Virtual Machines – History, Benefits and Features, Building Blocks, Types of Virtual Machines and their Implementations, Virtualization and Operating-System Components; Mobile OS - iOS and Android.

Question Bank – Principles of Operating Systems

(Focus Area: Virtual Machines & Mobile OS)

Aligned with MAANGO BIG7 Framework & MNC Interview Patterns

Part A: Short Answer Questions (Bloom's: Remember / Understand | Industry-Oriented)

Virtual Machines

1. Define Virtual Machine (VM) and list two benefits. (Unit 5 | Bloom's: Remember | Tag: Amazon AWS)

2. Differentiate between Type 1 and Type 2 Hypervisors. (Unit 5 | Bloom's: Understand | Tag: Microsoft Azure)

3. What is Live Migration in virtualization? (Unit 5 | Bloom's: Understand | Tag: Google Cloud)

4. Explain Paravirtualization with an example. (Unit 5 | Bloom's: Understand | Tag: Oracle Cloud)

5. How does Hardware-assisted Virtualization (VT-x/AMD-V) improve performance? (Unit 5 | Bloom's: Understand | Tag: Intel)

Mobile OS (iOS & Android)

6. What is the role of the Dalvik VM in Android? (Unit 5 | Bloom's: Remember | Tag: Google)

7. Differentiate between iOS Sandboxing and Android App Permissions. (Unit 5 | Bloom's: Understand | Tag: Apple)

8. Why does iOS use a Microkernel architecture? (Unit 5 | Bloom's: Understand | Tag: Meta)

9. What is ART (Android Runtime) and how does it differ from Dalvik? (Unit 5 | Bloom's: Understand | Tag: Samsung)

10. Explain iOS Security Enclave and its significance. (Unit 5 | Bloom's: Understand | Tag: Apple)

Virtualization & OS Components

11. How does Memory Ballooning work in virtualization? (Unit 5 | Bloom's: Understand | Tag: VMware)

12. What is Containerization and how is it different from VMs? (Unit 5 | Bloom's: Understand | Tag: Docker)

13. Why is I/O Virtualization challenging in cloud environments? (Unit 5 | Bloom's: Understand | Tag: IBM Cloud)

14. How does Android Binder IPC work? (Unit 5 | Bloom's: Understand | Tag: Google)

15. What is Swift and how does it impact iOS performance? (Unit 5 | Bloom's: Understand | Tag: Apple)

Part B: Long Answer Questions (Bloom's: Apply / Analyze / Evaluate | Real-World Scenarios)

Virtual Machines

1. Compare KVM, VMware, and Hyper-V in terms of performance, security, and use cases. (Bloom's: Analyze | Unit 5 | Tag: Microsoft)

2. Design a cost-effective cloud VM strategy for a startup using AWS EC2 instances. (Bloom's: Apply | Unit 5| Tag: Amazon)

3. Evaluate the security risks in multi-tenant VM environments and suggest mitigations. (Bloom's: Evaluate | Unit 5 | Tag: Oracle)

4. Explain how nested virtualization works and its applications in modern computing. (Bloom's: Analyze | Unit 5 | Tag: Intel)

5. Case Study: A company wants to migrate from physical servers to VMs. Propose a virtualization roadmap considering scalability and cost. (Bloom's: Evaluate | Unit 5| Tag: TCS)

Mobile OS (iOS & Android)

6. Analyze the impact of Android's Linux kernel modifications on performance and security. (Bloom's: Analyze | Unit 5 | Tag: Google)

7. Compare iOS and Android process management in terms of efficiency and security. (Bloom's: Evaluate | Unit 5| Tag: Apple)

8. Reverse Engineer an Android app sandboxing mechanism and discuss vulnerabilities. (Bloom's: Apply | Unit 5 | Tag: Meta)

9. Case Study: An e-commerce app (like Amazon) crashes frequently on low-end Android devices. Diagnose and optimize the memory management issues. (Bloom's: Evaluate | Unit 5 | Tag: Amazon)

10. Evaluate the role of Swift vs. Java/Kotlin in iOS and Android app performance. (Bloom's: Evaluate | Unit 5| Tag: Apple/Google)

Part C: Case-Based/Design-Based Questions (Bloom's: Analyze / Evaluate / Create | Industry Problem-Solving)

1. Case Study: A financial firm wants to switch from VMware to KVM-based virtualization for cost savings. Analyze risks, performance trade-offs, and migration steps. (Bloom's: Evaluate | Unit 5 | Tag: IBM)

2. Design a secure Android ROM for banking apps with enhanced sandboxing and SELinux policies. (Bloom's: Create | Unit 5 | Tag: Google)

3. Case Study: Netflix needs to optimize iOS background processes for better battery life. Propose a solution using GCD and energy-efficient APIs. (Bloom's: Analyze | Unit 5 | Tag: Netflix)

4. Architect a hybrid cloud solution using containers and VMs for a healthcare app (HIPAA compliance). (Bloom's: Create | Unit 5 | Tag: Microsoft)

5. Case Study: An IoT company uses Android Things but faces real-time scheduling issues. Redesign the OS-level task scheduler. (Bloom's: Evaluate | Unit 5 | Tag: Samsung)

📌 Key Features of Question Bank:

✓ Covers Virtual Machines, Mobile OS (iOS & Android)

✓ Bloom's Taxonomy Balanced (Remember → Create)

✓ Real-World MNC Case Studies (AWS, Google, Apple, etc.)

✓ Interview-Aligned (Cloud, Virtualization, Mobile OS Optimization)

✓ Difficulty Level: Moderate (Engineering Students Focused)

This Question Bank ensures industry relevance, problem-solving skills, and technical depth for Placement & Higher Studies. Need any refinements? 🚀