humanity – Philip Kotler, Hermawan Kartajaya & Iwan Setiawan
3. Contagious: Why Things Catch On – Jonah Berger
4. Jab, Jab, Jab, Right Hook – Gary Vaynerchuk
5. SEO 2024 – Adam Clarke
6. Digital Marketing for Dummies – Ryan Deiss & Russ Henneberry
7. Google Ads (AdWords) Workbook 2024 – Jason McDonald
8. Social Media Marketing Workbook 2024 – Jason McDonald

Assessment:

External Assessment: (50 Marks)

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
Course Credits	**2 Credits**
	1. Identify and explain an analytical framework to understand the emerging world of e-commerce
	2. To make the learners familiar with current challenges and issues in e-commerce.
	3. To develop the understanding of the learners towards various business models.
	4. Analyze the impact of e-payment, legal, and security issues in E-Commerce.
	5. Evaluate different digital marketing strategies.

Module 1 (Credit 1)

Learning Outcomes	**After learning the module, learners will be able to**
	1. Analyze the historical evolution, scope, and business models of E-Commerce (B2B, B2C, B2G), and explain the roadmap of E-Commerce development in India by identifying its main activities, functions, and benefits and challenges; and illustrate how different models apply to real-world marketing, sales, and promotional strategies.
	2. Apply E-Commerce concepts to design a basic business model by evaluating the E-Commerce Sales Life Cycle (ESLC), comparing alternative B2B/B2C processes, and recommending strategies for effective online operations aligned with Indian market trends and technological advancements.

Course Outline	**Introduction to Electronic Commerce–Evolution and Models:**
	Evolution of E-Commerce-Introduction, History/ Evolution of Electronic Commerce, Roadmap of E-Commerce in India, Main activities, Functions and Scope of E-Commerce.
	Benefits and Challenges of E-Commerce, E-Commerce Business Strategies for Marketing. Business Models of E-Commerce-Characteristics of Business to Business(B2B), Business to Consumers (B2C), Business to Government(B2G) Concepts of other models of E-commerce Business to Consumer E-Commerce process, Business to Business E-Commerce-Need and Importance, alternative Models of B2B E-Commerce.
	E-Commerce Sales Product Life Cycle (ESLC)Model

Module 2 (Credit 1)

Learning Outcomes	**After learning the module, learners will be able to**
	1. Explain the scope and techniques of E-Marketing—including traditional web promotion methods, web counters, advertisements, and social media—and evaluate customer strategies, support activities, and digital planning approaches; further, justify the feasibility of launching an Internet business by weighing the pros and cons of online shopping.
	2. Explain the scope and techniques of E-Marketing—including traditional web promotion methods, web counters, advertisements, social media—and evaluate customer strategies, support activities, and digital planning approaches; further, justify the feasibility of launching an Internet business by weighing the pros and cons of online shopping.
Course Outline	**E-marketing and Electronic Payment System**
	E-Marketing-Scope and Techniques of E-Marketing,
	Traditional web promotion; Web counters; Web
	advertisements, Role of Social media.
	E-Commerce Customer Strategies for Purchasing and
	Support activities, Planning for Electronic Commerce and its initiates, The pros and cons of online shopping, Justify an Internet business.
	Electronic Payment System-Characteristics of E-payment
	system, SET Protocol for credit card payment, prepaid
	epayment service, post-paid E-payment system, Types of
	payment systems.
	Operational, credit and legal risks of E-payment system,

	Risk management options for E-payment systems, Set standards/principles for E-payment

Assignments/Activities towards Comprehensive Continuous Evaluation (CCE) for Numerical Methods

Module 1:

1. Quiz: Key concepts, models, and history of E-Commerce.
2. Group Discussion: Benefits and limitations of E-Commerce in India.
3. Case Study: Comparative analysis of Amazon (B2C) vs. IndiaMART (B2B).

Module 2:

1. Create a table comparing Traditional Web Promotion (e.g., banners, web counters) and Social Media Marketing (e.g., Instagram ads, influencer partnerships).
2. Include examples from at least two current E-Commerce platforms (e.g., Flipkart and Nykaa).
3. Identify at least 3 benefits and 3 limitations of each approach.

Reference Books:

1. K Laudon, Kenneth C. and Carol Guercio Traver E-commerce: business, technology, society. (New Delhi : Pearson Educatin).
2. Awad, Elias M., Electronic Commerce: From Vision to Fulfillment (NewDelhi : Pearson Education).
3. Kalakota, Ravi and Marcia Robinson . Business 2.0: Roadmap for Success (newDelhi : Pearson Education).
4. Smith, P.R. and Dave Chaffey, eMarketing eXcellence; The Heart of eBusiness (UK : Elsevier Ltd.)
5. VivekSood Cyber Laws Simplified-TMH
6. VakulSharma Handbook of cyber Laws-Macmillan
7. Sundeep Oberol e Security and you-TMH
8. Greenstein & Feinman Electronic Commerce-Security, Risk Mgt and Control-TMH

.3.7 Field Projects (FP)

Course Title	**Field Project**
	Field project ideas based on Java programming specifically suited for BSc IT students — with a good balance between practicality, academic relevance, and technical skill development.
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. Project Idea & Relevance –** **5 Marks** Innovation or usefulness of the project Relevance to the student's field (IT/CS) Clarity and feasibility of objectives **2. System Design & Planning – 10 Marks** Proper use of flowcharts, DFDs, ER diagrams, UML, etc. Project architecture and technology stack Planning and scheduling of tasks Completeness of core features
Module 2 (Credit 2)	**Project Implementation Plan**
Learning	**Learners will be able to**

Outcomes	Create a detailed plan for implementing the project, including milestones, timelines, and resource allocation.
Content Outlines	**3. Implementation & Functionality – 15 Marks** Working of the application (GUI, database integration, logic, etc.) Code structure and logic (clarity, modularity, efficiency) Proper testing and debugging **4. Documentation – 10 Marks**
	Cover page, index, introduction Clear description of system analysis/design Tools/technologies used Screenshots of the application Code snippets (if needed) Future scope and conclusion **5. Presentation & Viva – 10 Marks** Oral explanation of the project Ability to answer questions related to project design/tech Confidence and clarity Demo of the working application

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	Python Programming
Course Credits	**4 Credits**
Course Outcomes	1. Develop logical solutions using Python programming
	2. Apply fundamental Python concepts to real-world applications.
	3. Implement control structures, functions, and modules for efficient coding.
	4. Analyze, debug, and optimize Python programs effectively.
	5. Develop applications using advanced data structures, web frameworks, and AI tools.
Module 1 (Credit 1)	
Learning Outcomes	**After learning the module, learners will be able to**
	Develop structured Python programs with functions and modules.
	Declare and manage variables, including dynamic typing and reassignment.
	Implement control structures, loops, and advanced data types
	Define and call user-defined functions with and without arguments.
Content Outline	**Python Basics:** Data types, Variables, Type Conversion, Operators **Program Flow Control:** If-Else, Loops, Break, Continue, Pass **Functions & Modules:** Defining Functions, Lambda Functions, Importing Modules
Module 2 (Credit 1)	
Learning Outcomes	**After learning the module, learners will be able to**
	Create and manipulate lists, tuples, sets, and dictionaries for effective data storage and retrieval.
	Create basic visualizations using Matplotlib to represent data graphically.
	Implement BeautifulSoup to extract information from HTML documents.
	Evaluate the basics of machine learning and its applications.
Content Outline	**Data Structures:** Lists, Tuples, Sets, Dictionaries

File Handling: Reading & Writing Files, Working with JSON **Web Scraping:** Introduction to BeautifulSoup, Scrapy **Data Analysis:** Pandas, NumPy, Matplotlib for visualization **Introduction to Machine Learning:** Scikit-learn basics, Data Processing	

Module 3 (Credit 1)

Learning Outcomes	**After learning the module, learners will be able to**
	Design and implement classes and objects in Python to model real-world entities.
	Demonstrate polymorphism through method overriding and dynamic behaviour.
	Implement multiple exception types effectively with multiple except clauses.
	Implement a basic web application using a lightweight Python web framework (Flask or FastAPI).
Content Outline	**Object-Oriented Programming:** Classes, Objects, Inheritance, Polymorphism **Exception Handling:** Try-Except, Handling Multiple Exceptions **Advanced File Operations:** JSON & CSV File Handling **Web Development:** Flask vs Django, Introduction to FastAPI

Module 4 (Credit 1)

Learning Outcomes	**After learning the module, learners will be able to**
	Implement object-oriented programming in Python.
	Develop web applications using Flask and FastAPI.
	Implement error handling using **try-except blocks**.
	Utilize Python for automation, testing, and debugging.
Content Outline	**Object-Oriented Programming:** Classes, Objects, Inheritance, Polymorphism **Exception Handling:** Try-Except, Handling Multiple Exceptions **Advanced File Operations**: JSON & CSV File Handling **Web Development:** Flask vs Django, Introduction to FastAPI

	REST API Development: Creating and Consuming APIs
	Testing & Debugging: Unit Testing with unittest and pytest
	Asynchronous Programming: asyncio and concurrent programming
	Version Control: Git and GitHub for collaborative development

Activities to be done in the class towards Comprehensive Continuous Evaluation

Module 1 (Python Basics & Control Flow)
- Hello World & User Input
  Write a program that prints "Hello, Python!" and asks the user for their name and age. Display a greeting message using the input values.
- Simple Calculator
  Create a calculator program that takes two numbers and an operator (+, -, *, /) as input and displays the result.
- Data Types & Type Casting
  Write a program to demonstrate different data types and use int(), float(), and str() for type casting.
- Even or Odd Checker
  Write a program that checks whether a number entered by the user is even or odd using if-else.
- Number Classification
  Take a number from the user and print whether it is positive, negative, or zero using nested if.
- Multiplication Table using Loop
  Write a program to print the multiplication table of a number using a for loop.
- Prime Numbers within a Range
  Write a program to print all prime numbers between two numbers using for and else.

Module 2 (Data structure)

- Python program to swap two elements in a list

- Take inputs from the user to make a list. Again take one input from the user and search it in the list and delete that element, if found. Iterate over a list using for loop.

- Write a Python program to find the maximum and minimum values in a set.

- Write a Python program to create an intersection of sets.

- Read contents of a file using readlines() method and manipulating it in Python.
- Append content to a file in Python.
- Python program to find tuples which have all elements are divisible by 4.

- Write a Python program to check if two given sets have no elements in common.

Module 3 (Exception Handling)
Exception Handling – Division Program
Write a program to divide two numbers. Handle Zero Division Error and display a user-friendly

message.
• Discuss how can you import and use the math and random
modules? Basic Function
Write a function that takes a number and returns its square. Call it from the main
program.
▪ Function with Default and Keyword Arguments
Write a function to calculate area of a rectangle. Use default arguments and keyword
arguments to demonstrate both.
▪ Factorial using Recursion
Create a recursive function to calculate the factorial of a number.
▪ Lambda Function for Filtering
Use a lambda function with filter() to get all even numbers from a list.
▪ Random Number Guessing Game
Use the random module to generate a number between 1 and 10. Let the user guess
until they get it right.

Module 4 (OOP in Python)

- Working with Binary Files
- Working with CSV Files
- JSON Files
- Error Handling in File Operations

Reference Books:

Learning Python - Mark Lutz

Python Crash Course - Eric Matthes

Data Structures and Algorithms in Python - Michael T. Goodrich,
Roberto Tamassia, Michael H. Goldwasser

Python for Data Analysis - Wes McKinney

Flask Web Development - Miguel Grinberg

Assessment:

External Assessment – 50 Marks

Internal Assessment – 50 Marks

Internal Assessment to be done on the basis of Project Presentations and Report Writing
with proper
Rubrics (Given below). Two sample projects are give below but it is expected from
students to choose a **good**
and **advanced** Java project topic that aligns with their interests and abilities to work on.

The Rubric will have the following Evaluation Parameters:		
Evaluation Parameters	Description / Evaluation Points	Marks
Core Functionality & Feature Coverage	Functionality (Core Features)	20
Code Structure & Best Practices	Code Quality (Structure, Readability)	10
User Interface & Design Consistency	GUI Design & User Experience	10
Input Validation & Exception Handling	Input Handling & Error Management	5
Project Report & Technical Documentation	Report writing or Documentation	5

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

1. Simple Console-Based To-Do List (Basic)

Uses **Python lists** to store tasks.

Users can **add, remove, and mark tasks as completed**

via command-line input. Saves tasks to a **text file** for

persistence.

Ideal for beginners.

Tech : Python (with file handling)

Libraries: None (pure Python)

2. GUI-Based ATM Simulation (Intermediate)

Uses **Tkinter or PyQt** for a user-friendly **ATM interface**.

Features **buttons for deposits,**

withdrawals, and balance checks.

Stores user data in **SQLite or JSON files**

for persistence.

Tech: Python + Tkinter/PyQt

Libraries: Tkinter/PyQt, SQLite3, JSON

.4.2 Major (Core)

Course Title	Advanced Java
Course Credits	4 Credits
Course Outcomes	**After Completion of this Course, students will be able**
	1. Develop advanced Java applications using object-oriented programming principles.
	2. Integrate Java applications with databases using JDBC for efficient data management.
	3. Design and implement dynamic web applications using Servlets and JSP.
	4. Implement Java frameworks such as Spring and Hibernate for enterprise-level development.
	5. Implement secure and scalable Java applications by applying best practices in exception handling, multithreading, and deployment.
Module 1 (Credit 1)	**Understanding Java EE**
Learning Outcomes	**After learning the module, learners will be able to**
	● Design and develop Java EE web applications using Servlets, JSP.
	● Implement Session Management & Request Handling in a multi-user web application.
	● Integrate Java EE applications with databases using JDBC
	● Deploy Java EE applications on Tomcat Server and understand enterprise-level web application.
Content Outline	**Understanding Java EE:** What is an Enterprise Application? What is java enterprise edition? Java EE Technologies, Java EE evolution, Tomcat server.
	Java EE Architecture, Server and Containers: Types of System Architecture, Java EE Server, Java EE Containers.
	Introduction to Java Servlets: The Need for Dynamic Content, Java Servlet Technology, Why Servlets? What can Servlets do? Servlet API and Lifecycle: Java Servlet API, The Servlet Skeleton, The Servlet Life

	Cycle, A Simple Welcome Servlet Working with Servlets: Getting Started, Using Annotations Instead of Deployment Descriptor.
	Request Dispatcher:
	Resquestdispatcher Interface, Methods of Requestdispatcher,
	Requestdispatcher Application. COOKIES: Kinds of Cookies, Where
	Cookies Are Used? Creating Cookies Using Servlet, Dynamically Changing the
	Colors of A Page SESSION: What Are Sessions? Lifecycle of Http Session, Session Tracking With Servlet API, A Servlet Session Example.
	Working with Databases: What Is JDBC? JDBC
	Architecture,Accessing Database, JDBC-ODBC Bridge Driver, Native Driver, Network Protocol Driver, and Thin Driver.JDBC Environment should set-up along with database creation. The Servlet GUI and
	Database
	Example.Connectivity with SQL, JDBC ResultSet, Execute read select query, update records and execute query.
Module 2 (Credit 1)	JSP
Learning Outcomes	**After learning the module, learners will be able to**
	1. Analyze the lifecycle of a JSP page and describe how it functions within a web container.
	2. Demonstrate the use of various JSP elements, including declarations, expressions, directives, and action tags, to build dynamic web pages.
	3.Design and create JavaBeans to encapsulate application data and business logic using setter and getter methods.
	4. Compare and contrast JSP and Servlets in terms of lifecycle, functionality, and usage in web application development.
Content Outline	**Java Server Pages Standard Tag Libraries:** What is wrong in
	using JSP Scriptlet Tags? How JSTL Fixes JSP Scriptlet's Shortcomings? Disadvantages of JSTL, Tag Libraries.
	Introduction To Java Server Pages: Why use Java Server Pages? Disadvantages Of JSP, JSP v\s Servlets, Life Cycle of a JSP Page, How does a JSP function? How does JSP execute?
Module 3 (credit 1)	**Introduction to Hibernate**

Learning Outcomes	Design Hibernate Application
	Design JPA application.
Content Outline	Writing JPA Application: Application Requirement Specifications, Software Requirements, The Application Development Approach, Creating Database and Tables in Mysql, creating a Web Application, Adding the Required Library Files, creating a Javabean Class, Creating Persistence Unit [Persistence.Xml] , Creating JSPS, The JPA Application Structure, Running the JPA application. Introduction to Hibernate: What is Hibernate? Why Hibernate? Hibernate, Database and The Application, Components of Hibernate, Architecture of Hibernate, How Hibernate Works? Writing Hibernate Application: Application Requirement Specifications, Software Requirements, The Application Development Approach, Creating Database and Tables in Mysql, creating a Web Application, Adding the Required Library Files, Creating Hibernate Configuration File, Adding a Mapping Class. Creating JSPS, Running The Hibernate Application.
Module 4 (Credit 1)	**Introduction to SpringBoot**
Learning Outcomes	**After learning the module, learners will be able to**
	1. Evaluate the core concepts of the Spring Framework and Spring Boot. 2. Develop web applications using Spring MVC, implementing controllers, views, and request mappings. 3. Create RESTful web services & microservices with Spring Boot. 4. Create and expose RESTful web services using Spring Boot, and explain the difference between REST and SOAP.
Content Outline	Spring Framework (Spring Boot): Introduction to Spring Core & Spring Boot. Environment Setup. Spring MVC for web applications RESTful Web Services using Spring Boot Spring Boot with JPA & Hibernate RESTful Web Services & Microservices Introduction to Web Services (REST vs. SOAP): Creating RESTful APIs with Spring Boot JSON & XML Data Exchange using Jackson Microservices Architecture in Java Building Microservices with Spring Boot
	API Gateway & Load Balancing with Spring Cloud
Activities to be done in the class towards Comprehensive Continuous Evaluation	

Module 1

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. 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.

Module 2

WAP that makes a connection with database using JDBC and prints metadata of this connection.

● WAP using JDBC to display Student's record (roll No, 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) 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 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.

Module 3 ● Study of Hibernate programs	
Module 4 ● Study of spring boot architecture.	

Text Books/Reference Books

1. **"Pro JPA 2: Mastering the Java Persistence API"** - **Author:** Mike Keith & Merrick Schincariol
2. **"Java Persistence with Hibernate"** - **Author:** Christian Bauer, Gavin King, Gary Gregory
3. **"Spring Data: Modern Data Access for Enterprise Java"** - **Author:** Mark Pollack, Oliver Gierk.
4. **"Spring Boot in Action"** -**Author:** Craig Walls
5. **"Spring Boot 3 and Spring Framework 6: Learn to Develop, Test, and Deploy Your Spring Applications"** - **Author:** Claudio Eduardo de Oliveira

Assessment

Internal Assessment – 50 Marks

Internal Assessment to be done on the basis of Project Presentations and Report Writing with proper Rubrics (Given below). Two sample projects are give below but it is expected from students to choose a good and advanced Java project topic that aligns with their interests and abilities to work on.

Evaluation Criteria	**Description**	**Marks**
1. Core Functional Implementation	Functionality (Core Features)	20
2. User Interface Design & Mobile Responsiveness	Code Quality (Structure, Readability)	10
3. Code Quality & Structure	GUI Design & User Experience	10
4. Input Validation & Error Handling	Input Handling & Error Management	5
5. App Documentation / Project Report	Report writing or Documentation	5

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

Project 1:Build a mini e-commerce website where products are dynamically fetched and displayed using Servlets, JSP, and a database.

Project 2: Simple CRUD Application using Spring Boot + JPA

Objective: Build a Spring Boot CRUD app that manages a specific entity (e.g., Books, Students, Employees).

External Assessment: (50 Marks)

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

.4.3 Minor Stream

Course Title	Web Technology
Course Credit	4
Course Outcome	1. Demonstrate a comprehensive understanding of fundamental web technologies and their applications in modern web development.
	2. Develop interactive, responsive, and visually appealing web pages using HTML, CSS, and JavaScript.
	3. Implement client-side scripting techniques with JavaScript to enhance user experience and interactivity.
	4. Design and construct dynamic, component-based web applications using ReactJS, adhering to industry best practices.
	5. Integrate APIs and manage state effectively to build scalable and data-driven web applications.
Module 1(Credit 1) **Introduction to Web Technologies**	
Learning Outcome	**After learning the modules, learners will be able to**
	Understand the basics of web development and the role of front-end technologies.
	Analyze and implement HTML and CSS for structuring and styling web pages.
	Develop structured web pages using **HTML5**, incorporating forms, semantic tags, and multimedia elements.
	Develop structured and responsive web pages using CSS frameworks.
Content Outline	**Introduction to Web Technologies** Basics of the Internet, Web Servers, and Web Browsers Introduction to HTML, CSS, and JavaScript Role of Front-end and Back-end Technologies **HHTML & CSS** HTML Basics: Structure of an HTML document, Elements, Attributes. Forms and Form Handling, HTML5 Features CSS Basics: Selectors, Box Model, Flexbox, Grid Responsive Design: Media Queries, Bootstrap Overview.
Module2 (Credit 1) **JavaScript Basics**	

Learning Outcome	After learning the modules, learners will be able to
	Evaluate and implement JavaScript for web interactivity.
	Develop basic HTML5 forms and semantic layouts.
	Use ES6 features such as let and const for variable declaration, arrow functions for more concise function definitions, and template literals for efficient string handling.
	Describe the structure of HTML documents, tags, attributes, and elements.
Content Outline	

Module3 (Credit 1)

Advanced Java Script and Introduction to React JS

Learning Outcome	After learning the modules, learners will be able to
	Evaluate concepts of callbacks, and demonstrate their usage in handling asynchronous operations in JavaScript.
	Implement Promises in JavaScript to handle asynchronous tasks, and chain multiple promises to create more efficient asynchronous workflows.
	Define key React concepts such as components, JSX, props, and state, and explain their role in building dynamic web applications.
	Implement React Hooks such as useState, useEffect, and others, in functional components.
Content Outline	**Advanced JavaScript** Callbacks, Promises, and Async/Await Error Handling and Debugging Techniques Working with APIs: Fetch API and JSON **Introduction to ReactJS** React Basics: Components, JSX, Props, and State Functional vs. Class Components React Lifecycle Methods and Hooks

Module 4(Credit 1)

Building and deploying react applications

Learning	After learning the modules, learners will be able to

Outcome	Evaluate the concept of state in React and demonstrate how to manage state within functional and class component
	Develop React applications from scratch, including component creation, state management, and event handling.
	Create forms in React and manage form input data using controlled components with state.
	Implement form validation and handle form submission to process user inputs in a React application.
Content Outline	**React State** **Management** Managing Component State React Context API Introduction to Redux (Optional) **Building and Deploying React Applications** Handling Forms in React Routing in React (React Router) Styling React Components: CSS Modules, Styled Components Deployment of React Applications (Notlify, Vercel, GitHub Pages)

Activities to be done in the classroom towards Comprehensive Continuous Evaluation (CCE)

Module 1

Create a static website using HTML, CSS, and JavaScript.

• Design a multi-page website with a consistent layout and navigation menu.

• Use HTML to structure the content of each webpage, including appropriate tags, elements, and attributes.

• Apply CSS to style the website, including selectors, properties, and responsive design techniques for different screen sizes.

Implement JavaScript to add interactivity to the website, such as dynamic content manipulation and form validation.

• Ensure the website adheres to web standards and best practices for accessibility and Usability

Module 2

- JavaScript Program to Print All Prime Numbers in an Interval
- JavaScript Program to Display the Multiplication Table
- JavaScript Program to Make a Simple Calculator
- JavaScript Program to Find HCF or GCD
- JavaScript Program to Create Multiline Strings

Module 3
●Develop a web application with database integration and secure coding practices.
• Choose a web development framework (e.g., React, Angular, Vue.js) and use it to build a dynamic web application.
• Implement client-side scripting using JavaScript for event handling, form validation, and dynamic content generation.
• Test the web application thoroughly to ensure functionality, security, and performance.

Module 4
● Building and developing react applications.

Reference Books

1. "JavaScript and JQuery: Interactive Front-End Web Development" – Jon Duckett
2. "Eloquent JavaScript" – Marijn Haverbeke
3. "Learning React" – Alex Banks & Eve Porcello
4. "You Don't Know JS" series – Kyle Simpson
5. "React Up and Running" – Stoyan Stefanov

Assessment:

Internal Assessment – 50 Marks

Internal Assessment to be done on the basis of Project Presentations and Report Writing with proper Rubrics (Given below). Two sample projects are give below but it is expected from students to choose a good and advanced Java project topic that aligns with their interests and abilities to work on.

Evaluation Criteria	Description	Marks
Implementation of Web Pages	Functionality (Core Features)	20
Backend/Server-Side Logic	Code Quality (Structure, Readability)	10
UI/UX Design Principles	GUI Design & User Experience	10
Input Handling	Input Handling & Error Management	5
Code Quality and Documentation	Report writing or Documentation	5

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

similar sort of projects Internal evaluation Projects

1. Basic E-Commerce Site (React + Shopping Cart)

Objective: Develop a simple e-commerce website with product listings, cart management, and checkout.

2. **Build a quiz app where users answer questions, get instant feedback, and see their score at the end.**

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	Introduction to Canva
Course Credit	2 Credits
Course Outcomes	1.**Apply** design principles such as color, typography, and composition to create visually compelling reports, presentations, and marketing materials.
	2.**Analyze** the effectiveness of design elements, such as layout, fonts, and branding consistency, in communicating messages across various formats.
	3. **Evaluate** the quality and impact of design work based on industry standards, visual communication strategies, and user engagement metrics.
	4. **Create** professional documents, reports, and marketing materials using Canva's templates, customization tools, and collaboration features.
Module 1 (Credit 1)	Introduction to canva and design basics
Learning Outcomes	After learning the module, learners will be able to
	Apply design principles such as color, typography, and composition to create visually appealing and effective designs using Canva's tools and features. **Analyze** Canva's templates and customization options to select and modify designs that align with specific business needs and branding guidelines. **Evaluate** the effectiveness of reports, presentations, and other design projects based on their visual appeal, clarity, and communication of key information. **Create** professional business reports, including charts, tables, and infographics, using Canva's features and tools for data visualization and effective communication. **Design** engaging and dynamic presentations by incorporating multimedia elements, animations, and transitions to enhance audience interaction and message delivery.
Content Outline	**Introduction to Canva & Design Basics** Navigating the Canva interface

	● Understanding design principles (color, typography, and composition) ● Exploring Canva's templates and customization options **Designing Reports** ● Creating professional business reports ● Formatting charts, tables, and infographics ● Exporting and sharing reports effectively **Creating Engaging Presentations** ● Designing visually compelling slides ● Using animations and transitions effectively ● Enhancing presentations with multimedia elements.
Module 2 (Credit 1)	**Marketing Material and Branding**
Learning Outcomes	**After learning the module, learners will be able to**
	● **Apply** Canva's design tools to create marketing materials such as posters, brochures, and social media graphics that adhere to branding guidelines. ● **Analyze** the integration of branding elements (logos, color schemes, fonts) in marketing materials to ensure visual consistency and alignment with brand identity. ● **Evaluate** the effectiveness of digital and print marketing materials by applying best practices to assess their visual appeal, communication, and target audience engagement. ● **Create** professional documents such as letterheads, resumes, and official materials, utilizing Canva's design and collaboration features to produce polished, high-quality outputs suitable for business and personal use.
Content Outline	**Marketing Materials & Branding** ● Designing posters, brochures, and social media graphics ● Incorporating branding elements (logos, color schemes, fonts) ● Best practices for digital and print marketing **Document Design & Collaboration** ● Creating letterheads, resumes, and official documents

	● Utilizing Canva's real-time collaboration features ● Sharing, exporting, and printing document

Activities to be done in the classroom towards Comprehensive Continuous Evaluation (CCE)

Module 1: Introduction to Canva
Create designs using canva's design tools.
Format Text and elements effectively.
Edit photos and videos.

Module 2: Marketing Materials and branding
Design with drawing tools and apps.
Practice with interactive activities.

External Evaluation for 50 Marks will be conducted by university.

Textbooks: -

1. "The Non-Designer's Design Book" by Robin Williams.
2. "Canva for Work: How to Design Like a Pro" by Melanie H. K.
3. "Branding: In Five and a Half Steps" by Michael Johnson
4. "Creating Documents with Canva: A Practical Guide for Beginners" by Olivia Davis

Additional Resources:

1. **Canva's own design tutorials**: Canva provides free, comprehensive tutorials on its platform, which are highly beneficial for students.
2. **Online articles and video tutorials** on YouTube or platforms like Skillshare and Udemy, focusing on using Canva for specific projects.

Required Tools:

1. **Canva Free or Pro Account** (depending on access)
2. Computer with internet connection

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

Course Title	Management Information Systems (MIS)
Course Credits	2 Credits
	1. Evaluate the fundamental concepts and components of MIS.
	2. Analyze the role of MIS in decision-making and business strategy
	3. Evaluate database management techniques for effective information processing
	4. Apply business intelligence and data analytics for strategic insights
Module 1(Credit 1)	Introduction to MIS
Learning Outcomes	After learning the module, learners will be able to
	1. Evaluate Define MIS and its role in organizations
	2. Apply various types of information systems
	3. Evaluate database management techniques.
	4. Analyze the ethical and security challenges in MIS.
Content Outline	**Introduction to MIS** Definition, Purpose, and Scope of MIS Role of MIS in Business and Management Components of MIS: Hardware, Software, Data, People, Processes **Types of Information Systems** Transaction Processing Systems (TPS) Decision Support Systems (DSS) Enterprise Resource Planning (ERP) Customer Relationship Management (CRM) Business Intelligence Systems **Database Management & Data Processing** Introduction to Database Management Systems (DBMS) SQL Basics and Database Queries Data Warehousing & Big Data in MIS Cloud Computing in Data Management **Decision Support Systems (DSS) & Business Analytics** Role of DSS in Managerial Decision-Making

	Business Analytics and Predictive Analytics
	Data Visualization Techniques (Dashboards, BI Tools)
	MIS Security & Ethical Concerns
	Cybersecurity Threats and MIS Security Strategies
	Ethical Issues in Information Management
	Data Privacy and Compliance (GDPR, HIPAA)
Module 2(Credit 1)	**Cloud Computing and Emerging Technologies**
Learning Outcomes	1. Create enterprise information systems using MIS principles.
	2. Apply data analytics for business decision-making
	3. Evaluate IT governance and risk management in MIS
	4. Create cloud computing and emerging technologies in MIS
Content Outline	**Enterprise Systems & IT Governance**
	Introduction to Enterprise Information Systems
	(EIS) IT Governance Frameworks (COBIT, ITIL)
	Risk Management in Information Systems
	Cloud Computing & Emerging Technologies
	Cloud-Based MIS Solutions
	AI, Machine Learning, and Automation in MIS
	Blockchain in Information Systems
	Business Intelligence & Data Analytics
	Business Intelligence Tools (Power BI,
	Tableau) Data Mining and Machine Learning
	in MIS
	Case Studies on Data-Driven Decision Making
	Strategic Role of MIS in Organizations
	MIS for Competitive Advantage
	Digital Transformation and Business Innovation
	Future Trends in MIS

Activities to be done in the classroom towards Comprehensive Continuous Evaluation

Module 1
- Data collection and gathering for projects.

Module 2
● Effective use of cloud computing services in education.

External Evaluation for 50 Marks will be conducted by university.

References:

1. **"Management Information Systems"** – Kenneth C. Laudon & Jane P. Laudon
2. **"Business Intelligence: A Managerial Perspective on Analytics"** – Ramesh Sharda, Dursun Delen
3. **"Database Management Systems"** – Raghu Ramakrishnan
4. **"IT Strategy for Business"** – Bernard Marr
5. **"Information Systems for Managers"** – Gabriele Piccol

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

Course Title	Introduction to Entrepreneurship
Course Credits	2 Credits
Course Outcomes	1. Understand the Concept and Role of Entrepreneurship
	2.Identify and Develop Entrepreneurial Traits and Business Ideas
	3.Apply Knowledge to Launch and Manage a Startup
	4.Analyze Institutional Support and Contemporary Trends
Module 1 (Credit 1)	
Learning Outcomes	After learning the module, learners will be able to
	1.Explain Key Concepts of Entrepreneurship
	2.Demonstrate Entrepreneurial Traits and Skills
	3.Develop a Framework to Start and Manage a Business
Content Outline	**Introduction to Entrepreneurship** **Concept and Meaning of Entrepreneurship** Definition and evolution Characteristics and need for entrepreneurship **Types and Classifications of Entrepreneurs** Innovative, Imitative, Drone, Fabian Social, Serial, Women, and Corporate Entrepreneurs **Entrepreneur vs Manager vs Intrapreneur** Roles, differences, and similarities **Importance of Entrepreneurship** Economic and social contributions Role in job creation, innovation, and self-reliance **Entrepreneurship in Indian Context** Historical background Present trends and future scope
Module 2 (Credit 1)	
Learning Outcomes	After learning the module, learners will be able to
	1.Explain key motivational theories relevant to

	entrepreneurship
	2.Identify and assess entrepreneurial traits and competencies
	3.Use creative thinking techniques
	4.Analyze the business environment
Content Outline	**Entrepreneurial Motivation** McClelland's Theory of Need for Achievement (nAch) Maslow's Hierarchy of Needs **Entrepreneurial Traits and Competencies** Creativity, innovation, leadership, risk-taking Competency mapping **Idea Generation Techniques** Brainstorming, mind mapping, design thinking Opportunity identification and assessment **Feasibility Study and Business Plan Development** Elements of a business plan Market research and demand analysis Project appraisal (technical, financial, social)

Activities to be done in the class towards Comprehensive Continuous Evaluation

Module 1:

Activities:

1. Self-Assessment

Complete a personal entrepreneurial traits checklist to identify strengths and areas for development.

2.Video Reflection

Watch a video or documentary on a successful entrepreneur and write a short summary of their journey and mindset.

3. Entrepreneur Profile Poster

Research and create a profile poster or digital slide of a well-known entrepreneur including:

Name & Background

Business type

Key traits

Success story

4. Myth Buster Quiz

Participate in a quiz identifying myths vs. realities of entrepreneurship.

5.Entrepreneur Case Study

Write or present on any successful entrepreneur (e.g., Kiran Mazumdar-Shaw, Elon Musk).

- Focus on journey, challenges, and lessons.

Module 2:

Activities:

1. Idea Generation
   Use brainstorming or the SCAMPER method to generate 5 potential business ideas.

2. Opportunity Screening Matrix
   Select top 3 ideas and evaluate using criteria like market demand, cost, competition, and profitability.

3. Market Survey
   Conduct a basic survey (Google Form or physical) to understand customer needs or preferences.

4. SWOT Analysis
   Perform a SWOT (Strengths, Weaknesses, Opportunities, Threats) analysis for one selected business idea.

5. 2-Minute Pitch
   Prepare and present a short elevator pitch explaining:

   o What your business does

o Who it's for
o Why it will succeed

Reference Books: -

1. Entrepreneurship Development Author: S. S. Khanka Publisher: S. Chand Publishing
2. Entrepreneurship and Small Business Management Author: C.B. Gupta and N.P. Srinivasan Publisher: Sultan Chand & Sons
3. Entrepreneurship Development,Author: Vasant Desai Publisher: Himalaya Publishing House.
4. Dynamics of Entrepreneurial Development and Management,Author: Vasant Desai Publisher: Himalaya Publishing House

Assessment:

External Assessment: (Marks 50)

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

.4.5 Skill Enhancement Courses (SEC)

Course Title	Introduction to Microprocessor
Course Credits	**2 Credits**
Course Outcomes	**After Completion of this Course, students will be able**
	1. Evaluate key features of microprocessors, including their architecture, processing capabilities, speed, and integration level.
	2. Apply various types of instructions with diagrams.
	3.Create various assembly language programs by using different types of instructions.
	4. Evaluate Advanced microprocessor Features, functions.
	5. Evaluate interrupts, DMA controllers etc features ,functions.
Module 1 (Credit 1)	**Introduction to Microprocessor**
Learning Outcomes	1. Evaluate features, functions and Operations of Microprocessor.
	2. Evaluate the significance of the 8086 microprocessor.
Content Outline	**Introduction to Microprocessor:** What is Microprocessor, Features, Application of Microprocessor. Functions and Operations performed by Microprocessor. **8086 Microprocessor:** Introduction, Pin diagram, Architecture, Memory Segmentation, Flag registers, Registers used in 8086.Signals Description of 8086, Interrupts of 8086. **Programming of 8086:** Addressing Mode of 8086, Instruction Set of 8086, Assembly language Programming of 8086, Simple programs.
Module 2 (Credit 1)	**Introduction to Advance Microprocessor**
Learning Outcomes	1. Evaluate purpose of Interrupts and USART Functionality & DMA controller
	2.Evaluate Advance Microprocessor for the 8088.

Content Outline	**Interrupts:** Purpose of interrupts, Hardware and Software Interrupts, Interrupt vectors. 8259-Interrupt & its organization.
	Introduction to Programmable Peripheral Interface & USART: 8255 PPL & USART 8251.
	Direct Memory Access: DMA controller 8257 & its organization.
	Introduction to Advance Microprocessor: 8088, 80386 Microprocessor and its interfacing. Difference between 8085, 8086 & 8088.

Activities to be done in the classroom towards Comprehensive Continuous Evaluation

Module 1: Introduction to Microprocessor
   ● 8086 Assembly Program for Addition of Two 8-bit Numbers
   ● 8086 MASM Assembly Program for Addition of Two 8-bit Numbers
   ● Mix (C++ and Assembly) Program to Add Two 8-bit Numbers
   ● 8086 Assembly Program to Subtract Two 16 bit Numbers
   ● 8086 Assembly Program for Subtraction of Two 32 bit Numbers
   ● 8086 Assembly Program for Subtraction of Two 8 bit Number

Module 2: Introduction to advanced microprocessor
   ● **Study of 8257 DMA Controller**
   ● **Study of 8251 USART**

External Evaluation for 50 Marks will be conducted by university.

References:

1. Microprocessor and Digital Systems by D.V. Hall.
2. 16 bit Microprocessor by Triebel and A. Singh.
3. Advanced Microprocessors and Peripherals **by** A.K. Ray & K.M. Bhurchandi.
4. The 8086 Microprocessor: Programming & Interfacing the PC by Kenneth J. Ayala.
5. Microprocessors and Interfacing: Programming and Hardware by Douglas V. Hall
6. Microprocessor Architecture Programming ~ Application, with 8080/8085 by Ramesh S. Gaonkar.
7. The Intel Microprocessors: 8086/8088, 80186/80286, 80386, 80486, Pentium by Barry B. Brey.

Course Title	Green Computing
Course Credit	2 Credits
Course Outcomes	1.Create awareness among stakeholders and promote green initiatives in their environments leading to a green movement.
	2.Implement to an eco-friendly environment.
	3.Apply knowledge about energy efficiency, IT assets disposal, carbon footprint
	4.Create awareness among stakeholders and promote green initiatives in their environments leading to a green movement.
	5.Apply the Green computing practices to save energy.
Module 1(Credit 1)	Introduction to Green Computing
Learning Outcomes	Develop a solid understanding of the key concepts and principles of green computing, including energy efficiency, resource conservation, electronic waste management, sustainable IT practices, and the environmental impacts of computing.
	Understand how to reduce energy consumption and minimize the carbon footprint of computing systems.
	Understand the power conservation techniques.
Course Outline	**Introduction: -** What is green computing? advantages of Green computing, where it is used?Present Problems: Toxins, Power Consumption, Equipment Disposal, Company's Carbon Footprint:Measuring, Details, reasons to bother, Plan for the Future, Cost Savings: Hardware, Power. **Power Conservation: -** Power Problems, Monitoring Power Usage,Energy conservation techniques, Green Computing and environment- Key Concepts, Environmental Drivers for Green Computing, Key Roots of Environmentalism, Environmentalism and IT,What It Means to "Go Green"
Module 2(Credit 2)	Recycling
Learning Outcomes	Gain knowledge of green data center design and management practices, including efficient cooling, power distribution, and server consolidation. Understand the process of recycling, disposal and awareness and adoption of green computing

Course Outline	**Going Paperless: -** User behavior- Preferring to go manual instead of automation, Paper Problems, The Environment, Costs: Paper and
	Office, Practicality, Storage, Destruction, Going Paperless,
	Organizational Realities, Changing Over, Paperless Billing, Electronic Data Interchange (EDI), Value Added Networks (Advantages and disadvantages.
	Recycling:- Meaning,E-waste management through recycling,EV vehicles battery recycling,Recycling of paper,glass,metal into resources,Awareness and adoption of green computing in India

Activities to be done in the classroom towards Comprehensive Continuous Evaluation

Module 1 Introduction to Green computing

1. Poster Presentations and group discussion on green computing topics such as GO GREEN, PAPERLESS ORGANIZATION

Module 2 Recycling

1. Case Studies of organizations implementing green computing practices
2. Study of E-waste management.

Assessment

Internal Assessment to be done on the basis of Green computing Project presentations and report writing of case studies with proper rubrics.

Evaluation Criteria	Description	Marks
1. Content Accuracy & Relevance	Poster Presentations and group discussions	20
2. Clarity & Simplicity of Communication	Conducting campaigns for increasing awareness	20
3. Design & Visual Presentation	Case studies on recycling	10

Reference books: -

1. **Green IT**-Toby Volte, Anthony Volte, Robert Elsenpeter, McGraw Hill
2. **Green Data Center: Steps for the Journey-**Alvin Galea, Michael Schaefer, Mike Ebbers, Shroff Publishers and Distributors
3. **Green Computing Tools and Techniques for Saving Energy, Money and Resources-**Bud E.Smith, CRC Press
4. **Vipul's Green IT** -Vipul Prakashan Akshatha Jain
5. **Harnessing Green IT: Principles and Practices**-Editor(s): San Murugesan, G. R. Gangadharan