Complete MERN Web Development Syllabus (JavaScript-Based)

PHASE 1: Fundamentals of Web Development

1. HTML5
- Structure of HTML document
- Semantic tags
- Forms and input types
- Tables, media, links, lists

2. CSS3
- Selectors, combinators
- Box model
- Flexbox and Grid
- Positioning and z-index
- Responsive Design (media queries)
- Animations, transitions

3. JavaScript (Core)
- Variables (var, let, const)
- Data types & type coercion
- Operators & expressions
- Loops and conditionals
- Functions & arrow functions
- Arrays and methods (map, reduce, etc.)
- Objects and destructuring
- DOM manipulation
- Event handling
- setTimeout, setInterval
- Error handling (try, catch)
- JSON basics

PHASE 2: Advanced JavaScript (Frontend + Interview-level)

- Scope, Hoisting, Closures
- Callbacks, Promises, Async/Await
- Event Loop & Call Stack
- Debouncing & Throttling
- this keyword
- bind, call, apply
- Modules (ES6 import/export)
- Prototypes and Inheritance

- ES6+ Features (spread, rest, optional chaining)
- JavaScript Classes & OOP

PHASE 3: Git, GitHub, and Terminal

- Basic Git commands (init, clone, add, commit, push, pull)
- Branching and merging
- GitHub repositories
- SSH vs HTTPS
- Collaboration workflow

PHASE 4: React.js (Frontend Library)

Basic React

- JSX syntax
- Functional Components
- Props and State
- Event handling
- Conditional rendering
- Lists and keys

Intermediate React

- React Hooks: useState, useEffect
- Forms and controlled components
- Routing using react-router-dom
- Component reusability
- Lifting state up
- Context API
- Styling: CSS modules, Styled Components, TailwindCSS or Bootstrap

Advanced React

- Custom Hooks
- useReducer & useContext
- Lazy loading components
- Error boundaries
- React.memo and performance optimization
- State management libraries (Redux or Zustand)
- Authentication handling in frontend (token storage)
- API Integration (Axios, Fetch)

PHASE 5: Node.js + Express.js (Backend)

Node.js Basics

- Understanding Node environment
- require() & module.exports
- Event Loop
- File system module (fs)
- Creating a basic HTTP server

Express.js (Web Framework)

- Routing (GET, POST, PUT, DELETE)
- Handling middleware
- Body parsers & query params
- Error handling
- Serving static files
- RESTful API creation

Backend Advanced

- API Validation (e.g., express-validator)
- Authentication (JWT, bcrypt)
- Role-based access control
- File uploads (multer)
- Nodemailer (for email)
- MVC folder structure
- Async/Await error handling with middleware

PHASE 6: MongoDB + Mongoose

- Introduction to NoSQL
- CRUD Operations
- MongoDB Compass
- Connecting MongoDB to Node.js with Mongoose
- Schemas and Models
- Data types and validation
- Mongoose middlewares (pre, post hooks)
- Population (joining collections)
- Indexes and performance

PHASE 7: Full Stack Integration (MERN)

- Connect React frontend to Express backend
- Axios for API calls
- CORS handling
- Protecting frontend routes
- Storing and validating JWT tokens

- User login, register, logout
- Fetching user-specific data
- Refresh tokens (optional)

PHASE 8: Testing

- Manual testing with Postman
- Frontend testing with React Testing Library or Jest
- Backend testing using Supertest & Mocha/Chai

PHASE 9: DevOps + Deployment

- Environment variables (.env)
- Build React app for production
- Deploying:
  - Frontend: Vercel / Netlify
  - Backend: Render / Railway / Cyclic
  - Full MERN app: Render / EC2 / VPS
- MongoDB Atlas setup
- Domain linking
- CI/CD basics with GitHub Actions

PHASE 10: Project Building Practice (Ideas)

Beginner Projects
- Portfolio website
- To-do list app
- Calculator
- Weather app

Intermediate Projects
- Blog platform
- Notes App with Login
- E-commerce cart system

Advanced MERN Projects
- Social media platform
- Chat application with Socket.io
- Real-time collaboration tool
- Money Tracker App (with JWT auth)
- Travel Booking Website
- Dashboard with analytics

Optional But Useful Topics

- TypeScript (strict typing)
- Next.js (React Framework)
- WebSockets
- GraphQL
- Redis for caching
- Payment integration (Stripe, Razorpay)
- Docker basics