SDE Roadmap

(beginner to advanced)

S D E

SOFTWARE   DEVELOPMENT   ENGINEER

Swipe>>

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1. Programming Language

Pick any one: **C++ / Java / Python**

Learn:

- **Variables**, loops, functions
- **Arrays**, Strings
- **OOP**: Class, Inheritance, Polymorphism, Encapsulation
- **Exception** Handling
- STL (if C++) or Collections (if Java)

2. Data Structures and Algorithms

Must-Know DS:	**Must-Know Algorithms:**
Arrays & Strings	Sorting
Stack & Queue	Recursion + Backtracking
Linked List	Binary Search
HashMap / HashSet	Two Pointers, Sliding Window
Binary Tree, BST	Greedy
Heap / Priority Queue	DP (Knapsack, LIS, LCS)
Graphs (BFS, DFS)	Union Find (Disjoint Set)

DSA handwritten notes in bio

3. System Design

- **HLD:**

  - (Monolith vs Microservices)
  - Component Diagram
  - Data Flow Design
  - API Gateway & Routing
  - Caching (Redis, Memcached)

  - Load Balancer

- **LLD**:

  - Class Diagrams (UML)
  - Object-Oriented Design
  - Design Patterns

4. Databases

SQL (Must Know):

- CRUD (SELECT, INSERT, UPDATE, DELETE)
- Joins (Inner, Left, Right, Full)
- Group By, Having, Subqueries
- Indexing, Normalization

NoSQL (Basics):

- Document (e.g., MongoDB)
- Key-Value (e.g., Redis)
- Differences between SQL and NoSQL
- CAP Theorem

DBMS full notes in bio

5. Operating System

1. Processes & Threads

2. CPU Scheduling (FCFS, SJF, RR, Priority)

3. Interprocess Communication (IPC)

4. Deadlock (Conditions, Banker's Algo)

5. Process Synchronization (Semaphores, Mutex)

6. Memory Management (Paging, Segmentation)

7. Virtual Memory (Page Replacement - LRU, FIFO)

8. File System & Allocation Methods

(OS handwritten Notes in bio)

6. Computer Networks

- **OSI Model** (7 Layers)

- TCP/IP Model

- IP Addressing (IPv4, Subnetting)

- TCP vs UDP

- Routing & Switching (Router vs Switch)

- DNS, DHCP, HTTP/HTTPS, FTP

- MAC Address & ARP

- Socket Programming Basics

7. Projects (2-3 Solid Ones)

Good project checklist:

- Uses frontend + backend + database
- Has authentication (login/signup)
- Hosted live (Render, Vercel, Netlify)
- Uses API (REST or GraphQL)

Suggested Projects:

- Blog App (MERN)
- Chat App (Socket.IO / Firebase)
- E-commerce Website

8. Apply for Jobs

- **Apply on:**
    - LinkedIn, Naukri
    - Internshala,
    - AngelList, Company Careers page
- Use referrals for big companies
- Keep learning while applying