**what to study in each topic** for MERN backend development — topic-wise and straight to the point:

### 1. **JavaScript / TypeScript**

* **JavaScript Basics** – Variables, Loops, Functions, Arrays, Objects
* **ES6+ Features** – Arrow functions, Destructuring, Spread/Rest, Promises
* **Async JS** – Callbacks, Promises, async/await
* **Modules** – import/export, CommonJS (require)
* **TypeScript (optional)** – Types, Interfaces, Enums, Generics

### 2. **Node.js**

* **Core Concepts** – Event loop, Call stack, Global objects
* **Modules** – fs, http, path
* **NPM/Yarn** – Installing & using packages
* **Process & Env** – process.env, dotenv

### 3. **Express.js**

* **Basic Server** – app.get(), app.post()
* **Middleware** – Custom, Built-in, 3rd party (e.g., morgan)
* **Routing** – Params, Query, Nested routes
* **Error Handling** – Try/Catch, next(), Custom error middleware

### 4. **MongoDB**

* **Basics** – Collections, Documents
* **CRUD Operations** – insertOne, find, updateOne, deleteOne
* **Indexes** – Performance, Unique fields
* **Aggregation** – $match, $group, $lookup

### 5. **Mongoose**

* **Schemas & Models** – Defining schema, Using models
* **CRUD with Mongoose**
* **Validation** – Built-in & custom validators
* **Middleware** – pre / post hooks
* **Population** – .populate() for relations

### 6. **Authentication (JWT)**

* **User Registration/Login** – Hashing passwords (bcrypt)
* **JWT** – Sign, verify tokens
* **Protected Routes** – Middleware to check auth
* **Refresh Tokens** (optional)

### 7. **Validation**

* **Joi** or **express-validator**
* Validate – Request body, params, headers
* Error messages customization

### 8. **Testing**

* **Jest** – Writing unit tests
* **Supertest** – Testing Express routes
* **Test Structure** – Arrange-Act-Assert

### 9. **Environment Management**

* **dotenv** – .env files
* **Secrets Management** – Keep API keys, DB URLs out of code

### 10. **Git & GitHub**

* **Git Basics** – clone, add, commit, push, pull
* **Branches** – checkout, merge, PRs
* **.gitignore** – Ignoring sensitive or generated files

### 11. **Deployment**

* **Render / Railway / Vercel** – Create account, connect GitHub repo
* **Environment Variables** – Set securely in dashboard
* **MongoDB Atlas** – Cloud DB setup
* **CORS & HTTPS** – Allow frontend access

Would you like a study roadmap based on these, like Week 1, Week 2, etc.?