

AC – 20/05/2025

Item No. – 6.19 (N) (2ab) Sem. III & IV

As Per NEP 2020

University of Mumbai



Syllabus for Minor Vertical II	
Faculty of Science	
Board of Studies in Computer Science	
UG Second Year Programme	
<u>Semester III</u>	
Title of Paper	Total Credits 4
I) Web Design & Development	2
II) Web Design & Development Practical	2
<u>Semester IV</u>	
Title of Paper	Total Credits 4
I) Open Source Database: MySQL	2
II) Open Source Database: MySQL Practical	2
From the Academic Year	2025 – 2026

Sem – III

Name of the Course: Web Design & Development

Sr. No.	Heading	Particulars
1	Description the course:	Introduction: In the digital age, websites form the core of personal, professional, and organizational presence. This course provides a hands-on introduction to web technologies—from static design using HTML and CSS to dynamic behavior using JavaScript and PHP. Even students without a computer science background can comfortably follow and build basic working websites by the end of this course. Relevance: The ability to create and manage a simple website is a valuable skill across all disciplines—be it arts, commerce, science, or business. Students can apply their learning to create portfolios, event pages, small business websites, or academic project displays. The course strikes a balance between creativity (design) and logic (functionality). Usefulness: This course builds self-reliant skills that enable students to independently launch and maintain a basic web presence. It helps them understand how modern websites are created, updated, and made interactive. Students gain practical knowledge of both frontend and backend components of a website. Application: The course equips students with practical skills to create personal portfolios, blogs, or small business websites. They can build forms to collect user feedback, manage event registrations, or create login and contact pages. These real-world applications give students a strong foundation to apply web development concepts in academic, professional, or entrepreneurial projects. Interest: Web design is inherently visual and creative, which makes it engaging for learners from non-technical backgrounds. The satisfaction of seeing one's own website running live provides motivation and a sense of accomplishment. The variety of tools and languages also

		keeps the learning process dynamic and fun. Connection with Other Courses: This course complements various disciplines such as Digital Marketing, Media & Communication, Entrepreneurship, and even Data Analytics. It enhances understanding of how websites function, supporting students in presenting content creatively and efficiently. It also sets the stage for learning content management systems like WordPress or integrating web skills with digital tools used in other fields. Demand in the Industry: Web development remains one of the most in-demand skills globally. Every small business, freelancer, influencer, or organization needs a digital presence. Knowledge of web technologies like HTML, CSS, JavaScript, and PHP can lead to freelance work, internships, or entry-level tech roles. Job Prospects: Basic web design and development skills are highly valued across industries, offering roles like Web Designer (Entry Level), Content Editor, Junior PHP Developer, or Freelance Web Creator. These skills also provide a strong foundation for internships, remote work, and freelance opportunities. Even non-IT professionals can leverage this knowledge to maintain their digital presence or assist in web-related tasks within their organizations.
2	Vertical:	Minor
3	Type:	Theory
4	Credits:	2 credits
5	Hours Allotted:	30 hours
6	Marks Allotted:	50 Marks
7	Course Objectives (CO): CO 1. To introduce students to the foundational concepts of web design using HTML5 and CSS3. CO 2. To build interactive and dynamic web pages using JavaScript and PHP. CO 3. To familiarize students with creating and accessing databases using MySQL. CO 4. To develop hands-on skills to design user-friendly and responsive web interfaces. CO 5. To equip students with the ability to build basic client-server applications.	

8	Course Outcomes (OC): After successful completion of this course, students would be able to - OC 1. Design and structure professional-looking websites using HTML and CSS. OC 2. Add interactive elements to websites using JavaScript. OC 3. Write simple PHP scripts for form handling and server-side logic. OC 4. Connect and interact with a MySQL database using PHP. OC 5. Build a basic full-stack application such as a contact form or login system.
9	Modules: Module 1: Introduction to Web Design: What is a Website? Types of Websites, Client-Server Model, Structure of a Web Page HTML5 Essentials: Basic Tags and Page Structure (<!DOCTYPE>, <html>, <head>, <body>), Formatting and Organizing Text (<h1> to <h6>, <p>,
, ,), Creating Lists and Links (, , <a href>), Adding Tables (<table>, <tr>, <td>, <th>), Inserting Images (tag, alt text, image formats) Working with Forms: Input Elements (<input>, <textarea>, <select>, <button>), Basic Form Validation using HTML attributes Multimedia Elements: Adding Audio and Video to a Web Page, Supported File Formats, <audio> and <video> tags with controls CSS for Styling Web Pages: Introduction to CSS, Using Inline, Internal, and External CSS, Selectors and Syntax, Styling Text, Fonts, Colors, and Backgrounds, Basic Layout Techniques: Box Model, Margins, Padding Module 2: Advanced Python Concepts (30 hours): Getting Started with JavaScript: Embedding JavaScript in HTML, Variables, operators, and conditional statements, Functions and event handling (onclick, onchange), Basic form validation using JavaScript The Document Object Model (DOM): Accessing and modifying HTML elements dynamically, Changing text, styles, and attributes using JS, Simple interactivity like toggle menus, show/hide sections Introduction to PHP: What is PHP? Why use it?, Running PHP on localhost (XAMPP or similar setup), PHP syntax, variables, operators, data types, echo, conditional statements (if, else), loops (for, while), Working with HTML forms using \$_GET and \$_POST, Simple form processing example: Contact Form, Sessions and Cookies PHP with MySQL Database: Introduction to databases and MySQL, Creating a database and table using phpMyAdmin, Connecting to MySQL from PHP using mysqli_connect(), Inserting data into the database from an HTML form, Displaying data from the database using SELECT queries
10	Text Books 1. HTML 5 Black Book, Covers CSS 3, JavaScript, XML, XHTML, AJAX, PHP and

	jQuery, 2ed, Dreamtech Press, 2016 2. Web Programming and Interactive Technologies, scriptDemics, StarEdu Solutions India, 2018 3. PHP: A Beginners Guide, Vikram Vaswani, TMH	
11	Reference Books 1. HTML, XHTML, and CSS Bible Fifth Edition, Steven M. Schafer, WILEY, 2011 2. Learning PHP, MySQL, JavaScript, CSS & HTML5, Robin Nixon, O'Reilly, 2018 3. PHP, MySQL, JavaScript & HTML5 All-in-one for Dummies, Steve Suehring, Janet Valade Wiley, 2018	
12	Internal Continuous Assessment: 40%	Semester End Examination: 60%

Name of the Course: Web Design & Development Practical

Sr. No.	Heading	Particulars
1	Description the course:	Introduction: The lab course in Web Design and Development is an application-focused complement to the theory course. It encourages students to convert knowledge into action through programming and designing websites. The lab sessions are structured to move progressively from basic page design to complete dynamic websites with database integration. Relevance: This course is essential for learners of all disciplines who want to create a personal or professional online presence. The skills acquired are relevant in the modern digital age where almost every business, organization, or portfolio requires a functional website. Usefulness: Students will gain tangible web development skills that allow them to create, customize, and maintain websites. This includes building user interfaces, validating user input, handling data, and implementing interactive features. Application: The course allows students to build working websites and applications — from online forms to mini CMS-like systems. These projects can be applied directly to NGOs, student portfolios, event pages, or small business websites. Interest: Students typically enjoy this practical paper as it yields immediate visual results. The excitement of seeing one's own website or login page function properly boosts confidence and sparks curiosity for further learning. Connection with Other Courses: This practical paper complements theoretical courses such as Introduction to Programming, Digital Marketing, E-Commerce, and Content Management Systems. It serves as a foundation for further web and app development studies.

		Demand in the Industry: There is a strong demand for professionals who can create and maintain websites. Even basic knowledge of HTML, CSS, JavaScript, and PHP is valuable in roles related to digital marketing, tech support, and content management. Job Prospects: Students completing this practical course may pursue freelance web development, intern as junior web developers, or take up roles such as content editors and technical assistants in IT or media industries. These practical skills also lay the groundwork for further upskilling into full-stack development roles.
2	Vertical:	Minor
3	Type:	Practical
4	Credits:	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 (CO): CO 1. To equip students with hands-on skills in designing and developing basic websites using HTML, CSS, and JavaScript. CO 2. To enable students to create dynamic, interactive web applications using PHP and MySQL. CO 3. To familiarize students with real-world scenarios such as form handling, validation, and database connectivity. CO 4. To promote experiential learning through guided lab work that reinforces theoretical concepts. CO 5. To introduce best practices in web development through structured and creative lab assignments.	
8	Course Outcomes (OC): After successful completion of this course, students would be able to - OC 1. Design user-friendly web pages using HTML and CSS with professional layout and styling. OC 2. Add interactivity to web pages using JavaScript functions and events. OC 3. Perform data collection and validation through web forms. OC 4. Develop and test basic server-side programs using PHP. OC 5. Connect websites to MySQL databases for storing and retrieving data dynamically. OC 6. Deploy a simple web application combining front-end and back-end technologies.	

9	Modules: Module 1: Creating a Simple Web Page with HTML • Use basic tags: headings, paragraphs, bold, italic, lists. Formatting and Organizing Content • Use tables, hyperlinks, images, and lists on a single webpage. Designing a Contact Form in HTML • Include input fields, text areas, checkboxes, radio buttons, and a submit button. Embedding Audio and Video in a Web Page • Add <audio> and <video> elements with controls and source formats. Working with CSS for Styling • Apply inline, internal, and external CSS. Style text, backgrounds, and borders. Building a Web Page Layout Using CSS • Use positioning techniques (relative, absolute, fixed), and the box model. Designing a Multi-page Website • Use navigation links between pages (e.g., Home, About, Contact). Introduction to JavaScript Programming • Basic arithmetic operations, alerts, and console logging. Form Validation using JavaScript • Validate required fields, check for email format, and password length. JavaScript Events and Interactivity • Implement onClick, onMouseOver, and onChange events with buttons and inputs. Module 2: Basic PHP Script • Create a script to display dynamic content using variables and control structures. Working with PHP Forms • Retrieve and display form data using \$_POST and \$_GET methods. PHP Arrays and Looping • Store and loop through data using indexed and associative arrays. File Handling in PHP
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	• Read from and write to a text file using PHP functions. Introduction to MySQL and phpMyAdmin • Create a database and tables, insert sample data using phpMyAdmin. Connecting PHP to a MySQL Database • Establish database connection using mysqli_connect() or PDO. Displaying Data from Database using PHP • Fetch records using SELECT and display results in an HTML table. Insert Form Data into MySQL Database • Capture form input and save it into a database using INSERT INTO. Updating and Deleting Database Records • Implement update and delete operations using UPDATE and DELETE queries. Building a Simple Login System • Use sessions, cookies, and basic user authentication using PHP and MySQL.	
10	Text Books 1. HTML 5 Black Book, Covers CSS 3, JavaScript, XML, XHTML, AJAX, PHP and jQuery, 2ed, Dreamtech Press, 2016 2. Web Programming and Interactive Technologies, scriptDemics, StarEdu Solutions India, 2018	
11	Reference Books 1. HTML, XHTML, and CSS Bible Fifth Edition, Steven M. Schafer, WILEY, 2011 2. Learning PHP, MySQL, JavaScript, CSS & HTML5, Robin Nixon, O'Reilly, 2018	
12	Internal Continuous Assessment: 40%	Semester End Examination: 60%

Sem – IV

Name of the Course: Open Source Database: MySQL

Sr. No.	Heading	Particulars
1	Description the course:	Introduction: Databases are at the heart of almost every digital system. This course introduces students from non-technical backgrounds to relational databases using MySQL, a popular and open-source platform. Through a blend of theory and practice, learners gain the skills needed to create, manage, and manipulate databases for real-world applications. Relevance: In today's data-driven world, every field—whether commerce, arts, science, or social work—requires some level of data handling. Knowing how to manage structured data using SQL and MySQL equips students with essential skills applicable across domains and job profiles. Usefulness: Learning MySQL equips students with the ability to manage structured data efficiently and securely. It helps in storing, retrieving, and organizing data, which is essential for academic, administrative, and business-related tasks. The open-source nature of MySQL makes it a cost-effective and accessible solution for individual and institutional use. Application: Students can apply MySQL skills in managing data for projects, inventory systems, student records, customer databases, or survey analysis. It is also useful in creating simple web applications that require database support. With MySQL, even small businesses can manage their data effectively without investing in expensive software. Interest: The hands-on, practical nature of MySQL makes it engaging even for students without a programming background. As students execute real-time queries and get instant results, they are motivated by immediate feedback and a sense of accomplishment. Connection with Other Courses:

		This course connects well with Web Development, especially when paired with PHP for dynamic websites. It also lays a foundation for Data Analytics, E-commerce systems, Management Information Systems (MIS), and Research Methodology where data handling is essential. Understanding MySQL enhances interdisciplinary learning across IT and business domains. Demand in the Industry: There is consistent demand in the industry for individuals who can work with relational databases like MySQL. It is widely used by startups, NGOs, educational institutions, and small to medium enterprises due to its reliability and cost-effectiveness. Companies look for candidates who can manage and manipulate data using SQL, even if they are from a non-technical background. Job Prospects: After completing this course, students can explore entry-level roles such as Data Entry Executive, MIS Assistant, Junior Backend Support, or Trainee Database Administrator. These roles are common across sectors like education, finance, marketing, and administration. It also opens pathways to upskilling in areas like full-stack web development or business data analysis.
2	Vertical:	Minor
3	Type:	Theory
4	Credits:	2 credits
5	Hours Allotted:	30 hours
6	Marks Allotted:	50 Marks
7	Course Objectives (CO): CO 1. To introduce students to the fundamentals of relational databases using MySQL as a platform. CO 2. To develop the ability to write, execute, and understand SQL queries for data management and retrieval. CO 3. To familiarize students with concepts like normalization, relational models, and basic database protection techniques. CO 4. To provide practical exposure to handling real-life datasets and applying database operations. CO 5. To encourage the adoption of open-source database tools and technologies for cost-effective and scalable solutions.	

8	Course Outcomes (OC): After successful completion of this course, students would be able to - OC 1. Understand and explain the purpose and components of a relational database system. OC 2. Use SQL commands to create, retrieve, update, and delete data in MySQL. OC 3. Apply relational concepts like constraints, normalization, and joins effectively. OC 4. Create user roles, handle permissions, and manage data backups in MySQL. OC 5. Build and manage small-scale database systems for academic or business use.
9	Modules: Module 1: Introduction to Databases: What is a Database? How is it different from Excel or text files? What is a DBMS (Database Management System)? Examples, Benefits of using a DBMS – easy storage, quick search, and secure handling of large data, Real-life examples of databases in banking, shopping, college systems Understanding MySQL and Data Models: Introduction to MySQL – free and open-source database tool, Getting started: Installing MySQL and using MySQL Workbench, Overview of how data is organized in tables (Relational Model), Idea of Client-Server Architecture in simple terms Structured Query Language (SQL): The Language of Databases: Introduction to SQL – what it is and why it's important, Understanding Tables, Rows, and Columns, Codd's 12 Rules Creating and Managing Databases: Creating own databases, Choosing appropriate data types (text, numbers, dates, etc.), Creating Tables with basic rules like primary key and not null, changing table structure (add/rename/remove columns), Deleting data from tables using DROP or TRUNCATE Working with Data (DML Queries): Adding new records with INSERT, Making changes using UPDATE, Removing records using DELETE, Viewing records using SELECT: all columns or specific ones, Filtering data using WHERE, IN, BETWEEN, Summarizing data with functions: COUNT, AVG, MIN, MAX, SUM, Grouping data using GROUP BY, filtering groups with HAVING, Sorting and limiting output using ORDER BY, LIMIT Module 2: Relational Concepts and Constraints: Understanding how data is connected across tables, Setting up relationships between tables using FOREIGN KEY, Ensuring data accuracy using constraints like PRIMARY KEY, NOT NULL, UNIQUE, CHECK Combining Tables and Using Subqueries: Merging data from multiple tables using JOIN – INNER JOIN, LEFT JOIN, RIGHT JOIN with simple examples, writing subqueries to fetch data based on other queries – Using IN, EXISTS, and simple nested subqueries

	Using MySQL Functions: String Functions: CONCAT, LENGTH, UPPER, LOWER, TRIM, Math Functions: MOD, ROUND, FLOOR, CEIL, Date Functions: NOW(), DAY(), MONTH(), YEAR() Creating Views and Managing Users: Creating simplified versions of tables using VIEWS, Updating and deleting views, Creating users and assigning them permissions, Using GRANT, REVOKE to control access, Using COMMIT and ROLLBACK to manage changes to the database	
10	Text Books 4. Murach's MySQL, Joel Murach, 3rd Edition, 3rd Edition, 2019 5. Learn SQL with MySQL: Retrieve and Manipulate Data Using SQL Commands with Ease, Ashwin Pajankar, BPB Publications, 2020	
11	Reference Books 4. MySQL: The Complete Reference, VikramVaswani , McGraw Hill, 2017 5. Database System Concepts, Abraham Silberschatz, HenryF.Korth, S.Sudarshan, McGraw Hill,2017	
12	Internal Continuous Assessment: 40%	Semester End Examination: 60%

Name of the Course: Open Source Database: MySQL Practical

Sr. No.	Heading	Particulars
1	Description the course:	Introduction: This lab-oriented course focuses on experiential learning of core database concepts using MySQL, a widely used open-source relational database. It emphasizes practical skills like querying, normalization, table design, data security, and basic administration — necessary for any student looking to work with data. Relevance: Understanding how data is created, stored, retrieved, and managed in databases is vital across disciplines. This course enables non-CS students to manage their data needs in research, business analytics, digital marketing, finance, etc., by applying structured query knowledge effectively. Usefulness: This practical course strengthens the ability to handle real-time datasets, maintain data integrity, and perform meaningful analysis through queries. It is particularly useful for students who need data literacy in their academic and professional work. Application: Students can apply their learning to build simple inventory systems, customer databases, academic records, or any structured dataset-based solution. The ability to use SQL for data extraction and report generation is widely applicable in internships and entry-level roles. Interest: Hands-on practice with immediate output keeps the learner engaged. Performing tasks like creating tables, writing queries, and solving case-based exercises builds curiosity and offers a sense of accomplishment, motivating students to explore data science or application development further. Connection with Other Courses: This practical course links well with courses like Data Analytics, Web Development, Research Methodology,

		Financial Systems, and MIS. Students can use MySQL as the backend for data-driven web applications or research databases. Demand in the Industry: Industry values professionals who are proficient in databases regardless of their core domain. Proficiency in MySQL is a required skill for roles in data entry, data analysis, operations, reporting, and technical support in nearly every sector. Job Prospects: The practical knowledge gained in this course opens up several entry-level opportunities in roles such as Database Assistant, Junior SQL Developer, MIS Executive, or Data Entry and Validation Specialist. Many industries — including finance, education, healthcare, e-commerce, and administration — require professionals who can manage and query structured data efficiently. Students who further develop these skills can branch into Business Analysis, Database Administration, or Data Analytics roles. The demand for data-literate professionals is steadily rising, even outside core tech sectors.
2	Vertical:	Minor
3	Type:	Practical
4	Credits:	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 (CO): CO 6. To provide practical exposure to database creation, manipulation, and management using MySQL. CO 7. To develop skills in writing efficient SQL queries for real-life scenarios. CO 8. To build confidence in designing and executing database-driven applications. CO 9. To ensure understanding of data protection, user privileges, and backup mechanisms through hands-on activities.	
8	Course Outcomes (OC): After successful completion of this course, students would be able to - OC 7. Create, manage and manipulate databases and tables using MySQL commands. OC 8. Execute complex queries including joins, subqueries, and functions to retrieve meaningful insights. OC 9. Apply normalization techniques practically to improve database design.	

	OC 10. Implement security features like user privileges, backup, and restore using MySQL tools. OC 11. Design and build small applications backed by a structured database schema.
9	Modules: Module 1: Introduction to MySQL Environment - Starting MySQL, creating databases, switching databases, and basic navigation. Creating Tables with Constraints - Create tables using appropriate data types and constraints (PRIMARY KEY, NOT NULL, DEFAULT). Altering and Dropping Tables - Alter table structure (add/modify/drop columns), rename tables, and drop tables. Inserting Data into Tables - Insert single and multiple rows, using default and NULL values. Basic SELECT Queries - Select all/specific columns, use of DISTINCT and simple filters. Conditional Queries - Use WHERE clause with operators (=, >, <, BETWEEN, IN, LIKE), and ORDER BY. Aggregate Functions and Grouping - Use COUNT, SUM, AVG, MIN, MAX with GROUP BY and HAVING. Updating and Deleting Data - Perform UPDATE with conditions and DELETE operations. Backup and Restore Basics - Basic backup using mysqldump, restoring using source command (command-line interface).
	Module 2:
	Working with JOINS Perform INNER JOIN, LEFT JOIN, RIGHT JOIN between two tables.

	Subqueries - Use subqueries in SELECT, WHERE and FROM clauses; nested subqueries. Using SQL Functions (String, Math, Date) - Practice string functions (CONCAT, LENGTH, LOWER), math functions (ROUND, MOD), and date functions (NOW(), DATEDIFF). Creating and Manipulating Views - Create, alter, and drop views; use views in SELECT statements. Views and Transactions - Implement view-based operations and transactions using COMMIT and ROLLBACK. Working with Users and Privileges - Create/drop MySQL users; grant/revoke SELECT, INSERT, UPDATE privileges. Security Exercises - Practice setting passwords, restricting access, and understanding user roles. Using Functions with GROUP BY and HAVING - Combine aggregate functions with grouping and filtering grouped records. Complex Queries using ANY, ALL, EXISTS - Use these logical operators in subqueries for conditional evaluations.	
10	Text Books - Murach's MySQL, Joel Murach, 3rd Edition, 2019 - Learn SQL with MySQL: Retrieve and Manipulate Data Using SQL Commands with Ease, Ashwin Pajankar, BPB Publications, 2020	
11	Reference Books MySQL: The Complete Reference, VikramVaswani , McGraw Hill, 2017	
12	Internal Continuous Assessment: 40%	Semester End Examination: 60%

EVALUATION SCHEME

A. Evaluation for Theory Courses (2 Credit Courses)

I. Internal Evaluation for Theory Courses – 20 Marks

Sr. No.	Component
1	Class Tests Class Test 1 on Module 1: 10 marks Class Test 2 on Module 2: 10 marks Average of 2 Class Tests: 10 marks
2	Assignments Assignment on Module 1: 5 marks Assignment on Module 2: 5 marks Total of 2 Assignments: 10 marks
	Total: 20 Marks

II. External Examination for Theory Courses – 30 Marks

A Semester End Theory Examination of 1 hour duration for 30 marks as per the paper pattern given below:

Total Marks: 30

Duration: 1 Hour

Question	Based On	Options	Marks
Q. 1	Module 1	Any 2 out of 4	10
Q. 2	Module 2	Any 2 out of 4	10
Q. 3	Module 1 & 2	Any 2 out of 4	10

B. Evaluation for Practical Courses (2 Credit Courses)

I. Internal Evaluation for Practical Courses – 20 Marks

Sr. No.	Component
1	Practical Assignments / Experiments / Hands-On Tests / Presentations / Demonstrations / Online Class Test / Case Studies: 15 marks
2	Journal: 5 marks
	Total: 20 Marks

II. External Examination for Practical Courses – 30 Marks

A Semester End Practical Examination of 2 hours duration for 30 marks as per the paper pattern given below.

Total Marks: 30

Duration: 2 Hours

Question	Practical Question Based On	Marks
Q. 1	Module 1	15
Q. 2	Module 2	15

Sd/-

Sign of the BOS Chairman

Dr. Jyotshna Dongardive

Ad-hoc BOS (Computer
Science)

Sd/-

Sign of the Offg.

Associate Dean

Dr. Madhav R. Rajwade

Faculty of Science & Technology

Sd/-

Sign of Offg. Dean

Prof. Shivram S. Garje

Faculty of Science &
Technology