As Per NEP 2020

Parle Tilak Vidyalaya Association's
M. L. DAHANUKAR COLLEGE OF COMMERCE (AUTONOMOUS)
Vile Parle East, Mumbai
Affiliated to University of Mumbai
Accredited 'B+' Grade by NAAC

Syllabus for Major / VSC / SEC / VEC / Basket of OE / Minor / AEC	
Board of Studies in Information Technology and Data Science	
UG First Year Programme	
Semester	**I**
Title of Paper	**Credits**
Python Programming Fundamentals	**02**
From the Academic Year	**2024-25**

Sr. No.	Heading	Particulars
1	**Description of the course:** **Including but not limited to:**	This Python course covers fundamental programming concepts and data manipulation techniques essential for beginners. From basic syntax and control flow to advanced topics like regular expressions and object-oriented programming, it provides a comprehensive foundation. Learners will learn to work with data structures like lists, tuples, and dictionaries, alongside understanding the principles of modular programming and exception handling. By the end, they'll be equipped with the skills needed to write efficient Python programs and solve real-world problems effectively.
2	**Vertical:**	Major
3	**Type:**	Theory
4	**Credit**:	2 credits (1 credit = 15 Hours of Theory Work in a Semester)
5	**Hours Allotted:**	30 Hours
6	**Marks Allotted**:	50 Marks
7	**Course Objectives**: 1. To understand the foundational principles of programming using Python. 2. To use different Python data structures in Python effectively. 3. To identify and debug errors in Python.	
8	**Course Outcomes**: **CO1:** Learners will demonstrate proficiency in applying foundational programming concepts in Python. **CO2:** Learners will be able to implement and manipulate data using Python data structures. **CO3:** Learners will be able to diagnose and resolve different types of errors in Python.	
9	**Module I:** **Unit I: Foundation of Python** **Introduction**: Overview of Python, Installing Python, Executing Python program in different modes, Basic Python Syntax, Input and Output Statements, Variables, Data Types. **Conditional Statements**: if, if–else, nested if–else. **Looping**: for, while, nested loops. **Control statements**: Terminating loops, skipping specific conditions. **Strings**: String Traversal, String Slices, String Methods, String Operators. **Modules**: Importing Module, Creating and Exploring Modules.	

	Module II:
	Unit II: Data Manipulation
	Lists: Traversing List, Adding, Modifying and Removing List Elements, List Operations, List Methods.
	Tuples: Accessing values in Tuples, Tuple Assignment, Tuples as return values, Variable-length argument tuples, Tuple Operations, Tuple Methods.
	Dictionaries: Creating a Dictionary, Accessing Values in a Dictionary, Adding, Modifying and Removing Dictionary Elements, Properties of Dictionary Keys, Operations in Dictionary, Dictionary Methods.
	Regular Expressions: Concept of Regular Expression, Types of Regular Expressions, Using match() Function.
	Classes and Objects: Overview of OOP (Object Oriented Programming), Class Definition, Creating Objects, Instances as Arguments, Instances as return values, Built-in Class Attributes, Inheritance, Method Overriding, Data Encapsulation, Data Hiding.
	Exceptions: Built-in Exceptions, Handling Exceptions, Exception with Arguments, User-defined Exceptions.
10	**Teacher's Material:** Study material prepared by the faculty members of P.T.V.A.'s M.L. Dahanukar College of Commerce (Autonomous), Vile Parle (E), Mumbai.
11	**Reference Books:**

Sr. No.	Title	Author/s	Publisher	Edition	Year
1.	Programming through Python	M T. Savaliya, R K. Maurya, G.M. Magar	Staredu Solutions	First	2018
2.	Python Data Science Handbook	Jake Vander Plas	O'Reilly Media	First	2016
3.	Let Us Python	Y.Kanetkar	BPB	First	2019
4.	Programming in Python 3	Mark Summerfield	Pearson Education	Fifth	2013
5.	Learning Python	Mark Lutz, David Ascher	O'Reilly Media	Fifth	2013

12	**Internal Continuous Assessment:** 40%	**External Semester End Examination:** 60%

	Individual Passing in Internal and External Examination	

13	**Continuous Evaluation through:**	
	1.Project Presentation / Case Study / Assignment / Viva / Active Participation	10 Marks
	2. Class Test	10 Marks
	Total	20 Marks
14	**Format of Question Paper:** For the semester end examination	
	Q1. Attempt any 3 (out of 5) (Based on Unit I)	15 Marks
	Q2. Attempt any 3 (out of 5) (Based on Unit II)	15 Marks
	Total	30 Marks

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Syllabus for Major / VSC / SEC / VEC / Basket of OE / Minor / AEC	
Board of Studies in Information Technology and Data Science	
UG First Year Programme	
Semester	**I**
Title of Paper	**Credits**
Database Design and Management – I	02
From the Academic Year	2024-25

Sr. No.	Heading	Particulars
1	**Description of the course:** **Including but not limited to:**	This course provides a comprehensive introduction to Database Management Systems (DBMS) and SQL essentials. It covers the fundamentals of databases, including their purpose, importance, and advantages, as well as the characteristics of DBMS and RDBMS. Learners will learn about data modeling, normalization techniques, and various SQL operations such as querying, data manipulation, and transaction management. By the end of the course, learners will gain an understanding of database concepts and be proficient in using SQL for data management tasks.
2	**Vertical:**	Major
3	**Type:**	Theory
4	**Credit**:	2 credits (1 credit = 15 Hours of Theory Work in a Semester)
5	**Hours Allotted:**	30 Hours
6	**Marks Allotted**:	50 Marks
7	**Course Objectives**: 1. To gain a comprehensive understanding of fundamental concepts in Database Management Systems (DBMS). 2. To develop proficiency in using Relational Database Management Systems (RDBMS) to store, retrieve and manipulate data efficiently.	
8	**Course Outcomes**: **CO1:** Learners will be equipped with the knowledge and skills to design, manage, and optimize database systems effectively. **CO2:** Learners will be able to demonstrate the ability to design and implement Relational Database Management Systems (RDBMS), ensuring efficient data management in real-world scenarios.	
9	**Module I:** **Unit I: Fundamentals of Database Management Systems** What is Database? Purpose and importance of databases, Advantages of using DBMS, characteristics of DBMS, what is RDBMS? DBMS Vs RDBMS, DBMS Vs File System, Three-layer architecture, Data independence, Basic building block of data model, Relational Model, ER model, mapping constraints, Types of keys, DBMS Generalization, Specialization, Aggregation, Functional Dependency, Normalization (1NF, 2NF, 3NF, BCNF)	
	Module II: **Unit II: Mastering SQL Essentials** Overview of SQL, Data Definition Language (DDL), Data Manipulation Language (DML), Data Control Language (DCL), Transaction Control Language (TCL), Operators (Arithmetic, Logical, comparison, Between), SQL Aliases, Pattern Matching, Aggregate functions, Clauses (order by, group by, having), Null values, Joins, Views, Subquery, Transaction, transaction property, States of transaction.	

10	Teacher's Material:

Study material prepared by the faculty members of P.T.V.A.'s M.L. Dahanukar College of Commerce (Autonomous), Vile Parle (E), Mumbai.

11 Reference Books:

Sr. No.	Title	Author/s	Publisher	Edition	Year
1.	Database System Concepts	Abraham Silberschatz, Henry Korth, and S. Sudarshan	McGraw-Hill Education	Seventh Edition	2019
2.	Fundamentals of Database Systems	Elmasri Ramez, Navathe Shamkant.	Pearson	Seventh Edition	2015
3.	Database Management Systems	Raghu Ramakrishnan, Johannes Gehrke,	McGraw Hill	Third Edition	2003
4.	Database Management Systems: Concepts, Design and Practice	Rajesh Narang	PHI Learning Pvt. Ltd.	First Edition	2012
5.	Database System Concepts	S. K. Singh, Shabana Mansoor	Pearson	First Edition	2017

12	**Internal Continuous Assessment:** 40%	**External Semester End Examination:** 60%
	Individual Passing in Internal and External Examination	

13	**Continuous Evaluation through:**	
	1.Project Presentation / Case Study / Assignment / Viva / Active Participation	10 Marks
	2. Class Test	10 Marks
	Total	20 Marks

14	**Format of Question Paper:** For the semester end examination	
	Q1. Attempt any 3 (out of 5) (Based on Unit I)	15 Marks
	Q2. Attempt any 3 (out of 5) (Based on Unit II)	15 Marks
	Total	30 Marks

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Board of Studies in Information Technology and Data Science	
UG First Year Programme	
Semester	I
Title of Paper	Credits
Major Practical I	02
From the Academic Year	2024-25

Sr. No.	Heading	Particulars
1	**Description of the course:** **Including but not limited to:**	Hands-on practical sessions based on Fundamentals of Programming and Data Organization will enable learners to apply theoretical knowledge to real-world scenarios, fostering a deeper understanding of programming and data organization principles.
2	**Vertical:**	Major
3	**Type:**	Practical
4	**Credit**:	2 credits (1 credit = 30 Hours of Practical Work in a Semester)
5	**Hours Allotted:**	60 Hours
6	**Marks Allotted**:	50 Marks
7	**Course Objectives**: 1. To gain an understanding of fundamental Python syntax, data types, and control flow structures. 2. To learn about essential data structures in Python, including lists, tuples, dictionaries, and sets, and understand how to manipulate them. 3. To introduce the concept of functions and modular programming in Python for code organization and reusability. 4. To familiarize learners with the principles of object-oriented programming (OOP) in Python, including classes, objects, inheritance, and polymorphism. 5. To enable learners to understand the concept of exception handling in Python and equip them with the skills to handle errors effectively in their code. 6. To learn manage databases using SQL by creating, viewing, and deleting databases and tables, and renaming tables. 7. To learn fundamental SQL statements for manipulating data in a database management system with commit and Rollback. 8. To understand and apply various constraints and data manipulation techniques in SQL for effective data management and retrieval. 9. To comprehend and apply aggregate and mathematical functions in SQL for data analysis and manipulation. 10. To create and handle views, understand different types of joins, and effectively use subqueries for data manipulation in SQL.	
8	**Course Outcomes**: **CO1:** Learners will be able to write Python programs to perform basic operations, such as arithmetic calculations, conditional statements, loops, and function definitions. **CO2:** Learners will be proficient in creating, accessing, modifying, and iterating over different data structures to solve programming problems effectively. **CO3:** Learners will be able to define functions to encapsulate reusable code blocks, organize them into modules, and import them into other Python scripts, promoting code modularity and maintainability. **CO4:** Learners will understand the concepts of OOP and be able to create and manipulate classes and objects, apply inheritance and polymorphism.	

CO5: Learners will be able to implement robust error handling mechanisms in their Python programs using try-except blocks, raise custom exceptions, and utilize the finally block for cleanup operations.

CO6: Learners will be able to effectively manage databases using SQL, including creating, viewing, and deleting databases and tables, and renaming tables as required.

CO7: Learners will be proficient in using SQL statements such as INSERT, UPDATE, SELECT, and DELETE to manipulate data within a database through COMMIT and ROLLBACK.

CO8: Learners will effectively utilize SQL aggregate and mathematical functions to analyse data and perform precise calculations within a database environment.

CO9: Learners will be able to design and implement database tables with appropriate constraints. Also demonstrate proficiency in retrieval and data manipulation.

CO10: Learners will develop proficiency in creating, managing, and utilizing views, joins, and subqueries to efficiently retrieve and manipulate data in SQL databases.

9	**Module I:**
	Unit I: Python Programming

List of Practical:	
1.	**Introduction to Python**
a.	Write a Python program to explore various data types.
b.	Write a Python program to perform input and output operations.
c.	Write a Python program to demonstrate conditional statements.
d.	Write a Python program to demonstrate looping.
2.	**Functions and Modules**
a.	Write a Python program to define and use functions.
b.	Write a Python program to demonstrate recursive functions.
c.	Write a Python program to demonstrate Boolean and lambda functions.
d.	Write a Python program to demonstrate user-defined modules.
3.	**Data Structures**
a.	Write a Python program to create list and apply various functions to it.
b.	Write a Python program to create tuple and apply various functions to it.
c.	Write a Python program to create dictionary and apply various functions to it.
d.	Write a Python Program to implement various methods for searching and replacing operations.
4.	**Classes and Objects**
a.	Write a Python program to design a class to store the information of student and display the same.
b.	Write a Python program to implement the concept of inheritance.
c.	Write a Python program to implement the concept of method overriding.
d.	Write a Python program to implement the concept of data hiding.
5.	**Exceptions**
a.	Write a Python program to implement exception handling.
b.	Write a Python program to implement nested exception handling.
c.	Write a Python program to demonstrate exceptions with arguments.
d.	Write a Python program to demonstrate user-defined exceptions.

	Module II:				
	Unit II: Database Design and Management I				
	List of Practical:				
	1.	**Basic SQL Queries**			
	a.	Creating and viewing all databases			
	b.	Viewing all Tables in a database			
	c.	Using DROP Statement.			
	d.	Using TRUNCATE Statement.			
	2.	**Mastering SQL Operations**			
	a.	Using INSERT Statement			
	b.	Using UPDATE Statement			
	c.	Using SELECT Statement			
	d.	Saving and Undoing (COMMIT and ROLLBACK)			
	e.	Using DELETE Statement			
	3.	**Constraints, Restricting and Sorting data**			
	a.	Creating Table with Constraints: PRIMARY KEY, FOREIGN KEY, NOT NULL, UNIQUE, DEFAULT.			
	b.	Using WHERE, DISTINCT, IN, AS, LIKE, ISNULL			
	c.	Using Group By, Having Clause, Order By			
	d.	Conceptual Designing using ER Diagrams (Identifying entities, attributes, keys and relationships between entities, cardinalities etc)			
	4.	**Aggregate and Mathematical Functions**			
	a.	AVG(), MIN(), MAX(), SUM(), COUNT()			
	b.	ABS, SQRT, ROUND, TRUNCATE, SIGN, POWER, MOD, CEIL, FLOOR.			
	5.	**Views, Joins and Subquery**			
	a.	Creating view, dropping view.			
	b.	Illustrating types of views.			
	c.	Selecting from a view.			
	d.	Illustrating types of joins.			
	e.	Subquery with IN clause and EXISTS clause.			

10	**Teacher's Material:**
	Study material prepared by the faculty members of P.T.V.A.'s M.L. Dahanukar College of Commerce (Autonomous), Vile Parle (E), Mumbai.

11 **Reference Books:**

Sr. No.	Title	Author/s	Publisher	Edition	Year
1.	Programming through Python	M T. Savaliya, R K. Maurya, G.M. Magar	Staredu Solutions	First	2018
2.	Python Data Science Handbook	Jake Vander Plas	O'Reilly Media	First	2016
3.	Let Us Python	Y.Kanetkar	BPB	First	2019
4.	Programming in Python 3	Mark Summerfield	Pearson Education	Fifth	2013

	5.	Learning Python	Mark Lutz, David Ascher	O'Reilly Media	Fifth	2013
	6.	Database System Concepts	Abraham Silberschatz, Henry Korth, and S. Sudarshan	McGraw-Hill Education	Seventh Edition	2019
	7.	Fundamentals of Database Systems	Elmasri Ramez, Navathe Shamkant.	Pearson	Seventh Edition	2015
	8.	Database Management Systems	Raghu Ramakrishnan, Johannes Gehrke,	McGraw Hill	Third Edition	2003
	9.	Database Management Systems: Concepts, Design and Practice	Rajesh Narang	PHI Learning Pvt. Ltd.	First Edition	2012
	10.	Database System Concepts	S. K. Singh, Shabana Mansoor	Pearson	First Edition	2017

12	**Internal Continuous Assessment:** 40%	**External Semester End Examination:** 60%
	Individual Passing in Internal and External Examination	
13	**Continuous Evaluation through:**	
	Performing and preparation of Journal (10 Hands-on Practical * 02 marks each) 20 Marks	
14	**Format of Question Paper:** For the semester end examination	
	02 Questions (Hands-on Practical) + Viva 15 Marks each	
	OR	
	03 Questions (Hands-on Practical) + Viva 10 Marks each	

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Board of Studies in Information Technology and Data Science	
UG First Year Programme	
Semester	**II**
Title of Paper	**Credits**
Advanced Python Programming	**02**
From the Academic Year	**2024-25**

Sr. No.	Heading	Particulars
1	**Description of the course:** **Including but not limited to:**	This course offers a comprehensive introduction to essential Python libraries for data manipulation and visualization. In Module I, learners delve into handling date and time data, utilizing IPython for enhanced interactive computing, and mastering fundamental concepts of NumPy for efficient numerical computation. Module II covers advanced data manipulation techniques with Pandas, including data aggregation and visualization with Matplotlib for creating various plots and charts, along with an exploration of Seaborn for stylish statistical graphics. By the end, learners will be equipped with the skills needed to analyze and visualize data effectively using Python.
2	**Vertical:**	Major
3	**Type:**	Theory
4	**Credit**:	2 credits (1 credit = 15 Hours of Theory Work in a Semester)
5	**Hours Allotted:**	30 Hours
6	**Marks Allotted**:	50 Marks
7	**Course Objectives**: 1. To understand Date and Time Module in Python 2. To explore IPython architecture for Python. 3. To develop competency in utilizing NumPy and Pandas libraries for data manipulation and analysis tasks. 4. To delve into widely-used data science tools and packages for visualizing data.	
8	**Course Outcomes**: **CO1:** Learners will be able to effectively handle and manipulate date and time data, perform comparisons, and calculate durations using Python's datetime module. **CO2:** Learners will be able to utilize IPython for advanced debugging, profiling, and code timing, improving their overall productivity as Python developers. **CO3:** Learners will be able to apply NumPy and Pandas functionalities to perform complex data operations, analyze datasets, and derive meaningful insights efficiently. **CO4:** Learners will be able to create visually appealing plots and charts using Matplotlib and Seaborn to effectively communicate insights from data.	
9	**Module I:** **Unit I: Date and Time, IPython, NumPy** **Date and Time in Python**: Date and Time, Date and Time Now, Combining Date and Time, Formatting Dates and Times, Finding Durations using "timedelta", Comparing Two Dates, Sorting Dates, Stopping Execution Temporarily, Knowing the Time taken by a Program, Working with Calendar Module. **IPython**: Beyond Normal Python, Help and Documentation in IPython, Keyboard Shortcuts in the IPython Shell, IPython Magic Commands, Input and Output History, IPython and Shell Commands, Errors and Debugging, Profiling and Timing Code.	

	Introduction to NumPy: Understanding Data Types in Python, The Basics of NumPy Arrays, Computation on NumPy Arrays: Universal Functions, Aggregations: Min, Max, and Everything In Between, Computation on Arrays: Broadcasting, Comparisons, Masks, and Boolean Logic, Fancy Indexing, Sorting Arrays, Structured Data: NumPy's Structured Arrays.
	Module II: **Unit II: Data Manipulation and Visualization** **Data Manipulation with Pandas**: Introducing Pandas Objects, Data Indexing and Selection, Operating on Data in Pandas, Handling Missing Data, Hierarchical Indexing, Combining Datasets: Concat and Append, Combining Datasets: Merge and Join, Aggregation and Grouping, Pivot Tables, Vectorized String Operations, Working with Time Series. High-Performance Pandas: eval() and query(). **Visualization with Matplotlib**: Simple Line Plots, Simple Scatter Plots, Visualizing Errors, Density and Contour Plots, Histograms, Binnings, and Density, Customizing Plot Legends, Customizing Colorbars, Multiple Subplots, Text and Annotation, Customizing Ticks, Customizing Matplotlib: Configurations and Stylesheets, Three-Dimensional Plotting in Matplotlib, Geographic Data with Basemap, Visualization with Seaborn.
10	**Teacher's Material:** Study material prepared by the faculty members of P.T.V.A.'s M.L. Dahanukar College of Commerce (Autonomous), Vile Parle (E), Mumbai.
11	**Reference Books:**

Sr. No.	Title	Author/s	Publisher	Edition	Year
1.	Python for Data Analysis	Wes McKinney	O'Reilly Media	Second	2017
2.	Mastering Python for Data Science	Samir Madhavan	BPB	First	2020
3.	Learning IPython for Interactive Computing and Data Visualization	Cyrille Rossant	Packt	Second	2015
4.	Python Data Science Handbook	Jake VanderPlas	O'Reilly Media	First	2016
5.	Effective Python Data Visualization	Anand S. Pandit	Shroff	First	2018

12	**Internal Continuous Assessment:** 40%	**External Semester End Examination:** 60%
	Individual Passing in Internal and External Examination	
13	**Continuous Evaluation through:** 1.Project Presentation / Case Study / Assignment / Viva / Active Participation 10 Marks 2. Class Test 10 Marks Total 20 Marks	
14	**Format of Question Paper:** For the semester end examination Q1. Attempt any 3 (out of 5) (Based on Unit I) 15 Marks Q2. Attempt any 3 (out of 5) (Based on Unit II) 15 Marks Total 30 Marks	

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Board of Studies in Information Technology and Data Science	
UG First Year Programme	
Semester	**II**
Title of Paper	**Credits**
Database Design and Management – II	02
From the Academic Year	2024-25

Sr. No.	Heading	Particulars
1	**Description of the course:** **Including but not limited to:**	This course offers a comprehensive introduction to two key areas in database management: PL/SQL and Big Data. Participants will delve into PL/SQL's role within Oracle databases, covering identifiers, control structures, and exception handling. Additionally, the course explores the vast landscape of Big Data, including its sources, characteristics (Volume, Variety, Velocity), and its role in decision-making through technologies like NoSQL databases and MapReduce. Learners will gain practical skills in handling data effectively in both traditional and contemporary database environments.
2	**Vertical:**	Major
3	**Type:**	Theory
4	**Credit**:	2 credits (1 credit = 15 Hours of Theory Work in a Semester)
5	**Hours Allotted:**	30 Hours
6	**Marks Allotted**:	50 Marks
7	**Course Objectives**: 1. To understand the role and significance of PL/SQL, including identifiers, keywords, operators, control structures, cursors, collections, composite data types, procedures, functions, exception handling, packages, and triggers. 2. To understand Big Data fundamentals, Master NoSQL databases, including their basics.	
8	**Course Outcomes**: **CO1:** Learners will develop skills in writing efficient PL/SQL code by applying control structures, cursors, collections, procedures, functions, exception handling, packages, and triggers for effective database management. **CO2:** Learners gain a strong understanding of Big Data fundamentals and NoSQL databases, enabling them to effectively analyze, manage, and derive insights from large volumes of data to aid decision-making and innovation.	
9	<u>**Module I:**</u> <u>**Unit I: Introduction to PL/SQL**</u> Understanding the role of PL/SQL in Oracle database, Identifiers and keywords, Operators, Expressions, Sequences, Control Structures, Cursors, Collections and composite data types, Procedures and Functions, Exception Handling, packages, Triggers.	
	<u>**Module II:**</u> <u>**Unit II: Big Data**</u> Getting Started, Big Data, Facts About Big Data, Big Data Sources, Three Vs of Big Data, Volume, Variety, Velocity, Usage of Big Data, Visibility, Discover and Analyze Information, Segmentation and Customizations, Aiding Decision Making, Innovation, Big Data Challenges, NoSQL, Definition, ACID Vs BASE, CAP Theorem, The BASE, NoSQL Advantages, Disadvantages, Categories of NoSQL databases, Basic Querying, Create and Insert, Explicitly Creating Collections, Inserting by Explicitly specifying _id, update, Delete, Read, Conditional operators, Regular Expressions, MapReduce, aggregate(), MongoDB Data Model.	

10	**Teacher's Material:**

Study material prepared by the faculty members of P.T.V.A.'s M.L. Dahanukar College of Commerce (Autonomous), Vile Parle (E), Mumbai.

11	**Reference Books:**

Sr. No.	Title	Author/s	Publisher	Edition	Year
1.	Oracle PL/SQL Programming	M. B. Ram Murthy	McGraw-Hill Education	Fourth	2018
2.	Oracle PL/SQL For Dummies	Michael Rosenblum, Paul Dorsey	For Dummies	First	2019
3.	Practical MongoDB	Shakuntala Gupta and Edward Navin Sabrawal	Apress	First	2015
4.	Big Data Analytics: A Hands -on Approach	Arshdeep Bahga, Vijay Madisetti	McGraw-Hill	First	2017
5.	Big Data: A Primer	Rajaraman V., Anand Talcott	Pearson India	First	2018

12	**Internal Continuous Assessment:** 40%	**External Semester End Examination:** 60%
	Individual Passing in Internal and External Examination	

13	**Continuous Evaluation through:**

1.Project Presentation / Case Study / Assignment / Viva / Active Participation   10 Marks

2. Class Test   10 Marks

                     Total   20 Marks

14	**Format of Question Paper:** For the semester end examination

Q1. Attempt any 3 (out of 5) (Based on Unit I)   15 Marks

Q2. Attempt any 3 (out of 5) (Based on Unit II)   15 Marks

                     Total   30 Marks

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UG First Year Programme	
Semester	**II**
Title of Paper	**Credits**
Major Practical II	**02**
From the Academic Year	**2024-25**

Sr. No.	Heading	Particulars
1	**Description of the course:** **Including but not limited to:**	This course covers two key areas: Advanced Python Programming and Database Design and Management II. In the Python section, learners will delve into practical applications such as handling date and time, utilizing IPython and Jupyter for debugging, leveraging the NumPy library for array manipulation, exploring data with Pandas, and creating visualizations with Matplotlib and Seaborn. In the Database Design and Management II section, learner will learn PL/SQL basics and control structures, conditional statements, handling exceptions, and MongoDB basics including querying, aggregation, and mapReduce operations. Through hands-on exercises, learners will gain proficiency in advanced Python techniques and database management skills essential for modern data-driven applications.
2	**Vertical:**	Major
3	**Type:**	Practical
4	**Credit**:	2 credits (1 credit = 30 Hours of Practical Work in a Semester)
5	**Hours Allotted:**	60 Hours
6	**Marks Allotted**:	50 Marks
7	**Course Objectives**: 1. To explore Date and Time Module in Python. 2. To understand the interactive features and capabilities of IPython for enhanced Python programming and data analysis. 3. To develop understanding of NumPy arrays and their manipulation techniques for efficient numerical computing. 4. To manipulate and analyze data using Pandas library in Python. 5. To learn various plotting techniques and customization options to create informative and visually appealing plots. 6. To understand the basics of PL/SQL and control structures. 7. To understand different conditional statements in PL/SQL, including IF, IF-ELSE, ELSIF ladder, and CASE expressions. 8. To understand working of sequences, cursors, procedures, Functions and error handling in PL/SQL. 9. To master the fundamental MongoDB operations. 10. To understand MongoDB techniques including aggregation and mapReduce.	
8	**Course Outcomes**: **CO1:** Learners will be able to convert, format, and manipulate dates and times in Python. **CO2:** Learners will gain proficiency in utilizing IPython's interactive shell for data exploration, visualization, and debugging purposes. **CO3:** Learners will be able to create and manipulate NumPy arrays to efficiently process numerical data. **CO4:** Learners will gain proficiency in performing data manipulation, aggregation, and statistical analysis using Pandas library. **CO5:** Learners will be able to create customize plots to effectively communicate data insights.	

CO6: Learners will be able to understand and apply conditional statements in PL/SQL.	
CO7: Learners will be able to analyse and implement conditional statements in PL/SQL including IF, IF-ELSE, ELSIF ladder, and CASE expressions.	
CO8: Learners will gain proficiency in utilizing sequences, cursors, procedures, functions, and error handling mechanisms in PL/SQL.	
CO9: Learners will have proficiency in essential MongoDB operations.	
CO10: Learners will have ability in utilizing MongoDB aggregation and mapReduce techniques.	

9

Module I:

Unit I: Advanced Python Programming

List of Practical:	
1.	**Date and Time**
a.	Write a Python program to convert given to date and time to different formats.
b.	Write a Python program to perform arithmetic and comparison operations on dates.
c.	Write a Python program to implement calendar module in Python.
2.	**IPython**
a.	Using IPython and Jupyter notebook.
b.	Debugging errors in IPython.
3.	**NumPy Library**
a.	Write a Python program to create and manipulate arrays using NumPy library.
b.	Write a Python program to demonstrate array operations and broadcasting using NumPy library.
c.	Write a Python program to demonstrate array indexing and selection using NumPy library.
4.	**Pandas Package**
a.	Write a Python program to import and explore data using Pandas module.
b.	Write a Python program to manipulate and clean data using Pandas module.
c.	Write a Python program to analyze and summarize data using Pandas module.
5.	**Matplotlib**
a.	Write a Python program to implement basic plotting.
b.	Write a Python program to implement advanced plotting techniques.
c.	Write a Python program to implement visualization with Seaborn.

Module II:

Unit II: Database Design and Management II

List of Practical:	
1.	**PL/SQL Basics and Control Structures**
a.	Use of variables and executable statements.
b.	Create Anonymous PL/SQL block.
c.	Using while loop
d.	Do loop
e.	For loop, use of GOTO statement.
2.	**Create Conditional Statement using PL/SQL**
a.	Using if statement Using

	b.	Using if else statement
	c.	Using elsif ladder
	d.	Using case expression.
	3.	**Sequence, Cursor, Procedure, Functions, Triggers, Handling Exception**
	a.	Creation of Sequence in PL/SQL
	b.	Implicit Cursor, Explicit Cursor.
	c.	Creation of Procedure
	d.	Creation of Function.
	e.	Create Row level Trigger, Statement level trigger.
	f.	Creation of user defined exception, system defined exception.
	4.	**MongoDB Basics**
	a.	MongoDB query to create and drop a database.
	b.	MongoDB query to create, display and drop the collection.
	c.	MongoDB query to insert, update and delete a document.
	d.	Simple Queries with MongoDB.
	5.	**Implementing Aggregation, mapReduce**
	a.	Write a MongoDB query to use sum, avg, min and max expression.
	b.	Write a MongoDB query to use push and addToSet expression.
	c.	Write a MongoDB query to restore database from the backup.
	d.	Implement word count using mapReduce.

10	**Teacher's Material:**
	Study material prepared by the faculty members of P.T.V.A.'s M.L. Dahanukar College of Commerce (Autonomous), Vile Parle (E), Mumbai.

| 11 | **Reference Books:** |

Sr. No.	Title	Author/s	Publisher	Edition	Year
1.	Python for Data Analysis	Wes McKinney	O'Reilly Media	Second	2017
2.	Mastering Python for Data Science	Samir Madhavan	BPB	First	2020
3.	Learning IPython for Interactive Computing and Data Visualization	Cyrille Rossant	Packt	Second	2015
4.	Python Data Science Handbook	Jake VanderPlas	O'Reilly Media	First	2016
5.	Effective Python Data Visualization	Anand S. Pandit	Shroff	First	2018
6.	Oracle PL/SQL Programming	M. B. Ram Murthy	McGraw-Hill Education	Fourth	2018
7.	Oracle PL/SQL For Dummies	Michael Rosenblum, Paul Dorsey	For Dummies	First	2019
8.	Practical MongoDB	Shakuntala Gupta and Edward Navin Sabrawal	Apress	First	2015

	9.	Big Data Analytics: A Hands -on Approach	Arshdeep Bahga, Vijay Madisetti	McGraw-Hill	First	2017
	10.	Big Data: A Primer	Rajaraman V., Anand Talcott	Pearson India	First	2018

12	**Internal Continuous Assessment:** 40% **External Semester End Examination:** 60%
	Individual Passing in Internal and External Examination
13	**Continuous Evaluation through:**
	Performing and preparation of Journal (10 Hands-on Practical * 02 marks each) 20 Marks
14	**Format of Question Paper:** For the semester end examination
	02 Questions (Hands-on Practical) + Viva 15 Marks each
	OR
	03 Questions (Hands-on Practical) + Viva 10 Marks each