DEPARTMENT OF CSE(DATA SCIENCE)
VALUE ADDED COURSE
HTML, CSS AND JAVASCRIPT

B.Tech: **II** Semester: **III** Academic Year: **2022-23**

Course Objectives

- To introduce the fundamentals of web development and web technologies.
- To develop skills in designing and structuring web pages using HTML.
- To enable students to create visually appealing and responsive web interfaces using CSS.
- To provide knowledge of JavaScript for adding interactivity and dynamic behavior to web applications.
- To equip students with the ability to develop complete front-end web applications.

Syllabus

Unit I: Introduction to Web Technologies and HTML Fundamentals

Introduction to Web Technologies, Internet and World Wide Web, Web Browsers and Web Servers, Structure of a Web Page, HTML Basics, HTML Document Structure, Text Formatting Tags, Lists, Hyperlinks, Images, Tables, Forms and Form Elements, Semantic HTML5 Elements, Audio and Video Integration.

Unit II: Advanced HTML and CSS Fundamentals

HTML5 Features, Canvas and Multimedia Elements, Introduction to CSS, Types of CSS (Inline, Internal and External), CSS Selectors, Colors, Backgrounds, Borders, Margins, Padding, Box Model, Typography and Font Styling, CSS Units and Measurements, Styling Forms and Tables.

Unit III: Responsive Web Design using CSS

CSS Positioning Techniques, Display Properties, Float and Clear, Flexbox Layout, CSS Grid Layout, Responsive Web Design Principles, Media Queries, Navigation Menus, Animations and Transitions, Transformations, Creating Responsive Web Pages and User Interfaces.

Unit IV: JavaScript Fundamentals

Introduction to JavaScript, JavaScript Syntax and Data Types, Variables and Constants, Operators and Expressions, Control Statements, Loops, Functions, Arrays, Objects, Strings, Date and Math Objects, Error Handling, Debugging Techniques, JavaScript Best Practices.

Unit V: Advanced JavaScript and Web Application Development

Document Object Model (DOM), Event Handling, Form Validation, Browser Object Model (BOM), Local Storage and Session Storage, JSON Fundamentals, AJAX and Fetch API, Asynchronous JavaScript, Promises and Async/Await, Dynamic Content Manipulation, Development of Interactive Web Applications and Mini Project.

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY
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DEPARTMENT OF CSE(DATA SCIENCE)
VALUE ADDED COURSE

NODEJS AND REACT.JS

B.Tech: **II** Semester: **IV** Academic Year: **2022-23**

Course Objectives

- To provide a strong foundation in modern web application development using Node.js and React.js.
- To enable students to develop server-side applications and RESTful APIs using Node.js and Express.js.
- To familiarize students with database design and integration using MongoDB.
- To develop skills in creating interactive and responsive user interfaces using React.js.
- To equip students with the knowledge required to build, test, and deploy full-stack web applications using the MERN stack.

SYLLABUS

Unit I: Introduction to Node.js and Web Development

Introduction to Full-Stack Web Development, Client-Server Architecture, Features and Advantages of Node.js, Installation and Configuration of Node.js and npm, Understanding Node.js Runtime Environment, Event-Driven Programming, Working with Modules, File System Operations, Streams and Buffers, Creating Basic HTTP Servers, Package Management using npm.

Unit II: Backend Development using Express.js

Introduction to Express.js Framework, Setting Up Express Applications, Routing and Route Parameters, Middleware Functions, Handling HTTP Requests and Responses, Building RESTful APIs, Error Handling Techniques, Working with Environment Variables, Authentication and Authorization Basics, JSON Web Tokens (JWT), API Testing using Postman.

Unit III: Database Integration with MongoDB

Introduction to NoSQL Databases, MongoDB Architecture and Installation, CRUD Operations in MongoDB, Connecting MongoDB with Node.js, Introduction to Mongoose ODM, Schema Design and Model Creation, Data Validation Techniques, Querying and Updating Documents, Aggregation Basics, Developing Database-Driven Applications.

Unit IV: Frontend Development using React.js

Introduction to React.js, React Environment Setup, JSX Syntax and Expressions, Components and Component Architecture, Functional Components, Props and State Management, Event Handling, Conditional Rendering, Lists and Keys, React Hooks including useState and useEffect, Forms and User Input Handling, Component Communication and Reusability.

Unit V: Full-Stack Application Development and Deployment

Introduction to React Router, Single Page Applications (SPA), API Integration using Fetch API and Axios, Connecting React Frontend with Node.js Backend, User Authentication and Session Management, State Management Concepts, Project Structure and Best Practices, Debugging and Performance Optimization, Deployment of React and Node.js Applications, Development of a Mini MERN Stack Project.

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DEPARTMENT OF CSE(DATA SCIENCE)
VALUE ADDED COURSE
DATA VISUALIZATION

B.Tech: **III** Semester: **V** Academic Year: **2022-23**

Course Objectives

- To introduce the concepts and importance of data visualization in data analysis and decision-making.
- To develop skills in transforming raw data into meaningful visual representations.
- To familiarize students with visualization principles, charts, graphs, and dashboards.
- To enable students to use modern data visualization tools and techniques for effective communication of insights.
- To provide hands-on experience in designing interactive and analytical visualizations.

Syllabus

Unit I: Fundamentals of Data Visualization

Introduction to Data Visualization, Importance of Data Visualization, Data Types and Data Sources, Data Collection and Preparation, Principles of Effective Visualization, Human Perception and Visual Encoding, Data Cleaning and Preprocessing, Introduction to Data Analytics and Visualization Workflow.

Unit II: Visualization Techniques and Chart Design

Types of Charts and Graphs, Bar Charts, Line Charts, Pie Charts, Histograms, Scatter Plots, Area Charts, Heat Maps, Tree Maps, Bubble Charts, Selection of Appropriate Visualizations, Chart Design Principles, Color Theory, Typography, Labels and Annotations, Avoiding Misleading Visualizations.

Unit III: Data Visualization using Spreadsheet Tools

Data Analysis using Microsoft Excel/Google Sheets, Data Import and Formatting, Sorting and Filtering Data, Pivot Tables, Pivot Charts, Conditional Formatting, Dashboard Creation, Interactive Reports, Data Summarization Techniques, Visualization Best Practices in Spreadsheet Tools.

Unit IV: Data Visualization using Python

Introduction to Python for Data Analysis, Data Handling with NumPy and Pandas, Data Visualization using Matplotlib, Seaborn Libraries, Creating Statistical Graphs, Distribution Analysis, Correlation Analysis, Time Series Visualization, Customizing Charts and Graphs, Exploratory Data Analysis (EDA).

Unit V: Interactive Dashboards and Data Storytelling

Introduction to Business Intelligence and Dashboards, Dashboard Design Principles, Interactive Visualization Concepts, Data Storytelling Techniques, Key Performance Indicators (KPIs), Report Generation, Visualization using Power BI/Tableau, Publishing and Sharing Dashboards, Mini Project on Real-World Dataset Analysis and Visualization.

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DEPARTMENT OF CSE(DATA SCIENCE)
VALUE ADDED COURSE
TABLEAU

B.Tech: **III** Semester: **VI** Academic Year: **2022-23**

Course Objectives

- To introduce students to the fundamentals of data visualization and business intelligence using Tableau.
- To develop skills in connecting, preparing, and analyzing data from multiple sources.
- To enable students to create effective visualizations, dashboards, and reports using Tableau.
- To provide knowledge of data storytelling and dashboard design principles.
- To equip students with the ability to build interactive and insightful business intelligence solutions.

Syllabus

Unit I: Introduction to Tableau and Data Visualization

Introduction to Data Visualization and Business Intelligence, Overview of Tableau, Tableau Interface and Components, Tableau Installation and Setup, Connecting to Data Sources, Understanding Data Types and Data Structures, Data Import and Management, Data Visualization Principles, Exploring Data using Tableau Worksheets.

Unit II: Creating Visualizations in Tableau

Working with Dimensions and Measures, Creating Bar Charts, Line Charts, Pie Charts, Scatter Plots, Maps and Geographic Visualizations, Heat Maps, Tree Maps, Highlight Tables, Dual-Axis Charts, Formatting and Customizing Visualizations, Applying Filters and Sorting Techniques.

Unit III: Data Analysis and Calculations

Data Preparation and Cleaning, Working with Data Blending and Joins, Groups and Sets, Hierarchies, Calculated Fields, Table Calculations, Parameters, Reference Lines and Forecasting, Trend Analysis, Statistical Functions, Interactive Data Analysis Techniques.

Unit IV: Dashboard Development and Interactivity

Introduction to Dashboards, Dashboard Design Principles, Creating Interactive Dashboards, Dashboard Layouts and Containers, Actions and Filters, Parameter Controls, Story Points, Dynamic Dashboards, KPI Monitoring Dashboards, Performance Optimization Techniques, User Experience Best Practices.

Unit V: Advanced Tableau and Business Intelligence Applications

Advanced Data Visualization Techniques, Connecting to Live Data Sources, Publishing Dashboards to Tableau Public and Tableau Server, Data Storytelling Techniques, Business Intelligence Reporting, Security and Sharing Options, Real-Time Data Analysis, Best Practices for Enterprise Reporting, Mini Project using Real-World Datasets.