Krishna Kanta Handiqui State Open University

Four Year Undergraduate Programme

(As per NEP 2020)

Syllabus of Computer Application as Minor/Elective

Semester	Name of the Courses	Credit
I	Computer Fundamentals	4
II	Fundamentals of PC Software	4
III	Fundamentals of Database Management Systems	4
IV	Open Source Software	4
V	Fundamentals of Web Technology	4
VI	Digital Marketing	4
VII	Digital Fluency	4
VIII	Fundamentals of Python Programming	4

Syllabus of Minor Courses

SEMESTER I: COMPUTER FUNDAMENTALS

Course Type:	**Minor**
Number of Credits:	**4**
Total Marks:	**100 (Formative: 30, Summative: 70)**

Course Objectives:

- To provide learners the knowledge of computers, its different generations and applications
- To provide learners the knowledge of different components of computers, memory and operating system
- To familiarize students in using algorithms, flowcharts and pseudocodes to solve problems
- To provide knowledge of cybercrimes, computer security threats and protection mechanisms

Course Outcome:

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

- describe components of computers, types of computer memory and different operating systems
- describe the different types of buses and instruction formats
- use algorithms, flowchart and pseudocode to solve problems
- describe computer security issues and explain different types of cyber crimes

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: Buses

Bus Structure- Address, Data and Control Bus, Different types of Buses–ISA, PCI, EISA, VESA, MCA, CA

Unit 6: Introduction to System Software

Compiler, Assembler, Linker, Loader and Editor

Unit 7: Instruction Types

Different Types of Instruction format (8 bit, 16 bit), Bit manipulation, Control, Data Transfer Instruction

Unit 8: Basics of Operating Systems

Functions of OS, Types of OS, DOS, LINUX (Single User, Multiuser), UNIX, ZENIX, WINDOWS, Multiprocessing OS, Time sharing OS

Unit 9: Computer Languages
Concepts of Machine level, Assembly level and High-level language; Basic difference between Procedure Oriented Language and Object-Oriented Language;
Unit 10: Introduction to Algorithms and Flowchart
Introduction to Algorithm, Flowchart, Pseudo code, Examples of algorithm and flowchart for simple problems.
Unit 11: File Structure
Data and Information, Records and its types, Files, Operations on Files
Unit 12: Computer Security
Computer Virus, Worm, SpyWare, Malware, Trojan Horse, Antivirus Software
Unit 13: Basics of Cyber Crimes I
Cyber Crimes against Individuals, Institution and State, Hacking, Digital Forgery, Identity Theft and Fraud.
Unit 14: Basics of Cyber Crimes II
Cyber Stalking/Harassment, Cyber terrorism, Cyber Defamation, Software Piracy, Different offences under IT Act, 2000

References:

1. P. K. Sinha & Priti Sinha , "Computer Fundamentals", BPB Publications, 2007.
2. Dr. Anita Goel, "Computer Fundamentals", Pearson Education, 2010.

SEMESTER II: FUNDAMENTALS OF PC SOFTWARE

Course Type:	**Minor**
Number of Credits:	**4**
Total Marks:	**100 (Formative: 20, Practical: 30, Summative: 50)**

Course Objectives:

- To provide learners the knowledge of operating systems and using DOS operating system
- To provide learners the knowledge of using both Microsoft and Linux operating systems
- To familiarize students in usage of LibreOffice Writer and Calc.
- To familiarize students in usage of LibreOffice Impress and Base.

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

- use DOS operating system
- use Microsoft Windows and Linux operating system
- use LibreOffice Writer and Calc to create documents and worksheets
- use LibreOffice Impress and Base to create presentations and tables, queries and forms.

Unit 1: Introduction to OS
Definition and functions of an Operating System, Types of OS (Single User, Multi user, Single tasking, Multitasking, Real time, Network OS, Distributed OS)
Unit 2: MS DOS Operating System
Introduction to DOS, System files of DOS, concept of Booting, Files and Directory Structure, Concept of Paths, Internal and External commands, Batch File.
Unit 3: MS Windows Operating System
Introduction to Windows, Components of Windows, Customizing the Desktop, Files and Folders.

Unit 4: LINUX Operating System

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

Unit 5: 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 6: 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 7: 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 8: 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 9: 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 10: 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 11: 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 12: 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 13: 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 14: 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

References:

1.https://documentation.libreoffice.org/assets/Uploads/Documentation/en/GS7.0/GS70-GettingStarted.pdf

SEMESTER III: FUNDAMENTALS OF DATABASE MANAGEMENT SYSTEM

Course Type:	**Minor**
Number of Credits:	**4**
Total Marks:	**100 (Formative: 20, Practical: 30, Summative: 70)**

Course Objectives:

- To provide learners knowledge of database architecture, data models and relational model
- To provide learners knowledge of functional dependencies and normalization
- To familiarize learners with SQL programming to create, alter and delete data and tables
- To provide learners knowledge of using GUI and connecting to a database

Course Outcome:

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

- describe the database architecture, data models and relational model
- explain functional dependencies, normalization and the different types of keys
- use SQL to create, modify, delete tables and databases and write queries and subqueries
- use WAMP and phpMyAdmin

UNIT 1: File Structure

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 System

Traditional file approach versus Database approach; Data independence, Database System, Database Architecture, The three level of architecture, Mapping, Database administrator, Database Management system, Types of DBMS, Merits and demerits of DBMS

UNIT 3: Data Models

Conceptual model, Logical model, Physical model, Entity-Relationship (ER) model as a tool for conceptual design: Entities, Attributes and Relationships, Weak and Strong entities, Conversion of ER model into Relational schema, ER modelling symbols.

UNIT 4: The Relational Model

Relational data model concepts, Integrity constraints: Entity integrity, Referential integrity, Domain Constraints.

UNIT 5: Keys

Concept of keys, Composite key, Candidate key, Primary key, Alternate key, Foreign key, Defining Primary and Foreign keys in Database.

UNIT 6: Relational Database Design

Database Design, Decomposition, Universal Relation, Functional Dependencies, Prime and Non-prime attributes.

UNIT 7: Normalization

Normalization, First Normal form (1NF), Second Normal form (2NF), Third Normal form (3NF), Boyce-Codd Normal form (BCNF)

UNIT 8: Introduction to SQL

Structured Query Language (SQL), Characteristics of SQL, Advantages of SQL, SQL Data types, Types of SQL commands, DDL, DML.

UNIT 9: Working with SQL Part I

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: Working with SQL Part II

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: Working with SQL Part III
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: Working with GUI
Introduction to WAMP, Installation of WAMP, Working with phpMyAdmin.
UNIT 13: Database Recovery
Concept of database recovery, Backup of database, Types of database failure, Types of database recovery.
UNIT 14: Database Security
Goals of database security, Discretionary Access Control, Mandatory Access control, Statistical Databases, Data Encryption.

References:

1. Elmasri, R., Navathe, S. B., Elmasri, R., & Navathe, S. B. (2000). *Fundamentals of Database Systems.* Addison-Wesley.
2. Ramakrishnan, R., Gehrke, J., & Gehrke, J. (2003). *Database management systems* (Vol. 3). New York: McGraw-Hill.
3. Silberschatz, A., Korth, H. F., & Sudarshan, S. (2011). Database system concepts.
4. Schwartz, B., Zaitsev, P., & Tkachenko, V. (2012). *High performance MySQL: optimization, backups, and replication*. " O'Reilly Media, Inc.".

SEMESTER IV: OPEN SOURCE SOFTWARE

Course Type:	**Minor**
Number of Credits:	**4**
Total Marks:	**100 (Formative: 20, Practical: 30, Summative: 70)**

Course Objectives:
- To provide the knowledge of using open-source packages LaTeX, Scilab, and Python with their applications.
- To provide a clear understanding of the basics of technical writing which will enable the learners to communicate their ideas effectively in the form of technical reports, journal papers etc., by using the technical writing tool LaTeX.
- To provide the knowledge of the Scilab environment and programming language.
- To get introduced to basics Python.

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

- understand the installation of various open-source packages like LaTeX, Scilab, and Python.
- format documents, typeset journal articles, reports, books, and slide presentations in Latex
- use Scilab environment to plot functions and data
- write code to solve simple problems in Python.

Unit 1: Installation to LaTeX
Installation of LaTeX, Understanding Latex compilation
Unit 2: Introduction of LaTeX
Basic Syntax, Writing equations, Matrix, Tables
Unit 3: Page Layout – I
Page Layout – Titles, Abstract Chapters, Sections, References, Equation references, Citation, Table of contents
Unit 4: Page Layout – II
List making environments, Generating new commands, Figure handling, table & figure numbering, List of figures, List of tables, Generating index
Unit 5: Packages
Packages: Geometry, Hyperref, amsmath, amssymb, algorithms, algorithmic graphic, color, tilez listing
Unit 6: Classes
Classes: article, book, report, beamer, slides, letter
Unit 7: Applications of LaTex
Applications: Writing Resume, Writing question paper, Writing articles/ research papers, Presentation using beamer, inserting graphics, drawing graphics, putting equations
Unit 8: Installation of Scilab
Installation of Scilab (both windows & Linux)
Unit 9: Introduction to Scilab
Introduction to Scilab, Basic syntax, Mathematical Operators, Predefined constants, Handling .sci files, Installation of additional packages e.g. optimization
Unit 10: Functions in Scilab
Built in functions, Complex numbers, Polynomials, Vectors, Matrix operations (functions like inv(), spec(), zeros(), ones(), eye(), rand(). Handling these data structures using built in functions.
Unit 11: Conditional Statements in Scilab
Loops (for & while), Conditional statements
Unit 12: Graphics in Scilab
Graphics handling: 2D, 3D, Generating .jpg files, Function plotting, Data plotting, GUI in scillab, Plotting 2D graphs
Unit 13: Applications of Scilab
Applications: Numerical Linear Algebra (Solving linear equations, eigen values atc.) solving Ordinary Differential Equations, Numerical Analysis – iterative methods, Comparison with C/C++/Matlab
Unit 14: Introduction to Python
Introduction to Python, Procedure to install Python, How to open Python console, Basic Python commands, Python programming.

References:

1. Kopka, H., Daly, P. W., & Rahtz, S. P. Q. (2004). *Guide to LATEX* (Vol. 4). Boston, MA: Addison-Wesley.
2. Ramchandran, H., & Nair, A. S. (2012). *Scilab (a Free Software to Matlab)*. S. Chand Limited.
3. The Python Tutorial — Python 3.11.2 documentation

SEMESTER V: FUNDAMENTALS OF WEB TECHNOLOGY

Course Type:	**Minor**
Number of Credits:	**4**
Total Marks:	**100 (Formative: 20, Practical: 30, Summative: 70)**

Course Objectives:

- To familiarize learners with Internet and its related topics
- To provide the knowledge of HTML programming
- To provide the knowledge of CSS
- To train a learner, so that he/she can create a simple website

Course Outcome:

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

- describe basic concepts related to the Internet, WWW and various protocols associated with email, file transfer etc.
- describe various tags used in HTML for web page design
- explain the use of CSS with HTML
- design a website

Unit 1: Basics of Internet and Web

Basics of Internet, World Wide Web, Web page, Home page, Web site, Static, Dynamic and Active web page, Overview of Protocols – Simple Mail Transfer Protocol, Gopher, Telnet, Emails, FTP, Hypertext Transfer Protocol, Client server computing concepts, MIME, Web Surfing

Unit 2: Web Client

Web Browser, Browsers e.g., Google Chrome, Microsoft Edge etc, Client-Side Scripting Languages-VB Script and Java Script, Active X control and Plug-ins

Unit 3: Web Server

Web Server Architecture, Image maps, CGI, API web database connectivity-DBC, ODBC, Proxy Server

Unit 4: Introduction to HTML

HTML markup, History of HTML, Use of HTML, tags, elements, attributes, creating HTML text using Notepad, Standard HTML document structure format

Unit 5: HTML Formatting-I

The browser as formatter, comment, Paragraph, line break, preformatting, heading, horizontal rules, meta tags, HTML styles, Working with other HTML formatting elements

Unit 6: HTML Formatting-II

Working with colors, hyperlink, images, lists, tables

Unit 7: HTML iframes

Iframe syntax, setting height and width, removing the border, target for a link, case studies

Unit 8: HTML Class and ID

Class attribute, syntax for class, multiple classes, id attribute, difference between class and id, HTML Bookmarks with ID and Links

Unit 9: HTML Layout and Responsive

HTML layout, HTML responsive, HTML emojis

Unit 10: HTML Forms

HTML Forms, HTML Form Attributes, HTML Form Elements, HTML Input Types, HTML Input Attributes, HTML Input Form Attributes.

Unit 11: HTML Media

HTML Media, Video, Audio, Plug-ins, YouTube

Unit 12: Working with CSS-I

Definition, Use of CSS, Types of CSS with examples

Unit 13: Working with CSS-II
Working with internal CSS, inline CSS, external CSS
Unit 14: Case Studies
Creating a simple website using HTML and CSS

References:

1. Duckett, J., & Schlüter, J. (2011). *HTML and CSS*. Wiley.
2. Duckett, J. (2011). *Beginning html, xhtml, css, and javascript*. John Wiley & Sons.

SEMESTER VI: DIGITAL MARKETING

Course Type:	**Minor**
Number of Credits:	**4**
Total Marks:	**100 (Formative: 30, Summative: 70)**

Course Objectives:
- To explain about different digital marketing strategy
- To identify how to create effective digital content that engages and informs customers, including the use of video, images, and written content
- To utilize digital advertising tools
- To identify latest trends and developments in digital marketing

Course Outcome:
On completion of this course, the learners will be able to:
- create and execute effective digital marketing campaigns
- explain data analytics and measurement
- analyze and interpret digital marketing data
- to effectively manage a digital marketing budget

Unit 1: Basics of Digital Marketing
Definition; Importance of Digital Marketing; working of digital marketing; advantages of digital marketing over traditional marketing; types of digital marketing
Unit 2: Keyword Research
Understanding keyword and its types; keyword research: tools for keyword research, localized keyword research; analysis of competitor website keyword; finalizing keyword for a project.
Unit 3: Website Planning
Importance of Domain name and domain extension; types of website: based on functionality and purpose; Planning of website design: content, plugin, engagement options; landing page and optimization.
Unit 4: Search Engine Optimization
Introduction to search engine and how it works; Concept of search engine optimization; Understanding the Search Engine Results Page; indexing; crawling
Unit 5: Social Media Marketing
Understanding social media and its marketing tools: paid marketing, organic marketing; Social Media optimization, Understanding marketing through Facebook, Instagram, YouTube, Google
Unit 6: Google mapping and Local Business
Listing of local in search engine; Image, video and Map setup in google places; visibility report of search engine and google reviews.
Unit 7: Google Analytics
Introduction and working of Google Analytics; Google analytics- account structure, insights, cookie

training; setting up analytics account; how to add google analytics in website

Unit 8: WhatsApp Marketing

Understanding WhatsApp Marketing; WhatsApp push notification; WhatsApp Business; tools and settings in WhatsApp business; Limitations of WhatsApp

Unit 9: Facebook marketing

Introduction to Facebook-insights, algorithm; Understanding Facebook ads- organic and paid, targeting option; Facebook page management

Unit 10: Twitter Marketing

Introduction to Twitter Marketing; Twitter marketing insights- dos and don'ts; Ad Content and targeting; fundamental of Influencer marketing; use of hashtags, tools

Unit 11: Instagram Marketing

Introduction to Instagram platform. Creation of Business page in Instagram; Marketing tools and Ads; Drive engagement and Lead generation; account switching

Unit 12: YouTube Marketing

Channel creation in YouTube; Uploading video and optimization; Video creation and story lineup; monetization of YouTube Channel; Case study

Unit 13: E-commerce marketing

E-commerce website and its advantages; marketing concept; Motivating shopping for online; affiliation marketing

Unit 14: Social Media Automation

Social Media automation- tools and process; Automatized report, analytics, best time to share; Rules related to automation

Unit 15: Google Ad Sense and AdWords

AdSense and process of earning through it; process of approval of AdSense; Placing Ads in website; AdWords and Ad placement; approval for AdWords; how to get Ads in Blog/YouTube

References:

1. Chaffey, D., & Ellis-Chadwick, F. (2019). *Digital marketing*. Pearson uk.
2. Ryan, D. (2016). *Understanding digital marketing: marketing strategies for engaging the digital generation*. Kogan Page Publishers.
3. Kingsnorth, S. (2022). *Digital marketing strategy: an integrated approach to online marketing*. Kogan Page Publishers.
4. Charlesworth, A. (2014). *Digital marketing: A practical approach*. Routledge.

SEMESTER VII: DIGITAL FLUENCY

Course Type:	**Minor**
Number of Credits:	**4**
Total Marks:	**100 (Formative: 20, Practical: 30, Summative: 70)**

Course Objectives:

- To familiarise learners to various eLearning and MOOCs Platforms and provide the working knowledge of various searching techniques and services provided by Google
- To give learners the concepts of various E-Payment methods
- To familiarise the learners with various video conferencing tools and proper handling of various social networking platforms
- To familiarize learners with concepts and applications of Artificial Intelligence, Machine Learning, Internet of Things, Cloud Computing, Big Data, e-Governance and Blockchain Technology.

Course Outcome:

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

- understand the concept of eLearning and various eLearning platforms
- demonstrate how to create and work with email through Gmail, prepare and share documents through google docs, google sheets and manage and share files in google drive
- handle various E-payment method, e-Governance applications and social networking sites in a proper way
- understand the concepts and applications of Artificial Intelligence and Machine Learning, Internet of Things, Cloud Computing, Big Data and Blockchain technologies

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-payment methods

E-cash Payment System, Credit Payment system, E-Check, Concept of OTP and uses, Concept of QR code and uses, Overview of Smart Card; Types of Electronic Payment Systems: Credit Card, Debit Card, Smart Card, E Money, Electronic Fund Transfer (EFT), UPI, Google Pay, BHIM etc.

Unit 6: E-commerce

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

Unit 7: Video Conferencing Tools

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

Unit 8: Working with Social Networks

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

Unit 9: 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 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: 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

Unit 14: Blockchain Technology
Introduction to Blockchain Technology and its Importance, Evolution of the Blockchain Technology, Elements of a Blockchain, Blockchain Applications

References:

1. Gerald Knezek and Rhonda Christensen. *Digital Fluency: Skills Necessary for Learning in the Digital Age*
2. Kristin Fontichiaro. *Teaching Digital Fluency: How do we Prepare Students for the Future?*

SEMESTER VIII: FUNDAMENTALS OF PYTHON PROGRAMMING

Course Type:	**Minor**
Number of Credits:	**4**
Total Marks:	**100 (Formative: 20, Practical: 30, Summative: 70)**

Course Objectives:
- To get introduced to Python programming.
- To provide the concept of flow control, functions and its implementation in Python.
- To provide the ability to design object – oriented programs with Python.
- To provide the knowledge of file processing in Python.

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

- learn Python installation, Anaconda installation and work with Google Colab, Jupyter Notebook, and Spyder.
- define and demonstrate the use of built-in data structures like lists, tuples and dictionary
- use functions and modules in Python programming.
- design object- oriented programs and to handle files in Python.

Unit 1: Installation of Python
Python Installation, Working with Google Colab, Anaconda Installation, Working with Jupyter Notebook, Spyder
Unit 2: Introduction to Python
Python, Python Interpreter, Using Python as calculator, Python shell, Indentation.
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 pointer using seek

References:

1. Budd, T. (2010). *Exploring Python*. McGraw Hill Higher Education.
2. The Python Tutorial — Python 3.11.2 documentation
3. Wentworth, P., Elkner, J., Downey, A. B., & Meyer, C. (2015). How to think like a computer scientist: Learning with Python 3.