



Krishna Kanta Handiqui State Open University

Hiranya Chandra Bhuyan School of Science and Technology

Discipline of Computer Science

**Programme name: Diploma in Computer Science (DCS)
(Revised Programme)**

Total Credits: 40

Minimum Qualification: Class 10+2 passed

Course Structure:

SEMESTER I:	COURSE 1: COMPUTER FUNDAMENTALS AND PC SOFTWARE
	COURSE 2: COMPUTER PROGRAMMING USING C
	COURSE 3: FUNDAMENTALS OF DATABASE MANAGEMENT SYSTEM
	COURSE 4: DIGITAL FLUENCY AND EMERGING TECHNOLOGIES
	COURSE 5: PRACTICAL
SEMESTER II:	COURSE 1: APPLIED AI AND GENERATIVE AI
	COURSE 2: FUNDAMENTALS OF NETWORKING AND AI-ASSISTED WEB PROGRAMMING
	COURSE 3: AI-ASSISTED PYTHON PROGRAMMING
	COURSE 4: CYBER SECURITY
	COURSE 5: PRACTICAL

SEMESTER I:

COURSE 1: COMPUTER FUNDAMENTALS AND PC SOFTWARE

Course Type:	Core
Number of Credits:	4
Total Marks:	100

Course Objective:

- Understand the basic concepts of computer systems and types of computer

classification.

- Understand the basic concepts of computer memory and operating systems, and components of computer.
- Develop practical skills in using office productivity tools such as word processors, spreadsheets, presentation software, and database management systems in both proprietary and open-source environments.
- Acquire the ability to create, format, manage, and analyse digital documents, data, and presentations for academic and professional purposes.

Course Outcome:

On completion of this course, the learners will be able to:

- Explain the types of computer systems and their classifications.
- Explain the components and functions of computer systems and operating systems.
- Create and format professional documents, spreadsheets, presentations, and databases using MS Office and LibreOffice tools.
- Apply spreadsheet formulas, data management techniques, charting tools, and database queries to organize and analyse data effectively.

Unit 1: Introduction to Computer

Computer- a Definition; Characteristics of Computer; Generations of Computers; Structural Evolution of Computers; File Structure of Computers; Flynn's Classification of Computer Architecture; Applications of Computer: Advantages of Computer

Unit 2: Basic Features of Computer Classification

Computer Classification based on Operating Principles: Analog Computers, Digital Computers, Hybrid Computers; Computer Classification based on Applications: General Purpose Computers, Special Purpose Computers; Computer Classification based on Size and Capability: Micro Computers, Mini Computers, Mainframe Computers, Super Computers

Unit 3: Basic Components of Computer

Concept of Bit and Byte; Block Diagram of Computer, CPU, ALU, CU; Computer Memory: Primary and Secondary; Input/Output Devices; Buses: Address, Data, Control.

Unit 4: Computer Memory and Storage

Memory Representations; Memory Hierarchy; CPU Registers; Primary Memory: Random Access Memory, Read Only Memory; Secondary Memory; Cache Memory; Virtual Memory

Unit 5: MS Windows Operating System

Introduction to Windows, Components of Windows, Customizing the Desktop, Files and Folders.

Unit 6: LINUX Operating System

Open Source and Free Software, Advantages and Disadvantages of Linux OperatingSystem, Concept of Path, Basic Linux Commands, File Permission, Text Editor vi.

Unit 7: Introduction to LibreOffice

Overview of LibreOffice software suite and its features, Advantages of using LibreOffice as an alternative to proprietary software, Installation and configuration of LibreOffice on different platforms

Unit 8: Getting started with Writer

Launching Writer and creating a new document, Navigating the Writer interface and understanding the different components of the document window, Entering and formatting

text, applying font styles, and working with paragraphs, Saving, closing, and opening existing documents in different formats.

Unit 9: Working with templates and styles in Writer

Creating and using document templates for consistent formatting and layout, Creating and modifying paragraph and character styles for consistent text formatting, Managing styles in the Styles and Formatting dialog box.

Unit 10: Formatting documents in Writer

Adding and formatting images, tables, and other objects in a document, Applying advanced formatting options, such as page borders, columns, and page backgrounds, Using Writer's built-in tools for spell-checking, grammar-checking, and language translation.

Unit 11: Introduction to Calc

Overview of Calc and its features as a spreadsheet program, Launching Calc and creating a new spreadsheet, Navigating the Calc interface and understanding the different components of the worksheet window, Entering and formatting data, applying cell formatting, and working with formulas.

Unit 12: Working with functions and formulas in Calc

Using built-in functions and formulas for common calculations in Calc, Creating custom functions and formulas for complex calculations, Using conditional formatting to highlight data based on certain criteria.

Unit 13: Advanced formatting and charting in Calc

Applying advanced formatting options, such as conditional formatting, data validation, and custom number formats, Creating and modifying charts to visualize data in different ways, Using Calc's built-in tools for filtering, sorting, and analyzing data

Unit 14: Introduction to Impress

Overview of Impress and its features as a presentation program, Launching Impress and creating a new presentation, Navigating the Impress interface and understanding the different components of the slide window, Adding and formatting slides, applying transitions, and customizing presentation settings

Unit 15: Working with multimedia and animations in Impress

Adding images, audio, and video to a presentation, Creating and modifying animations to enhance visual effects, Using Impress's built-in tools for recording and rehearsing presentations

Unit 16: Introduction to Base

Overview of Base and its features as a database management tool, Launching Base and creating a new database, Navigating the Base interface and understanding the different components of the database window, creating tables, forms, queries, and reports using Base's built-in tools

COURSE 2: COMPUTER PROGRAMMING USING C

Course Type:	Core
Number of Credits:	4
Total Marks:	100

Course Objective:

- Understand fundamental programming concepts such as algorithms, flowcharts, and structured program design using C language.
- Develop proficiency in using C language elements including data types, operators, control structures, arrays, strings, and functions to solve computational problems.
- Gain knowledge of advanced programming constructs such as pointers, structures, unions, file handling, storage classes, and preprocessor directives.
- Build logical thinking and problem-solving skills required to design, implement, debug, and test C programs efficiently.

Course Outcome:

On completion of this course, the learners will be able to:

- Design algorithms and flowcharts and translate them into structured C programs using appropriate syntax and programming constructs.
- Apply decision-making statements, loops, arrays, strings, and functions to develop efficient solutions for real-world problems.
- Implement advanced C concepts such as pointers, structures, unions, dynamic memory allocation, file handling, and macros in program development.
- Debug, test, and optimize C programs while demonstrating good programming practices and logical reasoning skills.

Unit 1: Introductory Concepts

Basic definition of Pseudo Code, algorithm, flowchart, program

Unit 2: Elements of C Programming

Characters used in C, Identifiers, Keywords, Tokens, Constants, Variables

Unit 3: Variables and Data types

Basic Data types in C: Integer, Character, Floating point, String; Variable and its declarations; Symbolic Constants

Unit 4: Operators and Expressions

Different types of operators: Arithmetic, Relational and Logical, Assignment, Conditional, Increment and decrement, Bitwise, Comma and other operator (size of, period etc). Precedence and associativity of operators, Expression in C, Type Casting

Unit 5: I/O Functions

Header Files (stdio.h, conio.h etc.), Formatted Input/Output Functions (scanf, printf), Escape Sequences, Unformatted Input/Output Functions (getch, getchar, putchar, gets, puts, getche, clrscr)

Unit 6: Conditional Statements

Decision Control Statements, Conditional Statement- if, if- else, nested if-else, switch-case; break, continue, goto

Unit 7: Loop Control Structures

Concept of Loops, Types of loop: while, do-while, for; nested loops

Unit 8: Storage Class

Storage Class, Automatic, External, Static, Register,

Unit 9: Arrays

Array, Array Declaration, 1-Dimensional array, 2-Dimensional array

Unit 10: Strings

String, String Handling Functions: strlen(), strcmp(), strcpy(), strrev(), strcat(), etc

Unit 11: Functions

Function, Function declaration, Function definition, Function call, Formal and Actual parameter, Recursive function

Unit 12: Pointers

Pointer, Pointer declaration, Passing pointer to a function, Pointer and one-dimensional arrays, Dynamic memory allocation

Unit 13: Structures and Union

Structure Declarations, Definitions, Array of Structure, Pointer to Structure. Union Declaration, Definition, Enumerated Data Types.

Unit 14: File Handling

Concept of File, File Pointer, File Opening in various modes, closing a file, reading and writing on files, Formatted Input/Output, fseek(), ftell(), rewind()

Unit 15: Preprocessor Directives

Preprocessor Directives, Macro, Macros with arguments, #if and #elif directives.

COURSE 3: FUNDAMENTALS OF DATABASE MANAGEMENT SYSTEM

Course Type:	Core
Number of Credits:	4
Total Marks:	100

Course Objective:

- Understand the fundamental concepts of data, file systems, database systems, and different data models used in database design.
- Develop the ability to design relational databases using Entity-Relationship modeling, functional dependencies, and normalization techniques.
- Acquire practical skills in writing SQL queries for data definition, manipulation, retrieval, and constraint enforcement.
- Gain knowledge of database implementation techniques, query processing, optimization, and GUI-based database connectivity tools.

Course Outcome:

On completion of this course, the learners will be able to:

- Differentiate between file processing systems and DBMS, explain database architecture, and describe various data models.
- Design ER diagrams and relational schemas, apply normalization (up to BCNF), and analyze functional dependencies to ensure data integrity.
- Write and execute SQL queries including DDL, DML, joins, subqueries, grouping, constraints, and advanced query operations.
- Implement database connectivity using tools such as phpMyAdmin, demonstrate understanding of query processing concepts, and compare structured and unstructured query languages.

Unit 1: File Structure and Organization

Data and Information, Concept of Field, Key Field; Records and its types, Fixed length records and Variable length records; Files, operation on files, Primary file organization.

Unit 2: Database Management System

Definition of DBMS, File processing system vs. DBMS, Advantages and Disadvantages of DBMS, Database Architecture, Data Independence, Data Dictionary, DBMS Language, Database Administrator.

Unit 3: Data Models

Data Models: Object Based Logical Model, Record Base Logical Model, Relational Model, Network Model, Hierarchical Model.

Unit 4: Entity-Relationship Model

Entity Set, Attribute, Relationship Set, Entity Relationship Diagram (ERD), Extended features of ERD.

Unit 5: Relational Databases

Relational data model; Terms: Relation, Tuple, Attribute, Cardinality, Degree, Domain; Keys: Super Key, Candidate Key, Primary Key, Foreign Key;

Unit 6: Relational Algebra

Operations: Select, Project, Union, Difference, Intersection, Cartesian Product, Natural join.

Unit 7: Database Design

Design of Relational Database, Functional Dependency Diagram, Dependency-preserving property

Unit 8: Normalization of Database

Introduction to Normalization, Anomalies of un-normalized Database, Normalization of Database: 1NF, 2NF, 3 NF, BCNF.

Unit 9: Introduction to SQL

Structured Query Language (SQL), Characteristics of SQL, Advantages of SQL, SQL Data types, Types of SQL commands, DDL, DML, Creating a Database, Creating, Altering, and Deleting Tables, Inserting new data, Updating data (the WHERE Clause, The Logical AND and OR operator), Deleting Data.

Unit 10: Advanced SQL I

The SELECT statement, Filtering results with the WHERE Clause; Logical Operators and Operator Precedence (Using logical operator NOT, BETWEEN, LIKE, IN); Ordering Results with ORDER BY (Joining columns-concatenation); Selecting data from more than one table,

Unit 11: Advanced SQL II

Join, Types of Join, SQL commands: Select... From...Where... Group by Having... Order by..., Tables, , Queries, Sub Queries, Insert, Update and Delete operations, Constraints considers (NOT NULL, UNIQUE, Check Primary key, Foreign key)

Unit 12: System Implementation Techniques

Query processing and optimization- translation between SQL queries and relational algebra;

Unit 13: Unstructured Query Language

Structured vs unstructured data, Features of UnQL, Differences between SQL and UnSQL databases, Applications of UnQL

Unit 14: GUI for Database Connectivity

Need for GUI connectivity, Working with PHPMyAdmin: Installation environment for XAMPP, Accessing phpMyAdmin through web browser

COURSE 4: DIGITAL FLUENCY AND EMERGING TECHNOLOGIES

Course Type:	Core
Number of Credits:	4
Total Marks:	100

Course Objectives:

- Understand the fundamental concepts of e-learning, digital platforms, and online collaboration tools used in modern education and business environments.
- Develop practical skills in using digital tools and services such as Google applications, video conferencing platforms, social media, and e-commerce systems.
- Gain foundational knowledge of emerging technologies including Artificial Intelligence, Data Science, IoT, Cloud Computing, Big Data, and Blockchain.
- Understand digital governance systems and the role of technology in transforming public services, industry, and society (Industry 4.0 and Education 4.0).

Course Outcome:

On completion of this course, the learners will be able to:

- Effectively use e-learning platforms, search engines, Google services, and video conferencing tools for academic and professional purposes.
- Apply digital communication and collaboration tools, including social networking platforms and e-commerce applications, in real-world scenarios.
- Explain the basic concepts, applications, and societal impact of emerging technologies such as AI, Machine Learning, IoT, Cloud Computing, Big Data, and Blockchain.
- Demonstrate awareness of digital governance models and online public service systems, and evaluate their role in promoting digital transformation and inclusive development.

Unit 1: Introduction to eLearning

Definition, Asynchronous/Synchronous Learning, e-learning Platforms: Proprietary and open source, Learning Management System (LMS), MOOCs: definition, various MOOC platforms like SWAYAM, Coursera, Edx, Audacity, FutureLearn etc.

Unit 2: Searching Techniques

Search Engines, Searching Techniques; Google, Bing, Advanced Search Options in Google, Translator: Google, Bing

Unit 3: Working with Google Services I

Working with Gmail, Google Docs: creating and posting; Google Sheets: creating and editing; Google Drive: uploading and sharing of files and folders

Unit 4: Working with Google Services II

Google Forms: Creating and analysis of response; Google Voice Assistant; Google Classroom: Creating classroom, Taking class etc.

Unit 5: E-commerce

Introduction, Types of E-commerce, Applications of E-commerce with examples

Unit 6: Video Conferencing Tools

Introduction, Working with various video conferencing tools like Google Meet, Zoom, WebX, Microsoft Teams, etc

Unit 7: Working with Social Networks

Introduction, Working with various Social Networking Sites like WhatsApp, Youtube, Telegram, Facebook, X, Instagram etc.

Unit 8: Introduction to Artificial Intelligence and Machine Learning

Definition of Artificial Intelligence (AI); Brief history of AI; Types/Categories of AI; Applications of AI: Healthcare, Agriculture, Education etc.; Machine Learning: definition, Supervised learning, Unsupervised learning; Introduction to Industry 4.0 and applications, Introduction to Education 4.0. and applications;

Unit 9: Introduction to Data Science

Definition, of Data Science; Components of Data Science; Data Scientist: Role and Responsibilities; Tools and Technologies used; Applications of Data Science: Healthcare, Education etc.

Unit 10: Introduction to IoT

Definition, basic concepts of IoT and its applications like Smart Home, Smart vehicles, IoT in Agriculture

Unit 11: Introduction to Cloud Computing

Cloud Computing: Definition; Types of Cloud: Public cloud; Private cloud; Hybrid cloud; Community cloud; Types of Cloud services: Infrastructure as a Service (IaaS), Platform as a Service (IaaS) and Software as a Service (SaaS), Applications of Cloud Computing

Unit 12: Introduction to Big Data

Big Data: Definition, Characteristics, Types of Big Data: Structured, Un-structured, Semi-structured; Apache Hadoop; Big Data Platforms, Applications of Big Data

Unit 13: Introduction to Blockchain Technology

Introduction to Blockchain Technology and its Importance, Evolution of the Blockchain Technology, Elements of a Blockchain, Blockchain Applications

Unit 14: E-Governance and Application

E-Governance Models: (G2B,G2C,C2G,G2G), Challenges to E-Governance, Strategies and tactics for implementation of E-Governance, Applications of E-Governance; Digilicker; ADDAR; PAN card; UPPAR ID; mParivathan; DigiYatra;

COURSE 5: PRACTICAL

Additional content or changes may be incorporated into the practical component as deemed necessary.

Practical Components of: COMPUTER FUNDAMENTALS AND PC SOFTWARE

1. Download and install LibreOffice.
2. LibreOffice Writer: Create formatted document like official letter. Use options like Styles, Templates and Insert: Table, Images, Page borders and Apply: Columns, Spell-check.

3. LibreOffice Calc: Create data sheet and apply: Formulas, Functions and use: conditional formatting, data validation, create charts and analyze data using filters.
4. LibreOffice Impress: Create professional presentation; Apply slide master, Add animations, transitions, Insert multimedia.
5. LibreOffice Base: Create database, Create tables, Define primary key, Create form, Run query, Generate report.

Practical Components of: COMPUTER PROGRAMMING USING C

6. Write programs to: Print "Hello World".
7. Write programs to: Perform arithmetic operations.
8. Write programs to: Swap two numbers (with and without third variable).
9. Write programs to: Convert temperature (Celsius ↔ Fahrenheit).
10. Write programs to: Calculate simple and compound interest
11. Write programs to: Check even or odd number.
12. Write programs to: Find largest of three numbers.
13. Write programs to: Grade calculation using if-else.
14. Write programs to: Menu-driven calculator using switch.
15. Write programs to: Print Fibonacci series.
16. Write programs to: Using Function to calculate factorial.
17. Write programs to: Differentiate between Call by value vs call by reference.
18. Write programs to: Store and access elements in an array
19. Write programs to: Find largest and smallest element in an array
20. Write programs to: Sort array (bubble sort).
21. Write programs to: Search element (linear search).
22. Write programs to: Find length of string (without strlen()), Reverse string, Check palindrome string, Count vowels and consonants, Compare two strings (without strcmp()).
23. Write programs to: Use malloc(), calloc() and free() functions
24. Write programs to: Use structure and unions
25. Write programs to: Create and write to file, Read file contents, Count words in file, Append data to file.

Practical Components of: FUNDAMENTALS OF DATABASE MANAGEMENT SYSTEM

26. Create database and tables using MySQL.
27. Insert records, Update records using WHERE clause, Delete records.
28. Alter and drop tables.
29. Perform SELECT queries with: WHERE, BETWEEN, LIKE, IN, NOT
30. Use ORDER BY.
31. Retrieve data from multiple tables.
32. Perform: Inner Join, Left Join, Right Join
33. Write queries using: GROUP BY, HAVING, Subqueries
34. Apply constraints: NOT NULL, UNIQUE, PRIMARY KEY, FOREIGN KEY
35. Install XAMPP.
36. Start Apache and MySQL services.
37. Access phpMyAdmin.
38. Create database using GUI.

Practical Components of: DIGITAL FLUENCY AND EMERGING TECHNOLOGIES

39. Perform advanced Google searches

40. Create: Google Doc, Google Sheet, Google Form
41. Create and manage a Google Classroom
42. Host a meeting on Google Meet/Zoom.
43. Create professional social media profile.
44. Explore DigiLocker, mParivahan, DigiYatra portal.

SEMESTER II

COURSE 1: APPLIED AI AND GENERATIVE AI

Course Type:	Core
Number of Credits:	4
Total Marks:	100

Course Objective:

- Understand the basic concepts and applications of Artificial Intelligence (AI).
- Explore the various subfields of AI including computer vision, NLP, and robotics.
- Introduce the learners to Machine Learning and Deep Learning concepts.
- Apply AI concepts in real-life applications such as education, office, and social media.

Course Outcome:

On completion of this course, the learners will be able to:

- Define AI and its subfields including its impact and evolution.
- Identify the application of AI in areas like computer vision and NLP.
- Explain machine learning and deep learning concepts.
- Apply Generative AI techniques in education, office, and social environments.

Unit 1: Introduction to Artificial Intelligence

Definition of Artificial Intelligence; Introduce the fundamental concepts of Artificial Intelligence (AI) and its real-world applications; History and evolution of AI; Importance and impact of AI in modern society

Unit 2: AI Applications

AI applications in education, healthcare, agriculture etc.; AI in smart devices and services; Ethical concerns and future possibilities

Unit 3: Computer Vision, NLP and Speech Processing

Introduction to Computer Vision and applications; Introduction to Natural Language Processing (NLP) and applications; Introduction to Speech Processing and Applications

Unit 4: Robotics & Expert Systems

Fundamentals of Robotics and applications; AI-Powered Autonomous Systems; Expert Systems: Definition, Components, and applications

Unit 5: Machine Learning & Deep Learning

Introduction to Machine Learning; Types of Machine Learning: Supervised, Unsupervised, Reinforcement Learning and applications; Introduction to Neural Networks, Deep Learning and applications

Unit 6: Introduction to Generative AI

Definition and Basics of Generative AI; Basics of LLM, how LLM works;

Unit 7: Commonly Used Generative AI Platforms

Introduction to Commonly Used Generative AI Platforms: ChatGPT, Gemini, Copilot, Perplexity, DeepSeek, Grok etc.

Unit 8: Prompt Engineering

Basics of Prompt Engineering; Effective Prompting Techniques for AI Models; Use Cases of Prompt Engineering in AI Applications

Unit 9: Generative AI in Education

AI-Powered Learning Assistants; AI for Content Generation; AI for Personalized Learning Experiences; Ethical Considerations

Unit 10: Generative AI in the Office Environment

Generative AI in the Office Environment; AI-Enhanced Correspondence; AI in Documentation and Reporting; AI for Meeting Management; AI in Proposal Development; AI for Document Summarization and Report Generation; AI-Powered Virtual Assistants in Workplaces;

Unit 11: Generative AI in Social Media

AI for Facebook, YouTube, Instagram, X etc.

Unit 12: Generative AI in Healthcare and Agriculture

AI Application in Healthcare and Agriculture

Unit 13: Exploring Various AI Tools I

Hands-on Experience with various AI Tools in various domains; Practical Use Cases and Demonstrations

Unit 14: Exploring Various AI Tools II

Exploring Various AI Tools developed in India

COURSE 2: FUNDAMENTALS OF NETWORKING AND AI-ASSISTED WEB PROGRAMMING

Course Type:	Core
Number of Credits:	4
Total Marks:	100

Course Objectives:

- Provide foundational knowledge of computer networking concepts, including network types, communication modes, transmission media, and networking devices.
- Develop an understanding of network architectures and data transmission mechanisms, including OSI and TCP/IP models, switching techniques, and network topologies.
- Understand the fundamentals of AI-assisted development, including prompt engineering, AI coding assistants, and the role of machine learning concepts in modern web programming.
- Develop front-end web applications using HTML, CSS, JavaScript, and front-end frameworks with the support of AI-powered development environments.

Course Outcome:

On completion of this course, the learners will be able to:

- Explain and differentiate various networking concepts such as LAN, MAN, WAN, communication modes, network topologies, transmission methods, and switching techniques.
- Describe and analyse the functions of networking devices and network models (ISO-OSI and TCP/IP) and interpret how data is transmitted across different network layers and media.
- Utilize AI-assisted IDEs and prompt-writing techniques to generate, modify, and optimize web development code efficiently and responsibly.
- Design and implement responsive and interactive front-end web interfaces using modern web technologies with AI support.

Unit 1: Introduction to Computer Network

Goals of Computer Network, Broadcast and Point-to-Point Networks, Connection-Oriented and Connection-Less Services, Types of Computer Network: LAN, MAN, WAN, LAN Transmission Methods, Peer-to-Peer LANs,

Unit 2: Data Communication Modes

Data Communication, Types of Communication (Analog, Digital), Modes of Communication (Simplex, Half-Duplex, Full-Duplex).

Unit 3: Network Devices

Network Interface Card (NIC), Modem, Repeater, Bridge and Gateway, Hub, Switch, Router.

Unit 4: Network Topology

Network Topology, Types of Network Topology: Bus, Ring, Star, Mesh, Tree.

Unit 5: Data Transmission

Parallel Transmission, Serial Transmission, Bandwidth, Baud length, Switching Techniques: Circuit Switching, Message Switching, and Packet Switching.

Unit 6: Network Models

Design Issues of Layers, Protocol Hierarchy, ISO-OSI Reference Model: Functions of each Layer; Various Terminology used in Computer Network; Connection-Oriented and Connectionless Services, TCP/IP Reference Model, Comparison of ISO-OSI and TCP/IP Model.

Unit 7: Transmission Media

Transmission Medium, Guided Media: Coaxial Cable, Twisted Pair, Fiber Optics Cable: Unguided Media: Radio Waves, Bluetooth, Infrared, Microwave, Satellite, Wireless LANs

(IEEE 802.11).

Unit 8: Introduction to AI-Assisted Web Programming

Introduction to Artificial Intelligence in web development, overview of AI coding assistants, basic concepts of machine learning in programming, advantages and limitations of AI tools, introduction to prompt writing for generating code, and applications of AI in modern web development.

Unit 9: AI-Powered Development Environment and IDEs

Introduction to development environments, installation and setup of AI-enabled IDEs (such as VS Code with AI plugins), code auto-completion, documentation generation using AI, basic Git and version control support, and improving coding productivity using AI tools.

Unit 10: AI-Assisted HTML Fundamentals

Basics of HTML structure, tags, attributes, forms, tables, semantic HTML elements, accessibility basics, webpage layout generation using AI tools, and basic SEO-friendly HTML coding.

Unit 11: AI-Assisted CSS and Styling

Introduction to CSS, selectors, colors, fonts, box model, layout techniques (Flexbox, Grid basics), simple animations, responsive styling basics, and using AI tools to generate CSS styles and UI designs.

Unit 12: Responsive Web Design

Concept of responsive design, media queries, mobile-first approach, viewport settings, responsive images, basic UI adaptation techniques, and AI assistance for responsive layout suggestions.

Unit 13: JavaScript Fundamentals with AI

Introduction to JavaScript, variables, data types, operators, functions, events, conditional statements, loops, simple debugging with AI assistance, and basic client-side scripting.

Unit 14: Web Security and Ethics in AI Programming

Introduction to web security, common vulnerabilities (XSS, SQL injection basics), password security, data privacy concepts, ethical AI use, plagiarism concerns, and responsible coding practices.

COURSE 3: AI-ASSISTED PYTHON PROGRAMMING

Course Type:	Core
Number of Credits:	4
Total Marks:	100

Course Objective:

- Develop a strong foundation in Python programming concepts including data types, control structures, functions, object-oriented programming, and file handling.
- Gain hands-on experience in configuring and using Python development environments, including AI-assisted IDEs and cloud-based platforms.

- Learn to integrate AI tools effectively to enhance coding productivity, debugging, optimization, and problem-solving.
- Apply Python libraries such as NumPy, Pandas, and Matplotlib for data handling, analysis, and visualization in real-world applications.

Course Outcome:

On completion of this course, the learners will be able to:

- Install, configure, and work efficiently in Python environments such as Jupyter Notebook, Google Colab, and AI-assisted IDEs.
- Write structured Python programs using appropriate data structures, control statements, functions, modules, and object-oriented programming principles.
- Utilize AI-assisted development tools responsibly to generate, debug, and optimize Python code while critically evaluating AI outputs.
- Analyze, manipulate, and visualize data using Python libraries such as NumPy, Pandas, and Matplotlib to solve basic real-world computational problems.

UNIT 1: Installation of Python

Python Installation, Working with Google Colab, Anaconda Installation, Working with Jupyter Notebook, Spyder

UNIT 2: Introduction to Python with AI-Assisted IDEs

Various AI-Assisted IDEs for Python, Basic Python Programming vs AI-Assisted Programming, Examples

UNIT 3: Python Basics

Atoms, Identifiers and keywords, Literals, Arithmetic operator, Relational operator, Logical or Boolean operator, Assignment operator, Bit wise operator, Identity and Membership operator.

UNIT 4: Strings

Strings, String properties, Built-in functions, String Methods, String Conversions, String Comparisons

UNIT 5: Decision Control Statements

Input and Output Statements, Control statements, Conditional Statements- if...else, Nested if statements, Ternary Operators.

UNIT 6: Loop Control Statements

Looping- while Loop, for Loop, Loop Control, break, continue and pass.

UNIT 7: Lists

Lists, Accessing List elements, looping in Lists, Basic List operations, Using built-in functions on Lists, List methods, Sorting and reversing.

UNIT 8: Tuples

Tuples, accessing tuple elements, looping in tuples, basic tuple operations, using built-in functions on Tuples, Tuple methods, Tuple varieties

UNIT 9: Sets

Definition of set, accessing set elements, looping in sets, basic set operations, Sets, Sets Methods and Functions

UNIT 10: Dictionaries

Dictionary, definition of dictionaries, accessing dictionary elements, looping in dictionaries, basic dictionary operations.

UNIT 11: Functions

Functions: Definition, call, positional and keyword parameter. Default parameters, variable number of arguments

UNIT 12: Modules

Modules: import mechanisms, Functional programming: map, filter, reduce, max, min. lambda function.

UNIT 13: Object Oriented Programming

Object Oriented Programming, Definition of Classes and Objects, Python Inheritance, Different types of Inheritance with examples.

UNIT 14: File Processing

File Processing: reading and writing files, manipulating file pointers using seek.

Unit 15: Python Libraries

Working with various libraries - NumPy, Pandas, Matplotlib, etc.

COURSE 4: CYBER SECURITY

Course Type:	Core
Number of Credits:	4
Total Marks:	100

Course Objectives:

- Understand the fundamentals of cyberspace, internet architecture, and the core concepts and challenges of cyber security.
- Gain knowledge of various types of cyber crimes, cyber threats, social engineering attacks, and digital payment frauds along with their preventive measures.
- Develop awareness of cyber laws, IT Act 2000 provisions, regulatory frameworks, and legal remedies related to cyber security in India.
- Acquire practical knowledge of digital device security, Wi-Fi protection, social media safety, and best practices for secure online transactions and communication.

Course Outcome:

On completion of this course, the learners will be able to:

- Explain the structure of cyberspace, internet infrastructure, and the emerging trends and challenges in cyber security.
- Identify different types of cyber crimes, social engineering techniques, malware attacks, and digital payment frauds, and suggest appropriate preventive measures.
- Interpret relevant cyber laws, including the IT Act 2000 and RBI guidelines, and demonstrate awareness of reporting mechanisms and legal protections.
- Apply cyber security best practices to secure digital devices, Wi-Fi networks, social media platforms, and e-commerce transactions in real-life scenarios.

Unit 1: Introduction to Cyberspace

Defining Cyberspace and Overview of Computer and Web-technology, Architecture of cyberspace, Communication and web technology.

Unit 2: Introduction to Internet and Cyber Security

Internet, World wide web, Advent of internet, Internet infrastructure for data transfer and governance, Internet society, Regulation of cyberspace, Concept of cyber security, Issues and challenges of cyber security.

Unit 3: Cyber Crime 1

Classification of cyber-crimes, Common cyber crimes- cyber crime targeting computers and mobiles, cyber crime against women and children.

Unit 4: Cyber Crime 2

Financial frauds, Social engineering attacks, malware and ransomware attacks, zero day and zero click attacks.

Unit 5: Cyber Law

Cybercriminals modus-operandi , Reporting of cyber crimes, Remedial and mitigation measures, Legal perspective of cyber crime, IT Act 2000 and its amendments, Cyber crime and offences, Organisations dealing with Cyber crime and Cyber security in India, Case studies.

Unit 6: Introduction to Social Media

Introduction to Social networks, Types of Social media, Social media platforms.; Social media monitoring, Hashtag, Viral content, Social media marketing, Social media privacy, Challenges, opportunities and pitfalls in online social networks.

Unit 7: Handling Social Media

Social media monitoring, Hashtag, Viral content, Social media marketing, Social media privacy, Challenges, opportunities and pitfalls in online social networks.

Unit 8: Security Issues in Social Media

Security issues related to social media, Flagging and reporting of inappropriate content, Laws regarding posting of inappropriate content, Best practices for the use of Social media, Case studies.

Unit 9: Introduction to E-Commerce

Definition of E- Commerce, Main components of E-Commerce, Elements of E-Commerce security, E-Commerce threats, E Commerce security best practices.

Unit 10: Introduction to Digital Payments

Introduction to digital payments, Components of digital payment and stake holders, Modes of digital payments- Banking Cards, Unified Payment Interface (UPI), e-Wallets, Unstructured Supplementary Service Data (USSD), Aadhaar enabled payments.

Unit 11: Security Aspects in Digital Payments

Digital payments related common frauds and preventive measures. RBI guidelines on digital payments and customer protection in unauthorised banking transactions. Relevant provisions of Payment Settlement Act,2007.

Unit 12: Digital Devices Security I

End Point device and Mobile phone security, Password policy, Security patch management, Data backup, Downloading and management of third party software.

Unit 13: Digital Devices Security II

Device security policy, Cyber Security best practices, Significance of host firewall and Anti-virus, Management of host firewall and Antivirus.

Unit 14: Wi-Fi Security

Introduction to Wi-Fi, Types of Wireless security: Wired Equivalent Privacy (WEP), Wi-Fi

Protected Access (WPA), Wi-Fi Protected Access 2 (WPA 2), Wi-Fi Protected Access 3 (WPA 3); Threats and risks to Wi-Fi Security, Ways to protect Wi-Fi network, Types of WiFi network security devices, Configuration of basic security policy and permissions

Unit 15: Latest Trends

Latest Cyber Security Trends, Reports Analysis, Attack Trends; Forbes Magazine etc.

COURSE 5: PRACTICAL

Additional content or changes may be incorporated into the practical component as deemed necessary.

Practical Components of: APPLIED AI AND GENERATIVE AI

1. Use: ChatGPT, Gemini, Copilot, Perplexity
2. Write basic prompts and then improve using: Role prompting, Few-shot prompting, Chain-of-thought prompting
3. Using Gen. AI: Lesson plan, Quiz questions, Learning objectives
4. Draft official mails using Gen. AI and generate meeting minutes
5. Generate: Instagram captions, YouTube script
6. Hands-on exploration of AI tools like: Canva AI, Notion AI, Grammarly, DeepSeek, Indian AI platforms (Bhashini, Krutrim, etc.)

Practical Components of: FUNDAMENTALS OF NETWORKING AND AI-ASSISTED WEB PROGRAMMING

7. Compare AI-generated code vs manually written code (simple HTML page).
8. Install and configure VS Code with AI plugin (Copilot/Codeium).
9. Initialize Git repository and push code to GitHub.
10. Use AI to generate: A semantic HTML webpage, A student registration form, A table with sample data
11. Generate CSS using AI for: Card layout, Navigation bar, Responsive form
12. Generate JavaScript code using prompts: Form validation, Simple calculator, Loop-based number series
13. Create dynamic webpage: Add/remove elements dynamically; Use AI to improve event handling logic.

Practical Components of: AI-ASSISTED PYTHON PROGRAMMING

14. Install Python using Anaconda.
15. Create and run a simple program in: Jupyter Notebook, Google Colab, Spyder
16. Install an AI-assisted IDE (VS Code + Copilot/Codeium). Write a simple calculator: First manually and then using AI suggestions.
17. Use AI to generate a program using all operator types in one script.
18. Write a programs to: count vowels and consonants in a string, reverse a string, check if a string is palindrome, compare two strings, and convert string to uppercase/lowercase using methods.
19. Write programs to: Find largest of three numbers, Grade calculator using if-else, Menu-driven

- program using nested if.
20. Write programs to: Print multiplication table, Generate Fibonacci series, Check prime number, Factorial using while loop, Use break and continue in examples. And use AI to debug an infinite loop program.
 21. Write programs to: Accept list from user and find: Maximum, Minimum, Sum
 22. Write programs to: Create tuple and access elements and Convert list to tuple.
 23. Write programs to: Perform union, intersection, and remove duplicates from list using set.
 24. Write programs to: Create student dictionary (name, marks), Find student with highest marks, Count word frequency in sentence, Merge two dictionaries.
 25. Write programs to: Create function for checking prime number and to calculate factorial of a number; Function with default arguments; Function with variable arguments; Recursive function example.
 26. Write programs to: Create custom module and import it; Use math module. Use lambda with map, filter, reduce. And Find maximum and minimum using built-in functions.
 27. Write programs to: Create class Student with attributes and methods; Demonstrate: Single inheritance, Multiple inheritance, Multilevel inheritance.
 28. Write programs to: Write data to file; Read file content; Count words in file; Use seek() to move file pointer.
 29. Write programs using: NumPy (To create arrays, Matrix addition and multiplication); Pandas (To create DataFrame, Read CSV file, Basic data analysis like mean, median etc.) Matplotlib (Plot: Line graph, Bar graph, Pie chart)
 30. Compare own code with code generated through AI.

Practical Components of: CYBER SECURITY

31. Prepare checklist for reporting cyber crime at Cyber crime Police Station.
32. Prepare checklist for reporting cyber crime online and reporting phishing emails.
33. Prepare basic checklist, privacy and security settings for popular Social media platforms.
34. Reporting and redressal mechanism for violations and misuse of Social media platforms.
35. Perform configuration of security settings in Mobile Wallets and UPIs.
36. Prepare checklist for secure net banking.
37. Perform setting, configuring and managing three password policy in the computer (BIOS, Administrator and Standard User).
38. Do setting and configuring two factor authentication in the Mobile phone.
39. Perform security patch management and updates in Computer and Mobiles.
40. Manage Application permissions in Mobile phone.
41. Installation and configuration of computer Anti-virus.
42. Installation and configuration of Computer Host Firewall.
43. Check Wi-Fi security management in computer and mobile.