Shiv Chhatrapati Shikshan Sanstha's

Rajarshi Shahu Mahavidyalaya, Latur

(Autonomous)

Structure and Curriculum of Three - Year Degree Programme with Multiple Entry and Exit option

Undergraduate Programme of Science & Technology

B.Sc. in Data Science

Board of Studies

in

Computer Science

Rajarshi Shahu Mahavidyalaya, Latur

(Autonomous)

w.e.f. June, 2025

(In accordance with NEP-2020)

Review Statement

The NEP Cell reviewed the Curriculum of **B. Sc. in Data Science** Programme to be effective from the **Academic Year 2025-26.** It was found that, the structure is as per the NEP-2020 guidelines of Govt. of Maharashtra.

Date: **09/08/2023**

Place: Latur

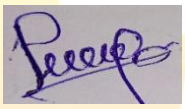
NEP CELL
Rajarshi Shahu Mahavidyalaya, Latur
(Autonomous)

CERTIFICATE

I hereby certify that the documents attached are the Bonafide copies of the curriculum of **B. Sc. in Data Science** Programme to be effective from the **Academic Year 2025-26.**

Date: **14.07.2023**

Place: Latur



(Dr. Renuka R Londhe)
Board of Studies in Computer Science
Rajarshi Shahu Mahavidyalaya, Latur
(Autonomous)

Shiv Chhatrapati Shikshan Sanstha's

Rajarshi Shahu Mahavidyalaya, Latur

(Autonomous)

Members of Board of Studies in the Subject Computer Science
Under the Faculty of Science and Technology

Sr. No.	Name	Designation	In position
1	**Dr Renuka R. Londhe** Head, Department of Computer Science, Rajarshi Shahu Mahavidyalaya (Autonomous), Latur	Chairperson	HoD
2	**Dr. Girish Choudhari** Professor and Head of Department School of Computational Sciences, SRTMU, Nanded	Member	V.C. Nominee
3	**Dr. Ramesh R. Manza** Professor, Department of Computer Science and IT, BAMU, Aurangabad	Member	Academic Council Nominee
4	**Dr. Shriram Raut** Associate Professor Department of Computer Science, PAHU, Solapur	Member	Academic Council Nominee
5	**Dr. Poorna Shankar** Professor, Indira College of Engineering, Pune	Member	Expert from outside for Special Course
6	**Mr N. D. Jagtap** Technical Trainer OHI-IITC,Muscat Oman	Member	Expert from Industry
7	**Dr. Santosh Shrikhande** Assistant Professor, School of Technology, SRTMU Subcenter Latur	Member	P.G. Alumni
8	**Mrs. Suchitra K. Kasbe**	Member	Faculty Member
9	**Mrs. Pooja S. Laturiya**	Member	Faculty Member
10	**Mr. Arun S. Shinde**	Member	Faculty Member
11	**Mrs. Sunita M Jadhav**	Member	Faculty Member
12	**Dr. Mahesh Wavare**	Member	Member from same Faculty

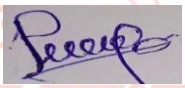
From the Desk of the Chairperson…

The rapid advancements in Data Science, Artificial Intelligence, Machine Learning, and IoT have revolutionized industries, governance, and everyday life. In this data-driven era, the ability to extract insights, build intelligent systems, and solve real-world problems using computational methods has become indispensable. Recognizing this need, the Board of Studies (BoS) in Computer Science at Rajarshi Shahu Mahavidyalaya, Latur (Autonomous), is proud to introduce the four-year B.Sc. (Data Science) programme under the National Education Policy (NEP) 2020.

Data Science sits at the intersection of computer science, statistics, and domain expertise, empowering professionals to transform raw data into actionable intelligence. Our carefully designed curriculum ensures that graduates:

- ✓ Develop strong mathematical, statistical, and computational foundations.
- ✓ Gain hands-on experience with Python, R, SQL, and modern data science tools (NumPy, Pandas, Scikit-learn, TensorFlow).
- ✓ Master data wrangling, visualization, machine learning, and big data technologies.
- ✓ Cultivate problem-solving skills applicable to industries like healthcare, finance, e-commerce, and research.
- ✓ Align with NEP-2020's vision of multidisciplinary learning, flexibility, and employability.

Thank you



(Dr. Renuka R Londhe)
Board of Studies in Computer Science

Shiv Chhatrapati Shikshan Sanstha's

Rajarshi Shahu Mahavidyalaya, Latur

(Autonomous)

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Shiv Chhatrapati Shikshan Sanstha's

Rajarshi Shahu Mahavidyalaya, Latur

(Autonomous)

Faculty of Science and Technology

Structure for Four Year Multidisciplinary Undergraduate Degree Programme in Computer Science Multiple Entry and Exit (In accordance with NEP-2020)

Year & Level	Sem	Major		Minor	GE/OE	VSC/ SEC (VSEC)	AEC/ VEC	OJT,FP,CEP, RP	Credit per Sem.	Cum./Cr. per exit
		DSC	DSE							
1	**2**	**3**		**4**	**5**	**6**	**7**	**8**	**9**	**10**
I 4.5	I	DSC I: 04 Cr. DSC II: 04 Cr.	NA	NA	GE-I: 04 Cr.	VSC-I: 02 Cr. SEC-I: 02 Cr.	AEC-I MIL: 02 Cr. VEC-I: 02 Cr.	CC-I: 02 Cr. (NSS, NCC, Sports, Cultural)/ CEP-I: 02 Cr. (SES-I)/ OJT: 02 Cr. / Mini Project: 02 Cr.	22	44 Cr. UG Certificate
	II	DSCIII: 04 Cr. DSC IV: 04 Cr.	NA	NA	GE-II: 04 Cr.	VSC-II: 02 Cr. SEC-II: 02 Cr.	AEC-II MIL: 02 Cr. VEC-II: 02 Cr.	Generic IKS: 02 Cr.	22	
	Cum. Cr.	16	-	-	08	04+04=08	04+02+02=08	04	44	
Exit Option: Award of UG Certificate in Major with 44 Credits and Additional 04 Credits Core NSQF Course/Internship or continue with Major and Minor										

Abbreviations:

1. **DSC : Discipline Specific Core (Major)**
2. **DSE : Discipline Specific Elective (Major)**
3. **DSM : Discipline Specific Minor**
4. **OE : Open Elective**
5. **VSEC : Vocational Skill and Skill Enhancement Course**
6. **VSC : Vocational Skill Courses**
7. **SEC : Skill Enhancement Course**
8. **AEC : Ability Enhancement Course**
9. **MIL : Modern Indian Languages**
10. **IKS : Indian Knowledge System**
11. **VEC : Value Education Courses**
12. **OJT : On Job Training**
13. **FP : Field Projects**
14. **CEP : Fostering Social Responsibility & Community Engagement (FSRCE)**
15. **CC : Co-Curricular Courses**
16. **RP : Research Project/Dissertation**
17. **SES : Shahu Extension Services**

Shiv Chhatrapati Shikshan Sanstha's

Rajarshi Shahu Mahavidyalaya, Latur

(Autonomous)

Faculty of Science & Technology

Programme Outcomes (POs) for B.Sc. Programme	
PO 1	
PO 2	
PO 3	
PO 4	
PO 5	
PO 6	
PO 7	

Programme Specific Outcomes (PSOs) for B.Sc. Computer Science (Honors/Research)	
PSO No.	Upon completion of this programme the students will be able to
PSO 1	Apply statistical and computational techniques to analyze and interpret complex datasets across diverse domains.
PSO 2	Demonstrate proficiency in programming languages like Python, R, and SQL for data manipulation and algorithm development.
PSO 3	Design, implement, and evaluate machine learning models to solve real-world problems and drive intelligent decision-making.
PSO 4	Develop and manage relational and non-relational databases ensuring efficient data storage, retrieval, and integrity.
PSO 5	Create intuitive data visualizations and effectively communicate insights to technical and non-technical audiences.
PSO 6	Understand and apply ethical principles related to data usage, privacy, and responsible AI practices.
PSO 7	Conduct independent research in data science, contributing to innovative solutions and academic advancement.
PSO 8	Apply data science methodologies to specialized domains such as healthcare, finance, agriculture, or social sciences.

Shiv Chhatrapati Shikshan Sanstha's

Rajarshi Shahu Mahavidyalaya, Latur

(Autonomous)

Department of Computer Science

B.Sc. Data Science

Year & Level	Semester	Course Code	Course Title	Credits	No. of Hrs.
I 4.5	I	(DSC-I)	Problem Solving using 'C' Language	03	45
			Lab Course-I	01	30
		(DSC-II)	Matrices and Calculus	03	45
			Lab Course-II	01	30
		GE-I	Statistics for Data Science –I	04	60
		(VSC-I)	Data Analysis using Spreadsheet	02	45
		(SEC-I)	From Basket (Introduction to Databases-I)	02	30
		(AEC-I)	From Basket	02	30
		(VEC-I)	Constitution of India	02	30
		AIPC/OJT-I	Min Project	02	60
	Total Credits			**22**	
	II	(DSC-III)	Python & Data Structure	03	45
			Lab Course-III	01	30
		(DSC - IV)	Linear Algebra	03	45
			Lab Course-IV	01	30
		GE-II	From Basket	04	60
		(VSC-II)	Python for Data Science	02	45
		(SEC-II)	Web Programming using HTML & CSS	02	30
		(AEC-II)	From Basket	02	30
		(CC-I)	FSRCE (CBPR)	02	30
		Generic IKS	Introduction to Indian Knowledge System	02	60
	Total Credits			**22**	
Total Credits (Semester I & II)				**44**	

Curriculum

Major and VSC Courses

Semester - I

Shiv Chhatrapati Shikshan Sanstha's

Rajarshi Shahu Mahavidyalaya, Latur

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Department of Computer Science

Course Type: DSC I
Course Title: Problem Solving using 'C' Language
Course Code: _____
Credits: 03 **Marks: 75** **Lectures: 45 Hrs.**

Learning Objectives:

LO 1. To Understand and apply structured problem-solving techniques using algorithms and flowcharts
LO 2. To develop foundational programming skills in C language
LO 3. To implement control structures and modular programming concepts for efficient solutions
LO 4. To Manipulate data using arrays, strings, and pointers in a memory-efficient manner
LO 5. To handle structured data and file input/output operations in real-world applications
LO 6. To apply C programming skills to solve data-centric problems in various domains

Course Outcomes:

After completion of the course, students will be able to-

CO 1. Demonstrate understanding of basic programming principles and C syntax
CO 2. Design algorithms and flowcharts for data-driven problems
CO 3. Develop C programs using control structures and user-defined functions
CO 4. Apply arrays, strings, and pointers for effective data manipulation and memory management
CO 5. Construct structured programs using data files and structures for persistent data handling
CO 6. Analyze and optimize C programs to solve real-world domain-specific problems

Unit No.	Title of Unit & Contents	Hrs.
I	**Fundamentals of Programming & C Language**	**12**
	Introduction to computers and programming Problem-solving strategies and flowcharts Basics of C language: structure, syntax, variables, data types Operators and expressions Input/Output functions	
	Unit Outcomes: UO 1. Understand the basics of computer programming and the role of C in computational thinking UO 2. Apply logical flow to problems using algorithms and flowcharts UO 3. Write simple C programs using correct syntax and structure	
II	**Control Structures and Functions**	**10**
	Conditional statements: if, else, switch Looping constructs: for, while, do-while Break and continue statements Introduction to functions Function declaration, definition, and recursion	
	Unit Outcomes: UO 1. Use control structures effectively to manage program flow	

Unit No.	Title of Unit & Contents	Hrs.
	UO 2. Develop modular programs using user-defined functions UO 3. Apply recursion to solve repetitive problems	
III	**Arrays, Strings, and Pointers**	**13**
	One-dimensional and multidimensional arrays String handling and character arrays Concepts and operations using pointers Pointer and array relationship Dynamic memory allocation (malloc, calloc, free)	
	Unit Outcomes: UO 1. Manipulate large datasets using arrays UO 2. Handle textual data using string functions UO 3. Understand and implement pointer-based memory management.	
IV	**Structures, File Handling, and Applications**	**10**
	Structures and unions File operations: reading, writing, updating files Binary vs text files Real-world problem-solving using C: case studies Debugging and code optimization techniques	
	Unit Outcomes: UO 1. Store and process structured data using C structs UO 2. Perform file operations for persistent data storage UO 3. Solve domain-specific problems with optimized C solutions	

Learning Resources:

1. The C Programming Language by Brian W. Kernighan & Dennis M. Ritchie
2. Programming in ANSI C by E. Balagurusamy
3. Computer Basics and C Programming by V. Rajaraman
4. Programming in C by Reema Thareja
5. Let Us C by Yashavant Kanetkar
6. C Programming: A Modern Approach by K. N. King

Shiv Chhatrapati Shikshan Sanstha's

Rajarshi Shahu Mahavidyalaya, Latur

(Autonomous)

Department of Computer Science

Course Type: Lab Course
Course Title: Lab Course –I (Based on DSC-I)
Course Code:
Credits: 01 **Max. Marks: 50** **Hours: 30**

Learning Objectives:

LO 1. To Understand and apply structured problem-solving techniques using algorithms and flowcharts
LO 2. To develop foundational programming skills in C language
LO 3. To implement control structures and modular programming concepts for efficient solutions
LO 4. To Manipulate data using arrays, strings, and pointers in a memory-efficient manner
LO 5. To handle structured data and file input/output operations in real-world applications
LO 6. To apply C programming skills to solve data-centric problems in various domains

Course Outcomes:

After completion of the course, students will be able to-

CO 1. Demonstrate understanding of basic programming principles and C syntax
CO 2. Design algorithms and flowcharts for data-driven problems
CO 3. Develop C programs using control structures and user-defined functions
CO 4. Apply arrays, strings, and pointers for effective data manipulation and memory management
CO 5. Construct structured programs using data files and structures for persistent data handling
CO 6. Analyze and optimize C programs to solve real-world domain-specific problems

Practical No.	Unit
1	Any three programs on printf & scanf statements & Program to calculate simple interest
2	Any three programs on datatypes in C Language & Program to convert temperature from Celsius to Fahrenheit
3	Any three programs on operators in C language.
4	Any three programs on for & while loop.
5	Any three programs using if, if-else, if else ladder
6	Program to find factorial of a number using recursion.
7	Program to calculate Fibonacci series using recursion.
8	Program to create a calculator using switch statement
9	Any two programs to demonstrate Array & Program to find largest and smallest element in an array
10	Program to reverse a string without using library functions
11	Program to demonstrate use of pointers for swapping two numbers
12	Program to store and display student information using structures
13	Program to read and write data to a file (text mode) and count number of lines

Shiv Chhatrapati Shikshan Sanstha's

Rajarshi Shahu Mahavidyalaya, Latur

(Autonomous)

Department of Computer Science

Course Type: DSC-II
Course Title: Matrices and Calculus
Course Code: _____
Credits: 03 **Max. Marks: 75** **Lectures: 45 Hrs.**

Learning Objectives:

LO 1. To apply matrix operations and calculus techniques to solve real-world data science problems.
LO 2. To use matrix algebra in data modeling, linear transformations, and machine learning.
LO 3. To apply differentiation and integration to analyze trends and optimize models.
LO 4. To use multivariable calculus for understanding multidimensional data behaviors.

Course Outcomes:

After completion of the course, students will be able to-

CO 1. Perform matrix operations and understand their application in data analytics.
CO 2. Apply linear algebra methods in data transformation and reduction techniques.
CO 3. Solve optimization problems using concepts of differential calculus.
CO 4. Use integral and multivariable calculus for data modeling and interpretation.

I	**Matrix Fundamentals for Data Modeling**	**10**
	Types of matrices and operations Determinants and inverse of a matrix Rank of a matrix and echelon forms System of linear equations: Gauss elimination, Gauss-Jordan Applications in data systems (e.g., image representation, recommendation systems)	
	Unit Outcomes: UO 1. Understand core matrix operations UO 2. Solve systems relevant to data applications.	
II	**Linear Algebra in Data Science**	**12**
	Vector spaces, linear independence, basis, and dimension Linear transformations and their matrix representations Eigenvalues and eigenvectors Diagonalization, spectral decomposition Principal Component Analysis (PCA) introduction	
	Unit Outcomes: UO 1. Implement linear transformations UO 2. Use eigen-decomposition in dimensionality reduction and PCA.	
III	**Differential Calculus for Optimization**	**13**
	Limits, continuity, and differentiability Rules of differentiation and higher-order derivatives Maxima and minima of functions Gradient and directional derivatives Cost functions and optimization in machine learning	

	Unit Outcomes: UO 1. Apply derivative concepts to find patterns UO 2. Perform optimizations in data modeling.	
IV	**Integral and Multivariable Calculus in Data Analysis**	**10**
	Indefinite and definite integrals, applications in data aggregation Improper integrals and probability density functions Multivariable functions: partial derivatives, chain rule Double and triple integrals for spatial data Optimization with constraints (Lagrange multipliers)	
	Unit Outcomes: UO 1. Use integral and multivariable calculus in modeling continuous data UO 2. Perform advanced analysis.	

Learning Resources:

1. Matrix Computations, Gene H. Golub & Charles F. Van Loan, Johns Hopkins University Press
2. Introduction to Linear Algebra, Gilbert Strang, Wellesley-Cambridge Press
3. Essential Math for Data Science, Thomas Nield, O'Reilly Media

Shiv Chhatrapati Shikshan Sanstha's

Rajarshi Shahu Mahavidyalaya, Latur

(Autonomous)

Department of Computer Science

Course Type: Lab Course
Course Title: Lab Course –II (Based DSC-II)
Course Code: _____
Credits: 01 **Max. Marks: 50** **Hours: 30**

Learning Objectives:

LO 1. To apply matrix operations and calculus techniques to solve real-world data science problems.
LO 2. To use matrix algebra in data modeling, linear transformations, and machine learning.
LO 3. To apply differentiation and integration to analyze trends and optimize models.
LO 4. To use multivariable calculus for understanding multidimensional data behaviors.

Course Outcomes:

After completion of the course, students will be able to-

CO 1. Perform matrix operations and understand their application in data analytics.
CO 2. Apply linear algebra methods in data transformation and reduction techniques.
CO 3. Solve optimization problems using concepts of differential calculus.
CO 4. Use integral and multivariable calculus for data modeling and interpretation.

Practical No.	Unit
1	Perform basic matrix operations (addition, multiplication, inversion), and visualize matrix behavior with heatmaps. (Tools: Python (NumPy, Matplotlib)
2	Implement Gauss Elimination and Gauss-Jordan methods to solve linear equations.(Tools: Python (NumPy/SymPy), MATLAB, Octave)
3	Develop a program to compute rank and row echelon form of a matrix and interpret solutions of linear systems. (Tools: Python (SymPy), MATLAB)
4	Compute and visualize eigenvectors and eigenvalues, interpret data transformation effects. (Tools: Python (Pandas, Scikit-learn, Matplotlib))
5	Perform Principal Component Analysis on a real dataset (e.g., Iris) and visualize variance captured. (Tools: Python (Pandas, Scikit-learn, Matplotlib))
6	Verify properties of vector spaces, orthogonal sets, and projection onto subspaces. (Tools: Python (NumPy, SymPy), MATLAB)
7	Create visualizations of functions and their derivatives to understand slopes and curvature. (Tools: Python (Matplotlib, SymPy), Desmos)
8	Use gradient-based optimization to find minima/maxima of cost functions in 1D and 2D. (Tools: Python (SciPy, Matplotlib), Jupyter Notebook)
9	Solve constrained optimization problems using Lagrange Multipliers method.(Tools: Python (SymPy), MATLAB)
10	Compute definite integrals numerically (trapezoidal, Simpson's rule) and visualize area under curves. (Tools: Python (NumPy, SciPy, Matplotlib))
11	Compute partial derivatives and visualize 3D surfaces and contour maps. (Tools: Python (Matplotlib 3D, Plotly), MATLAB)
12	Use integration for computing areas under probability density functions (PDFs) and cumulative distribution. (Tools: Python (SciPy.stats, Seaborn))

Shiv Chhatrapati Shikshan Sanstha's

Rajarshi Shahu Mahavidyalaya, Latur

(Autonomous)

Department of Computer Science

Course Type: GE-I
Course Title: Statistics for Data Science –I
Course Code: _____
Credits: 03 **Max. Marks: 75** **Lectures: 45 Hrs.**

Learning Objectives:

LO 1. To understand and apply descriptive and inferential statistical methods.
LO 2. To analyze and interpret data distributions and relationships.
LO 3. To use statistical tools to summarize, visualize, and model data.
LO 4. To apply probability theory to real-world data science problems.

Course Outcomes:

After completion of the course, students will be able to-

CO 1. Summarize and visualize data using descriptive statistics.
CO 2. Apply probability theory to model uncertainty in data.
CO 3. Perform statistical inference using estimation and hypothesis testing.
CO 4. Use statistical software to analyze and interpret real-world datasets.

Unit No.	Title of Unit & Contents	Hrs.
I	**Descriptive Statistics and Data Types**	**8**
	Types of data: qualitative vs quantitative, discrete vs continuous Scales of measurement: nominal, ordinal, interval, ratio Frequency distributions, histograms, bar charts, pie charts Measures of central tendency: mean, median, mode Measures of dispersion: range, variance, standard deviation, IQR Box plots and outlier detection	
	Unit Outcomes: UO 1. Classify data types and summarize datasets using appropriate descriptive statistics UO 2. Apply data visualizations.	
II	**Probability and Distributions**	**7**
	Basic probability concepts: sample space, events, conditional probability Bayes' theorem and applications Random variables: discrete and continuous Probability distributions: Binomial, Poisson, Normal Central Limit Theorem and Law of Large Numbers	
	Unit Outcomes: UO 1. Apply probability theory and distribution models UO 2. Quantify uncertainty in data.	
III	**Statistical Inference – Estimation and Hypothesis Testing**	**10**
	Sampling techniques and sampling distributions Point and interval estimation Confidence intervals for means and proportions Hypothesis testing: null and alternative hypotheses, Type I & II errors t-tests (one-sample, two-sample), z-tests, p-values	

	Unit Outcome: UO 1. Perform estimation and hypothesis testing UO 2. Draw conclusions from sample data.	
IV`	**Correlation, Regression, and Introduction to Statistical Software**	**20**
	Correlation: Pearson and Spearman coefficients Simple linear regression: model, assumptions, interpretation Residual analysis and goodness-of-fit Introduction to statistical tools: Excel, Python (Pandas, SciPy), R Real-world case studies in data science	
	Unit Outcomes: UO 1.Analyze relationships between variables. UO 2.Apply statistical tools to real datasets.	

Learning Resources:

1. Statistics for Business and Economics, Paul Newbold, William Carlson, Betty Thorne, Pearson
2. Practical Statistics for Data Scientists, Peter Bruce, Andrew Bruce, Peter Gedeck, O'Reilly Media
3. Introductory Statistics, Prem S. Mann, Wiley
4. Think Stats, Allen B. Downey, O'Reilly Media
5. Fundamentals of Statistics, S. C. Gupta, Himalaya Publishing House
6. Discovering Statistics Using R, Andy Field, Jeremy Miles, Zoë Field, SAGE Publications

Shiv Chhatrapati Shikshan Sanstha's

Rajarshi Shahu Mahavidyalaya, Latur

(Autonomous)

Department of Computer Science

Course Type: VSC-I
Course Title: Data Analysis using Spreadsheet
Course Code: _____
Credits: 02 **Max. Marks: 50** **Lectures: 30 Hrs.**

Learning Objectives:

LO 1. To understand spreadsheet fundamentals and apply them to data analysis tasks.
LO 2. To perform data cleaning, transformation, and visualization using spreadsheet tools.
LO 3. To use advanced spreadsheet functions for statistical, logical, and financial analysis.
LO 4. To apply scenario modeling, pivot tables, and dashboards for decision-making.

Course Outcomes:

After completion of the course, students will be able to-

CO 1. Demonstrate proficiency in spreadsheet operations for data handling.
CO 2. Apply statistical and logical functions to analyze datasets.
CO 3. Create visualizations and dashboards for data-driven insights.
CO 4. Use advanced spreadsheet tools for modeling, forecasting, and reporting.

Unit No.	Title of Unit & Contents	Hrs.
I	**Spreadsheet Basics and Data Handling**	**8**
	Spreadsheet interface, navigation, and formatting Data types and cell referencing (relative, absolute, mixed) Data entry, editing, and validation Sorting, filtering, and conditional formatting Working with multiple sheets and named ranges	
	Unit Outcomes: UO 1. Understand spreadsheet structure and perform basic data operations. UO 2. Apply formatting and referencing techniques for clean data organization.	
II	**Functions and Formulas for Data Analysis**	**7**
	Arithmetic and logical functions (IF, AND, OR, NOT) Text functions (LEFT, RIGHT, MID, CONCATENATE) Lookup functions (VLOOKUP, HLOOKUP, XLOOKUP, INDEX-MATCH) Date/time functions and error handling Named ranges and formula auditing	
	Unit Outcomes: UO 1. Use logical and lookup functions to extract and manipulate data. UO 2. Apply text and date functions for data transformation.	
III	**Data Visualization and Statistical Analysis**	**15**
	Charts: bar, column, pie, line, scatter, combo Pivot tables and pivot charts Descriptive statistics: mean, median, mode, variance, standard deviation Histogram, box plot, and trendlines Data cleaning and outlier detection	

	Unit Outcomes: UO 1. Create and interpret charts and pivot tables for data insights. UO 2. Perform basic statistical analysis using spreadsheet functions.	
IV	**Advanced Tools and Scenario Modeling**	**15**
	What-if analysis: Goal Seek, Scenario Manager, Data Tables Solver for optimization problems Data consolidation and grouping Dashboard creation with slicers and dynamic charts Importing data from external sources (CSV, web)	
	Unit Outcomes: UO 1. Use scenario modeling and solver for decision-making. UO 2. Build interactive dashboards for reporting and analysis.	

Learning Resources:

1. Data Analysis and Analytics Using Spreadsheet, MRCET Faculty, MRCET Publications
2. Excel 2019 Bible, Michael Alexander, Richard Kusleika, John Walkenbach, Wiley
3. Microsoft Excel Data Analysis and Business Modeling , Wayne Winston , Microsoft Press
4. Excel Dashboards and Reports, Michael Alexander, John Walkenbach, Wiley
5. Data Analysis Using Excel, Ash Narayan Sah, Excel Books India
6. Introduction to Data Analysis Using Excel, Sharad Borle (Coursera), Coursera (Online Resource)

Shiv Chhatrapati Shikshan Sanstha's

Rajarshi Shahu Mahavidyalaya, Latur

(Autonomous)

Department of Computer Science

Course Type: Lab Course
Course Title: Lab Course – (Based on VSC-I)
Course Code: _____
Credits: 01 **Max. Marks: 50** **Hours: 30**

Learning Objectives:

LO 1. To understand spreadsheet fundamentals and apply them to data analysis tasks.
LO 2. To perform data cleaning, transformation, and visualization using spreadsheet tools.
LO 3. To use advanced spreadsheet functions for statistical, logical, and financial analysis.
LO 4. To apply scenario modeling, pivot tables, and dashboards for decision-making.

Course Outcomes:

After completion of the course, students will be able to-

CO 1. Demonstrate proficiency in spreadsheet operations for data handling.
CO 2. Apply statistical and logical functions to analyze datasets.
CO 3. Create visualizations and dashboards for data-driven insights.
CO 4. Use advanced spreadsheet tools for modeling, forecasting, and reporting.

Practical No.	Unit
1	Explore interface, format cells, use styles (Tools: Excel, Google Sheets)
2	Use data types, drop-downs, restrict inputs (Tools: Excel (Data Validation))
3	Apply multi-level sorting and filters (Tools: Excel, Google Sheets)
4	Highlight trends, outliers, and duplicates (Tools: Excel (Rules Manager))
5	Use IF, AND, OR, NOT in real-world scenarios (Tools: Excel)
6	Apply VLOOKUP, HLOOKUP, INDEX-MATCH (Tools: Excel)
7	Clean and transform messy data (Tools: Excel)
8	Summarize and visualize large datasets (Tools: Excel)
9	Compute mean, SD, variance, histogram (Tools: Excel (Analysis ToolPak))
10	Use Goal Seek, Scenario Manager (Tools: Excel)
11	Solve linear programming problems (Tools: Excel (Solver Add-in))
12	Build interactive dashboards with slicers (Tools: Excel, Google Sheets)

Shiv Chhatrapati Shikshan Sanstha's

Rajarshi Shahu Mahavidyalaya, Latur

(Autonomous)

Department of Computer Science

Course Type: SEC-I
Course Title: Introduction to Databases-I
Course Code: _____
Credits: 02 **Max. Marks: 50** **Lectures: 30Hrs.**

Learning Objectives:

LO 1. To understand the fundamentals of database systems and their architecture.
LO 2. To design conceptual and relational models for real-world applications.
LO 3. To write and optimize SQL queries for data manipulation and retrieval.
LO 4. To apply normalization and indexing techniques for efficient data storage.

Course Outcomes:

After completion of the course, students will be able to-

CO 1. Explain the architecture and components of database systems.
CO 2. Design ER models and convert them into relational schemas.
CO 3. Write SQL queries for data definition, manipulation, and retrieval.
CO 4. Apply normalization and indexing for efficient database design.

Unit No.	Title of Unit & Contents	Hrs.
I	**Database Concepts and Architecture**	**10**
	Introduction to databases and DBMS File system vs DBMS Data models: hierarchical, network, relational Three-schema architecture DBMS components and users Data independence and data dictionary	
	Unit Outcome: UO 1. Understand the need for DBMS and its advantages over file systems. UO 2. Identify components and architecture of modern database systems.	
II	**Data Modeling and Relational Design**	**13**
	Entity-Relationship (ER) modeling Attributes, entity sets, relationships, cardinality Enhanced ER concepts: generalization, specialization, aggregation Mapping ER to relational schema Relational model: keys, constraints, schema	
	Unit Outcome: UO 1. Design ER diagrams for real-world scenarios. UO 2. Convert ER models into normalized relational schemas.	
III	**Structured Query Language (SQL)**	**12**
	SQL basics: DDL, DML, DCL, TCL Creating and altering tables Inserting, updating, deleting records Querying with SELECT, WHERE, ORDER BY, GROUP BY, HAVING Joins: inner, outer, self, cross Subqueries, views, aggregate functions	

Unit No.	Title of Unit & Contents	Hrs.
	Unit Outcomes: UO 1. Write SQL queries for data definition and manipulation. UO 2. Use joins and subqueries to retrieve complex data.	
IV	**Normalization and Indexing**	**10**
	Functional dependencies Normal forms: 1NF, 2NF, 3NF, BCNF Decomposition and dependency preservation Indexing: primary, secondary, clustered, B+ trees Introduction to query optimization	
	Unit Outcome: UO 1. Normalize relational schemas to reduce redundancy. UO 2. Apply indexing techniques to improve query performance.	

Learning Resources:

1. Database System Concepts , Abraham Silberschatz, Henry Korth, S. Sudarshan, McGraw-Hill
2. Fundamentals of Database Systems, Ramez Elmasri, Shamkant Navathe, Pearson Education
3. Database Management Systems, Raghu Ramakrishnan, Johannes Gehrke, McGraw-Hill
4. An Introduction to Database Systems, C.J. Date, Pearson Education
5. Database Systems: Design, Implementation, and Management, Peter Rob, Carlos Coronel, Cengage Learning.

Shiv Chhatrapati Shikshan Sanstha's

Rajarshi Shahu Mahavidyalaya, Latur

(Autonomous)

Department of Computer Science

Course Type: Lab Course
Course Title: Lab Course – (Based on SEC)
Course Code: _____
Credits: 01 **Max. Marks: 50** **Hours: 30**

Learning Objectives:

LO 1. To understand the fundamentals of database systems and their architecture.
LO 2. To design conceptual and relational models for real-world applications.
LO 3. To write and optimize SQL queries for data manipulation and retrieval.
LO 4. To apply normalization and indexing techniques for efficient data storage.

Course Outcomes:

After completion of the course, students will be able to-

CO 1. Explain the architecture and components of database systems.
CO 2. Design ER models and convert them into relational schemas.
CO 3. Write SQL queries for data definition, manipulation, and retrieval.
CO 4. Apply normalization and indexing for efficient database design.

Practical No.	Unit
1	Install ORACLE / MySQL / PostgreSQL and configure environment (Tools: MySQL, PostgreSQL)
2	Use DDL commands to create, alter, and drop tables (Tools: MySQL Workbench, pgAdmin)
3	Use DML commands to insert, update, and delete records (Tools: SQL CLI, GUI tools)
4	Write SELECT queries with filters and sorting (Tools: MySQL, SQLite)
5	Use COUNT, AVG, SUM, MIN, MAX with GROUP BY (Tools: MySQL, PostgreSQL)
6	Perform inner, outer joins and nested queries (Tools: MySQL, SQLite)
7	Create views and apply indexing for performance (Tools: MySQL, pgAdmin)
8	Design ER diagrams for a case study (e.g., Library DB) (Tools: Draw.io, Lucidchart)
9	Convert ER model to relational schema and implement (Tools: SQL)
10	Apply 1NF to BCNF on sample datasets (Tools: Manual + SQL)
11	Apply primary, foreign keys, NOT NULL, UNIQUE (Tools: MySQL)
12	Design and implement a small database system (Tools: MySQL/PostgreSQL + GUI)

Semester - II

Shiv Chhatrapati Shikshan Sanstha's

Rajarshi Shahu Mahavidyalaya, Latur

(Autonomous)

Department of Computer Science

Course Type: DSC III
Course Title: Python & Data Structure
Course Code: _____
Credits: 03 **Marks: 75** **Lectures: 45 Hrs.**

Learning Objectives:

LO 1. To understand Python syntax, semantics, and core programming constructs.
LO 2. To apply Python for data manipulation, visualization, and algorithmic problem-solving.
LO 3. To implement and analyze data structures for efficient data handling.
LO 4. To develop modular, reusable, and scalable Python programs for data science applications.

Course Outcomes:

After completion of the course, students will be able to-

CO 1. Write Python programs using control structures, functions, and modules.
CO 2. Implement and apply data structures like lists, stacks, queues, trees, and graphs.
CO 3. Use Python libraries for data manipulation and visualization.
CO 4. Solve real-world problems using Python and appropriate data structures.

Unit No.	Title of Unit & Contents	Hrs.
I	**Python Basics and Programming Constructs**	**12**
	Introduction to Python: installation, IDEs, syntax Variables, data types, type casting Operators and expressions Control structures: if-else, loops (for, while) Input/output operations Error handling and debugging	
	Unit Outcomes: UO 1. Write basic Python programs using variables, operators, and control structures. UO 2. Handle user input and exceptions effectively in Python scripts	
II	**Functions, Modules, and File Handling**	**10**
	Defining and calling functions Arguments, return values, recursion Lambda, map, filter, reduce Modules and packages File operations: read, write, append Working with CSV, JSON files	
	Unit Outcome: UO 1. Create modular programs using functions and built-in modules. UO 2. Perform file operations and handle structured data formats	
III	**Data Structures in Python**	**13**
	Lists, tuples, sets, dictionaries: operations and applications Stack and queue implementation using lists/deque Linked lists: singly, doubly	

Unit No.	Title of Unit & Contents	Hrs.
	Trees: binary tree, BST Graphs: adjacency list/matrix, BFS, DFS Searching and sorting algorithms	
	Unit Outcomes: UO 1. - Implement linear and non-linear data structures using Python. UO 2. Apply sorting/searching algorithms to structured data.	
IV	**Object-Oriented Programming and Data Science Libraries**	**10**
	Classes and objects, constructors Inheritance, polymorphism, encapsulation Exception handling in OOP Introduction to NumPy, Pandas, Matplotlib Data manipulation and visualization Case studies in data science using Python	
	Unit Outcomes: UO 1. Apply object-oriented principles to build reusable Python components. UO 2. Use Python libraries for data analysis and visualization.	

Learning Resources:

1. Python Programming: An Introduction to Computer Science, John Zelle, Franklin, Beedle & Associates
2. Think Python, Allen B. Downey, O'Reilly Media
3. Data Structures and Program Design Using Python, D. Malhotra, N. Malhotra, Mercury Learning and Information
4. Python for Data Analysis, Wes McKinney, O'Reilly Media
5. Problem Solving with Algorithms and Data Structures Using Python, Bradley N. Miller, David L. Ranum, Franklin Beedle & Associates
6. Fluent Python, Luciano Ramalho, O'Reilly Media

Shiv Chhatrapati Shikshan Sanstha's

Rajarshi Shahu Mahavidyalaya, Latur

(Autonomous)

Department of Computer Science

Course Type: Lab Course
Course Title: Lab Course –IV (Based on DSC-III)
Course Code:
Credits: 01 **Max. Marks: 50** **Hours: 30**

Learning Objectives:

LO 1. To understand Python syntax, semantics, and core programming constructs.
LO 2. To apply Python for data manipulation, visualization, and algorithmic problem-solving.
LO 3. To implement and analyze data structures for efficient data handling.
LO 4. To develop modular, reusable, and scalable Python programs for data science applications.

Course Outcomes:

After completion of the course, students will be able to-

CO 1. Write Python programs using control structures, functions, and modules.
CO 2. Implement and apply data structures like lists, stacks, queues, trees, and graphs.
CO 3. Use Python libraries for data manipulation and visualization.
CO 4. Solve real-world problems using Python and appropriate data structures.

Practical No.	Unit
1	Install Python, write basic programs (Tools: Python, VS Code, Jupyter)
2	Implement decision-making and loops (Tools: Python)
3	Create reusable functions and recursive logic (Tools: Python)
4	Read/write CSV and JSON files (Tools: Python, Pandas)
5	Manipulate and analyze data using collections (Python)
6	Build stack and queue using lists/deque (Tools: Python)
7	Implement singly and doubly linked lists (Tools: Python)
8	Create and traverse binary trees (Tools: Python)
9	Implement BFS and DFS (Python, NetworkX)
10	Apply bubble, merge, binary search (Tools: Python)
11	Build classes, inheritance, and encapsulation (Tools: Python)
12	Use Pandas and Matplotlib for EDA (Tools: Python, VS Code, Jupyter)

Shiv Chhatrapati Shikshan Sanstha's

Rajarshi Shahu Mahavidyalaya, Latur

(Autonomous)

Department of Computer Science

Course Type: DSC IV

Course Title: Linear Algebra

Course Code: _____

Credits: 03 **Marks: 75** **Lectures: 45 Hrs.**

Learning Objectives:

LO 1. To explore and analyze vector spaces, transformations, and abstract structures.
LO 2. To apply eigen decomposition and factorizations in data compression and modeling.
LO 3. To use linear algebra for dimensionality reduction, optimization, and machine learning.
LO 4. To implement algorithms using Python for experimentation and visualization.

Course Outcomes:

After completion of the course, students will be able to-

CO 1. Construct and interpret vector spaces and subspaces relevant to data models.
CO 2. Use eigenvalues, eigenvectors, and matrix decompositions in dimensionality reduction and system analysis.
CO 3. Apply linear transformations and factorization techniques for machine learning and optimization.
CO 4. Translate linear algebra concepts into code using Python and related libraries.

Unit No.	Title of Unit & Contents	Hrs.
I	**Vector Spaces and Subspaces**	**12**
	Formal definition of vector spaces and axioms Subspaces, linear dependence and independence Basis, dimension, and spanning sets Column space, null space, and rank Orthogonal vectors and projection	
	Unit Outcomes: UO 1. Determine bases and dimensions of subspaces in higher-dimensional data. UO 2. Apply projections for feature engineering and data transformations.	
II	**Linear Transformations and Matrix Representations**	**10**
	Concept of linear transformation Range and kernel of a transformation Matrix representation of linear mappings Change of basis and similarity transformation Applications in encoding and signal processing	

Unit No.	Title of Unit & Contents	Hrs.
	Unit Outcome: UO 1. Represent linear systems through transformation matrices. UO 2. Interpret change of basis and structure-preserving transformations	
III	**Eigenvalues, Eigenvectors, and Spectral Techniques**	**13**
	Characteristic polynomials Computation and geometric interpretation of eigenvalues/eigenvectors Diagonalization and Jordan forms Spectral decomposition Principal Component Analysis (PCA) using eigen concepts	
	Unit Outcomes: UO 1. Analyze systems and datasets using eigen decomposition. UO 2. Apply PCA for dimensionality reduction and feature selection.	
IV	**Matrix Factorizations and Applications in Data Science**	**10**
	QR decomposition and Gram-Schmidt process Singular Value Decomposition (SVD) Least squares methods and regression Positive definite matrices Data compression, latent semantics, recommendation systems	
	Unit Outcomes: UO 1. Solve optimization and regression problems using matrix factorizations. UO 2. Use SVD for data reconstruction and compression tasks.	

Learning Resources:

1. Introduction to Linear Algebra, Gilbert Strang, Wellesley-Cambridge Press
2. Linear Algebra Done Right, Sheldon Axler, Springer
3. Matrix Computations, Golub & Van Loan, Johns Hopkins University Press
4. Applied Linear Algebra, Peter J. Olver & Chehrzad Shakiban, Springer
5. Python Libraries for Linear Algebra, Online Documentation, NumPy, SciPy, Scikit-learn |

Shiv Chhatrapati Shikshan Sanstha's

Rajarshi Shahu Mahavidyalaya, Latur

(Autonomous)

Department of Computer Science

Course Type: Lab Course
Course Title: Lab Course –IV (Based on DSC-IV)
Course Code:
Credits: 01 **Max. Marks: 50** **Hours: 30**

Learning Objectives:

LO 1. To explore and analyze vector spaces, transformations, and abstract structures.
LO 2. To apply eigen decomposition and factorizations in data compression and modeling.
LO 3. To use linear algebra for dimensionality reduction, optimization, and machine learning.
LO 4. To implement algorithms using Python for experimentation and visualization.

Course Outcomes:

After completion of the course, students will be able to-

CO 1. Construct and interpret vector spaces and subspaces relevant to data models.
CO 2. Use eigenvalues, eigenvectors, and matrix decompositions in dimensionality reduction and system analysis.
CO 3. Apply linear transformations and factorization techniques for machine learning and optimization.
CO 4. Translate linear algebra concepts into code using Python and related libraries.

Practical No.	Unit
1	Validate basis of subspace and dimension calculations (Tools: Python (NumPy, SymPy))
2	Visualize column space and null space of matrices (Tools: Python (Matplotlib), GeoGebra
3	Project vectors onto subspaces and analyze residuals (Tools: Python)
4	Implement linear mappings on geometric shapes (Tools: Python (Plotly), matplotlib)
5	Compute and interpret eigenpairs (Tools: Python)
6	Perform PCA and plot explained variance (Tools: Python (Scikit-learn, Seaborn))
7	Verify diagonalizability and similarity transforms (Tools: Python)
8	Implement orthogonalization and QR decomposition (Tools: Python (NumPy))
9	Apply SVD on image data for compression (Tools: Python (OpenCV, NumPy))
10	Fit regression line using pseudo-inverse (Tools: Python (SciPy))|
11	Simulate transformation under different bases (Tools: Python)
12	Check matrix properties for ML kernels (Tools: Python (NumPy, SciPy))

Shiv Chhatrapati Shikshan Sanstha's

Rajarshi Shahu Mahavidyalaya, Latur

(Autonomous)

Department of Computer Science

Course Type: VSC-II
Course Title: Python for Data Science
Course Code: _____
Credits: 02 **Max. Marks: 50** **Lectures: 30 Hrs.**

Learning Objectives:

LO 1. To understand the basics and tools of Python in the context of data analysis.
LO 2. To apply Python libraries to explore, manipulate and visualize data.
LO 3. To perform statistical analysis and machine learning tasks using Python.
LO 4. To solve real-world data problems with structured workflows.

Course Outcomes:

After completion of the course, students will be able to-

CO 1. Master Python programming techniques suited for data science applications.
CO 2. Use essential Python libraries like NumPy, Pandas, Matplotlib, Scikit-learn.
CO 3. Analyze and visualize data sets effectively.
CO 4. Apply machine learning models to datasets and evaluate performance.

Unit No.	Title of Unit & Contents	Hrs.
I	**Python Basics & Data Science Foundations**	**8**
	Python programming recap: syntax, data types, functions, loops, conditionals Data Structures in Python: Lists, Tuples, Dictionaries, Sets Introduction to Jupyter Notebook & Google Colab NumPy basics: arrays, broadcasting, indexing, operations Pandas' introduction: Series, DataFrames, data wrangling Data Input/Output using Pandas	
	Unit Outcomes: UO 1. Demonstrate proficiency in Python syntax and core data structures. UO 2. Use NumPy and Pandas for basic data analysis and manipulation.	
II	**Exploratory Data Analysis & Visualization**	**7**
	Descriptive Statistics using Pandas Data Cleaning: missing values, duplicates, outliers Data transformation & feature engineering Data visualization with Matplotlib, Seaborn Introduction to Plotly for interactive plots Working with time series and categorical data	
	Unit Outcomes: UO 1. Perform exploratory data analysis using Python libraries. UO 2. Create effective visualizations to communicate insights.	

III	**Statistics & Machine Learning with Python**	**10**
	Introduction to probability and statistical distributions Hypothesis testing using SciPy Introduction to machine learning concepts Supervised Learning: Regression, Classification Model evaluation: accuracy, confusion matrix, ROC curves Unsupervised Learning: K-Means, Hierarchical Clustering	
	Unit Outcome: UO 1. Apply statistical methods for data analysis using SciPy. UO 2. Build machine learning models and evaluate their performance.	
IV`	**Capstone Workflows & Real-World Applications**	**20**
	Full data science workflow using a real dataset Data preprocessing pipeline automation Feature selection & dimensionality reduction Model tuning and hyperparameter optimization Working with pipelines using Scikit-learn Introduction to Flask/Streamlit for creating simple data apps	
	Unit Outcomes: UO 1. Design and execute a complete data science pipeline. UO 2. Build and deploy a basic data science application.	

Learning Resources:

1. Python for Data Analysis, Wes McKinney, O'Reilly Media
2. Data Science from Scratch: First Principles with Python, Joel Grus, O'Reilly Media
3. Introduction to Machine Learning with Python, Andreas C. Müller, Sarah Guido, O'Reilly Media
4. Think Stats: Exploratory Data Analysis in Python, Allen B. Downey, O'Reilly Media
5. Practical Statistics for Data Scientists, Peter Bruce, Andrew Bruce, O'Reilly Media

Shiv Chhatrapati Shikshan Sanstha's

Rajarshi Shahu Mahavidyalaya, Latur

(Autonomous)

Department of Computer Science

Course Type: Lab Course
Course Title: Lab Course – (Based on VSC-II)
Course Code: _____
Credits: 01 **Max. Marks: 50** **Hours: 30**

Learning Objectives:

LO 1. To understand the basics and tools of Python in the context of data analysis.
LO 2. To apply Python libraries to explore, manipulate and visualize data.
LO 3. To perform statistical analysis and machine learning tasks using Python.
LO 4. To solve real-world data problems with structured workflows.

Course Outcomes:

After completion of the course, students will be able to-

CO 1. Master Python programming techniques suited for data science applications.
CO 2. Use essential Python libraries like NumPy, Pandas, Matplotlib, Scikit-learn.
CO 3. Analyze and visualize data sets effectively.
CO 4. Apply machine learning models to datasets and evaluate performance.

Practical No.	Unit
1	Python Fundamentals: Variables and Data Types
2	Array Operations with NumPy
3	Series and DataFrames with Pandas
4	Exploratory Data Analysis on Sample Dataset
5	Handling Missing Data
6	Visualizing Distributions and Relationships
7	Time Series Analysis Basics
8	Hypothesis Testing using SciPy
9	Simple Linear Regression
10	Classification with Decision Trees
11	Clustering on Unlabeled Data
12	1Build a Mini Data App with Streamlit

Shiv Chhatrapati Shikshan Sanstha's

Rajarshi Shahu Mahavidyalaya, Latur

(Autonomous)

Department of Computer Science

Course Type: SEC-II
Course Title: SEC-II
Course Code: _____
Credits: 02 **Max. Marks: 50** **Lectures: 30Hrs.**

Learning Objectives:

LO 1. To understand the structure and semantics of web documents using HTML
LO 2. To design visually appealing and responsive web pages using CSS
LO 3. To implement best practices in layout, styling, and accessibility
LO 4. To build static dashboards and data presentation interfaces using HTML/CSS

Course Outcomes:

After completion of the course, students will be able to-

CO 1. Develop standards-compliant web pages using HTML5
CO 2. Style and layout websites using advanced CSS techniques
CO 3. Create responsive and accessible web interfaces
CO 4. Apply web design concepts to data science projects

Unit No.	Title of Unit & Contents	Hrs.
I	**Fundamentals of Web Programming**	**08**
	Introduction to web technologies & browsers Structure of a website: files, paths, and hosting basics HTML5 syntax and tags: headings, paragraphs, lists, links, images Attributes and semantic HTML Forms and input types Introduction to basic CSS: selectors, properties, inline vs internal vs external	
	Unit Outcome: UO 1. Create well-structured HTML documents using semantic tags UO 2. Apply basic styling to web pages using CSS	
II	**Intermediate Styling and Layout**	**07**
	Box model: margin, border, padding, content Typography and color schemes CSS Units: px, %, em, rem, viewport Display properties: block, inline, inline-block, none Positioning and float Flexbox for responsive layouts Introduction to Media Queries	
	Unit Outcome: UO 1. Design responsive layouts using Flexbox UO 2. Utilize CSS properties for effective design across devices.	
III	**Advanced CSS Techniques & Accessibility**	**07**
	CSS Grid Layouts	

Unit No.	Title of Unit & Contents	Hrs.
	Advanced Selectors and Pseudo-classes Transitions, Animations, and Transformations Responsive design patterns and best practices Introduction to Web Accessibility (WCAG guidelines) Designing accessible forms and elements	
	Unit Outcomes: UO 1. Implement advanced visual effects using transitions and animations UO 2. Create accessible web pages following standards.	
IV	**Integrating Web Design with Data Science**	**08**
	Embedding visualizations (charts/plots) using HTML/CSS containers Basic integration with JavaScript for interactivity (only minimal exposure) Creating static dashboards with HTML/CSS CSS frameworks: Bootstrap introduction Styling JSON and tabular data using CSS Portfolio creation showcasing data science projects	
	Unit Outcome: UO 1. Build static data dashboards using HTML and CSS UO 2. Integrate basic interactivity into web pages for data presentation.	

Learning Resources:

1. HTML & CSS: Design and Build Websites, Jon Duckett, Wiley
2. Learning Web Design, Jennifer Niederst, O'Reilly Media
3. Web Design with HTML, CSS, JavaScript & jQuery, Jon Duckett, Wiley
4. Responsive Web Design with HTML5 and CSS, Ben Frain, Packt Publishing
5. Head First HTML and CSS, Elisabeth Robson, Eric Freeman, O'Reilly Media

Shiv Chhatrapati Shikshan Sanstha's

Rajarshi Shahu Mahavidyalaya, Latur

(Autonomous)

Department of Computer Science

Course Type: Lab Course
Course Title: Lab Course – (Based on SEC-II)
Course Code: _____
Credits: 01 **Max. Marks: 50** **Hours: 30**

Learning Objectives:

LO 1. To understand the structure and semantics of web documents using HTML
LO 2. To design visually appealing and responsive web pages using CSS
LO 3. To implement best practices in layout, styling, and accessibility
LO 4. To build static dashboards and data presentation interfaces using HTML/CSS

Course Outcomes:

After completion of the course, students will be able to-

CO 1. Develop standards-compliant web pages using HTML5
CO 2. Style and layout websites using advanced CSS techniques
CO 3. Create responsive and accessible web interfaces
CO 4. Apply web design concepts to data science projects

Practical No.	Unit
1	Create a personal homepage using HTML (Tools: HTML, Text Editor, Browser)
2	Design a resume layout using HTML5 & CSS (Tools: HTML/CSS, VS Code)
3	Create styled navigation bar (Tools: HTML, CSS)
4	Responsive product card using Flexbox (Tools: HTML, CSS)
5	Multi-column layout with CSS Grid (Tools: CSS Grid, Browser)
6	Image gallery with hover effects (Tools: HTML, CSS)
7	Style a table to represent tabular data (Tools: HTML Table, CSS Styling)
8	Responsive design using Media Queries (Tools: HTML, CSS)
9	Form creation with validation styles (Tools: HTML, CSS)
10	Accessible webpage with ARIA labels (Tools: HTML5 , ARIA)
11	Static dashboard layout for a dataset (Tools: HTML, CSS, Matplotlib Image Embed)
12	Portfolio site to showcase projects HTML/CSS, Bootstrap

Shiv Chhatrapati Shikshan Sanstha's

Rajarshi Shahu Mahavidyalaya, Latur

(Autonomous)

UG First Year

Basket I: Generic/Open Elective (GE/OE)

(GEs offered to the Humanities and Social Sciences students in Sem.-I& II)

Sr. No.	BoS Proposing GE/OE	Code	Course Title	Credits	Hrs.
1	Biotechnology	101BIO1401	Nutrition, Health and Hygiene	04	60
2	Chemistry	101CHE1401	Medicines for Daily Life	04	60
3	Commerce	101MAE1401	Fundamentals of Statistics	04	60
4	Commerce	101BAI1401	Personal Financial Management	04	60
5	Information Technology	101COM1401	MS-Office	04	60
6	Microbiology	101MIB1401	Microbiology in Everyday life	04	60
7	Music	101MUS1401	Indian Vocal Classical& Light Music	04	60
8	NCC Studies	101NCC1401	Introduction to NCC	04	60
9	Physics	101PHY1401	Energy Sources	04	60
10	Sports	101SPO1401	Counselling and Psychotherapy	04	60

Note: Student can choose any one GE from the basket.

Shiv Chhatrapati Shikshan Sanstha's

Rajarshi Shahu Mahavidyalaya, Latur

(Autonomous)

UG First Year

Basket II: Skill Enhancement Courses (SEC)

(SEC offered to the Humanities and Social Sciences students in Sem.-I& II)

Sr. No.	BoS Proposing SEC	Code	Course Title	Credits	Hrs.
1	Biotechnology	101BIO1601	Food Processing Technology	02	30-45
2	Commerce	101AAF1601	Financial Literacy	02	30
3	English	101ENG1601	Proof Reading and Editing	02	30
4	English	101ENG1602	Communication Skills	02	30
5	Geography	101GEO1601	Tourism & Travel Management	02	30-45
6	Information Technology	101COA1601	PC Assemble and Installation	02	30-45
7	Marathi	101MAR1601	कथा/पटकथालेखन	02	30
8	NCC Studies	101NCC1601	Leadership and Personality Development	02	30
9	Zoology	101ZOO1601	Bee Keeping	02	30-45

Note: Student can choose any one SEC from the basket.

Shiv Chhatrapati Shikshan Sanstha's

Rajarshi Shahu Mahavidyalaya, Latur

(Autonomous)

UG First Year

Basket III: Ability Enhancement Courses (AEC)

(AEC offered to the Humanities and Social Sciences students in Sem I)

Sr. No.	BoS Proposing AEC	Code	Course Title	Credits	Hrs.
1	Marathi	101MAR1701	भाषिककौशल्यभाग – १	02	30
2	Hindi	101HIN1701	हिंदीभाषाशिक्षणभाग – १	02	30
3	Sanskrit	101SAN1701	व्यावहारीकव्याकरणवनितिसुभाषिते	02	30
4	Pali	101PAL1701	उपयोजितव्याकरण	02	30
5	*English	101ENG1701	English for Professionals I	02	30

Note: Student can choose any one AEC from the basket.

(AEC offered to the Humanities and Social Sciences students in Sem II)

Sr. No.	BoS Proposing AEC	Code	Course Title	Credits	Hrs.
1	Marathi	101MAR1701	भाषिककौशल्यभाग – 2	02	30
2	Hindi	101HIN1701	हिंदीभाषाशिक्षणभाग – 2	02	30
3	Sanskrit	101SAN1701	व्यावहारीकव्याकरणवनितिसुभाषिते	02	30
4	Pali	101PAL1701	उपयोजितव्याकरण	02	30
5	*English	101ENG1701	English for Professionals II	02	30

Note: Student can choose any one AEC from the basket.

***Only for IT & BT Program Courses**

Shiv Chhatrapati Shikshan Sanstha's

Rajarshi Shahu Mahavidyalaya, Latur

(Autonomous)

UG First Year

Extra Credit Activities

Sr. No.	Course Title	Credits	Hours T/P
1	MOOCs	Min. of 02 credits	Min. of 30 Hrs.
2	Certificate Courses	Min. of 02 credits	Min. of 30 Hrs.
3	IIT Spoken Tutorial Courses	Min. of 02 credits	Min. of 30 Hrs.

Guidelines:

Extra -academic activities

1. All extra credits claimed under this heading will require sufficient academic input/ contribution from the students concerned.
2. Maximum 04 extra credits in each academic year will be allotted.
3. These extra academic activity credits will not be considered for calculation of SGPA/CGPA but will be indicated on the grade card.

Additional Credits for Online Courses:

1. Courses only from SWAYAM and NPTEL platform are eligible for claiming credits.
2. Students should get the consent from the concerned subject Teacher/Mentor/Vice Principal and Principal prior to starting of the course.
3. Students who complete such online courses for additional credits will be examined/verified by the concerned mentor/internal faculty member before awarding credits.
4. Credit allotted to the course by SWAYAM and NPTEL platform will be considered as it is.

Additional Credits for Other Academic Activities:

1. One credit for presentation and publication of paper in International/National/State level seminars/workshops.
2. One credit for measurable research work undertaken and field trips amounting to 30 hours of recorded work.
3. One credit for creating models in sponsored exhibitions/other exhibits, which are approved by the concerned department.
4. One credit for any voluntary social service/Nation building exercise which is in collaboration with the outreach center, equivalent to 30 hours
5. All these credits must be approved by the College Committee.

Additional Credits for Certificate Courses:

1. Students can get additional credits (number of credits will depend on the course duration) from certificate courses offered by the college.
2. The student must successfully complete the course. These credits must be approved by the Course Coordinators.

3. Students who undertake summer projects/ internships/ training in institutions of repute through a national selection process, will get 2 credits for each such activity. This must be done under the supervision of the concerned faculty/mentor.

Note:

1. The respective documents should be submitted within 10 days after completion of Semester End Examination.
2. No credits can be granted for organizing or for serving as office bearers/ volunteers for Inter-Class / Associations / Sports / Social Service activities.
3. The office bearers and volunteers may be given a letter of appreciation by the respective staff coordinators. Besides, no credits can be claimed for any services/activities conducted or attended within the college.
4. All claims for the credits by the students should be made and approved by the mentor in the same academic year of completing the activity.
5. Any grievances of denial/rejection of credits should be addressed to Additional Credits Coordinator in the same academic year.
6. Students having a shortage of additional credits at the end of the third year can meet the Additional Credits Coordinator, who will provide the right advice on the activities that can help them earn credits required for graduation.

Shiv Chhatrapati Shikshan Sanstha's

Rajarshi Shahu Mahavidyalaya, Latur

(Autonomous)

Examination Framework

Theory:

40% Continuous Assessment Tests (CATs) and 60% Semester End Examination (SEE)

Practical:

50% Continuous Assessment Tests (CATs) and 50% Semester End Examination (SEE)

Course	Marks	CAT & Mid Term Theory				CAT Practical		Best Scored CAT & Mid Term	SEE	Total
1	2	3				4		5	6	5 + 6
		Att.	CAT I	Mid Term	CAT II	Att.	CAT			
DSC/DSE/ GE/OE/Minor	100	10	10	20	10	-	-	40	60	100
DSC	75	05	10	15	10	-	-	30	45	75
Lab Course/AIPC/ OJT/FP	50	-	-	-	-	05	20	-	25	50
VSC/SEC/ AEC/VEC/CC	50	05	05	10	05	-	-	20	30	50

Note:

1. All Internal Exams are compulsory
2. Out of 02 CATs, best score will be considered
3. Mid Term Exam will be conducted by the Exam Section
4. Mid Term Exam is of Objective nature (MCQ)
5. Semester End Exam is of descriptive in nature (Long & Short Answer)
6. CAT Practical (20 Marks): Lab Journal (Record Book) 10 Marks, Overall Performance 10 Marks.