Saurabh Nahariya from VIT Vellore 2021 Batch, has joined us at C4 Projects. He recently got placed in D.E. Shaw through an On-Campus Drive. Here he has shared with us, all the important topics related to CS Fundamentals (DBMS, OS, Networks, and Software Engineering) that will be enough to Crack Interviews. We hope it helps you!

Database Management System (DBMS)

1. What is DBMS? How it is different from Data Structures.
2. Difference between Database and Database Management System?
3. Main Memory and Secondary Memory.
4. Basic Functionality and Advantages of DBMS i.e. Data Retrieve, Delete, Insert

   (Functionality) and remove redundancy, easy access (Advantages)
5. DBMS Two-Level and Three-Level Architecture.
6. Entity-Relationship Model (ER Model, Know the Basics i.e What is Entity, Attributes, and Cardinality) (Hint: They won't ask you to make Complex ER diagram)
7. Relational Model (Difference b/w ER model and Relational Model)
8. All type of keys in the relational model (Primary Key, Super Key, Candidate Key, Foreign Key) (Hint: Important)
9. Armstrong Axioms and all type of functional dependencies (Transitive and Relative)
10. Database Anomalies (Insert, Delete and Update)
11. Normalization ->What is Normalization? Why do we need Normalization? 12. All the types of normalization, 1 NF, 2NF, 3NF, and BCNF. (Hint: They won't ask you to convert the functions into 1NF, 2NF, and All, Just know the basics of

    each normal form & it would be better if you understand every NF form with an example (Important topic)
13. SQL Queries (Learn with one example of each query, not much, best resource: SQL from W3schools)
14. File Structures in Database (Indexing, Sparse Indexing, B - Tree, B+ trees) (Source GFG)
15. Transactions, Operations of Transactions, Transaction's ACID Properties (Important)

16. State of Transactions i.e Committed, partially Committed
17. Concurrency Control, Lock and all over Transactions

Youtube Channel - Sanchit Jain

Operating Systems (OS)

1. What is Operating System and Its Types (MultiProcessing, MultiTasking, and All)
2. Process and Threads in OS, Process State, Process Control Block, and Context Switching (Threading is Important Topic)
3. Process Scheduling (All the Job Scheduling Algorithms)
4. Important Scheduling Algos (SJF, SRTF, FCFS, LJF(Longest Job First) and Round Robin Scheduling)
5. Process Synchronization, Critical Section, Inter-Process Communication, Locks for Synchronization (Semaphore and Mutex) and Monitors (Important)
6. DeadLock, Characteristics of DeadLock, Handling and Recovery from Deadlock
7. Memory Management in Operating System
8. First Fit, Best Fit, Next Fit, and Worst Fit in Operating System (Important)
9. Paging in Memory Management (Concept of Virtual memory) (Important)
10. Demand Paging, Thrashing and Page Replacement Algo (FCFS and LRU Algorithm)
11. Segmentation in Memory Management and Translation Lookaside Buffer (TLB)

Youtube Channel - Ravindrababu Raula

Computer Networks (Network and Communication)

Generally, they don't ask Computer Networks most of the time, but read the job description first, If it is necessary for the job description or you have time to prepare for it then you can. (CISCO focuses on Computer Networks so, for that, you have to study this subject.)

1. What is Computer Networks (LAN, WAN, and MAN)
2. Network Topologies (Star, Bus, etc.)
3. Translation Modes in Networks (Simplex, Duplex, and Half Duplex)
4. TCP/IP vs. OSI Model (Most Important)
5. Functionality of All the OSI Layers (Important: Those are Mentioned Below 6 -)
6. Stop and Wait HRQ, Selective Repeat Protocol, Sliding Window, Go Back N (Data Link Layer)
7. IPV4 vs. IPV6 (Network Layer) (Important)
8. TCP vs. UDP (Transport Layer) (Important)
9. Domain Name System (DNS) (Application Layer) (Important) 10. (Optional: Have some basic knowledge of Subnetting and IP Addressing)

Software Engineering (According to Job Description if Necessary / Imp. in HR Round)

1. What is Software Engineering and why do we need it? (HR Question)
2. Software Development Life Cycle (SDLC)
3. SDLC Models (Important)
4. Waterfall Model, V Model, Iterative Model, Spiral Model, and Agile Model(Important)
5. Why is the Agile Model important and better?
6. Quality assurance and testing (QTE) - If you are applying for this post then you should have knowledge about BlackBox and Whitebox Testing.
7. What is Software Requirement Specification (SRS Document)
8. Use Software Engineering basics while giving an explanation of your projects (Example Below)
9. Example: I and my team thought of making this XYZ project. So I made one SRS Document for requirements. Which model you used (Tell agile cause it is the best model).

   Then tell, we tested this. (Complete Idea with Software Engineering) (Very much important in CV and HR round)

Special Note: No need to go deep into any of the topics mentioned above. Just try to understand the meaning and working of every topic with an example. Majorly

Questions will be basic only. Don’t fear much. Just cover the basics. Those who are in the 2nd or 3rd Year will take classes of all the CS fundamentals mentioned above very soon in the near future. Those who are currently in the 4th Year, they can refer GeeksForGeeks for the preparation of topics mentioned above.

All the Best!