



GUJARAT TECHNOLOGICAL UNIVERSITY

Program Name: Bachelor of Engineering

Level: UG

Subject Code: BE05000281

Subject Name: Web Application Development

w. e. f. Academic Year:	2024-25
Semester:	5
Category of the Course:	Professional Elective Course - 02

Prerequisite:	Basic knowledge of Programming Fundamentals, Internet Technologies, and Database Management Systems.
Rationale:	The syllabus of Web Application Development is designed to meet current software industry demands for full-stack developers. The course covers frontend and backend technologies, responsive web design, JavaScript programming, API integration, Node.js, React.js, database connectivity, deployment strategies, cloud concepts, and secure web development practices. Students will gain hands-on experience in building scalable and modern web applications aligned with current market trends.

Course Outcomes:

Sr. No.	CO Statement	Marks % Weightage
1	CO-1: Understand modern web technologies and client-server architecture.	20
2	CO-2: Develop responsive webpages using HTML, CSS, and Bootstrap.	20
3	CO-3: Implement interactive applications using JavaScript and APIs.	20
4	CO-4: Develop backend APIs using Node.js, Express.js, and databases.	20
5	CO-5: Build and deploy frontend applications using React.js and cloud concepts.	20

Teaching and Examination Scheme:

Teaching / Learning Scheme (in Hours per semester)					Total Credits	Assessment Pattern and Marks					Total Marks
L	T	P	PBL	Total no of hours per semester		Theory		Tutorial / Practical			
						ESE (E)	PA / CA (M)	PA/C A (I)	PBL (I)	ESE (V)	
45	0	30	15	90	3	70	30	20	30	50	200

* *Problem-Based Learning (PBL) aims to accommodate learning beyond syllabus as per clause 9.4 of NBA manual.*



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Content:

Sr.	Module	Detailed Topics	Hours
1	Introduction to Web Technologies	Introduction to Web Technologies, Evolution of Websites, Client–Server Architecture, Frontend, Backend and Database Overview, Role of Web Technologies in Banking and Finance, Static vs Dynamic Websites	2
2	HTML & CSS Fundamentals	Introduction to HTML and CSS, Structure of HTML Documents, Basic HTML Tags, Tables, Forms and Media Elements, Div and Semantic Elements, Introduction to CSS, Selectors and Styling, Colors, Backgrounds and Fonts, Margin, Padding and Borders, Flexbox Layout, Positioning, Responsive Design Basics, Media Queries, Basic lab exercise for landing page or personal portfolio website, Bootstrap basics	9
3	JavaScript Fundamentals	Introduction to JavaScript, Variables and Datatypes, Operators and Conditions, Loops and Functions, Arrays and Objects, DOM Manipulation, Event Handling, Browser Local Storage, Introduction to Asynchronous Programming, Callbacks and Promises Overview, Introduction to Fetch API	10
4	APIs & HTTP Communication	Introduction to APIs, Client–Server Communication, HTTP Request and Response, Status Codes, Query Parameters and Request Body, CRUD Operations, JSON and XML Overview, Integrating Public APIs using JavaScript	6
5	Backend Development with Node.js	Introduction to Node.js, Runtime Environment Concept, npm and Package Management, Creating HTTP Servers, Introduction to Express.js, Routing and Middleware Basics, REST API Development, Database Connectivity Basics, CRUD Operations with Database, API Testing using Postman, Authentication and Authorization Overview	8
6	Frontend Development with React.js	Introduction to React.js, JSX Basics, Component-Based Architecture, Functional Components, Props and State, useState Hook, useEffect Hook, Conditional Rendering, List Rendering, API Integration using Axios/Fetch, Introduction to CORS	7
7	Deployment & Modern Web Concepts	Hosting Basics, Domain Management, SEO Introduction, CAPTCHA Concepts, Introduction to Cloud Concepts	3

Suggested Specification table with Marks (Theory): (For B.E. only)



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Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
15	30	15	20	10	10

R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create and above Levels (Revised Bloom's Taxonomy)

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Reference Books:

1. Jon Duckett, HTML & CSS: Design and Build Websites, Wiley.
2. Jon Duckett, JavaScript and JQuery, Wiley.
3. Ethan Brown, Web Development with Node and Express, O'Reilly.
4. Alex Banks and Eve Porcello, Learning React, O'Reilly.
5. Robin Nixon, Learning PHP, MySQL & JavaScript, O'Reilly.
6. MDN Web Docs – Mozilla Developer Network.
7. Research papers and documentation from React, Node.js, and Express official websites.

List of Experiments:

1. Design responsive personal portfolio webpage using HTML and CSS.
2. Implement forms, tables, and media elements.
3. Develop interactive applications using JavaScript DOM manipulation.
4. Implement Fetch API and asynchronous communication.
5. Create REST APIs using Node.js and Express.js.
6. Integrate MongoDB/MySQL database with backend.
7. Perform CRUD operations using APIs.
8. Develop React.js frontend using components and hooks.
9. Integrate frontend and backend services.
10. Mini Project: Library Management System, Expense Tracker, Blog System, or Weather Dashboard.

Major Equipment / List of Open Source Software:

1. Computer Systems with Internet Connectivity
2. Visual Studio Code IDE
3. Node.js Runtime Environment
4. MongoDB/MySQL Database
5. Postman API Testing Tool
6. Modern Web Browsers
7. Git and GitHub



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List of learning website:

1. W3Schools (<https://www.w3schools.com/>)
2. React Official Documentation (<https://react.dev/>)
3. Node.js Learn Portal (<https://nodejs.org/learn>)
4. CodePen (<https://codepen.io/>)
5. MDN Web Docs (<https://developer.mozilla.org/>)
6. freeCodeCamp (<https://www.freecodecamp.org/>)

List of suggested activities for Problem-based Learning (PBL):

Sr. No.	PBL Category	Name of Activity	No. of Hours	Evaluation Criteria
1	Micro Project	Responsive website or CRUD application development	10	Implementation and presentation
2	Industry Visit	Visit software company/web hosting provider	10	Report and observations
3	Complex Problem Solving	Develop SDG-oriented web application	15	Innovation and technical depth
4	Video Based Learning	MOOC/NPTEL learning on React.js or Node.js	10	Quiz and certification
5	Technical Writing	Research article/blog on modern web technologies	10	Originality and technical content
6	Poster/Presentation	Presentation on cloud deployment or cybersecurity	6	Presentation skills
7	Group Discussion	Discussion on AI-based web applications	5	Participation and analysis
8	Case Study/Seminar	Case study on scalable web applications	10	Technical analysis

Note:

1. The hours allocated to specific activities should be proportionate to the total no. of PBL hours and marks.
