



# SNS COLLEGE OF ENGINEERING

Kurumbapalayam (po), Coimbatore – 641 107  
Accredited by NAAC-UGC with 'A' Grade  
Approved by AICTE & Affiliated to Anna University, Chennai



## DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

Academic Year 2025-2026(Even Semester)

### UNIT I – INTRODUCTION TO OPERATING SYSTEM

Question Bank (Bloom's Level + MNC Mapping + GATE Year in Same Column)

#### UNIT 1

PART A – 2 MARKS (15 Questions)

Bloom's Level 1 & 2

| Q.No | Question   | Bloom's Level | MNC / GATE Mapping (Year) |
|------|--|---------------|---------------------------|
| 1    | Define Operating System.                         | L1            | GATE 2014                 |
| 2    | List any four functions of an Operating System.  | L1            | TCS                       |
| 3    | Differentiate between Kernel and Shell.          | L2            | Infosys                   |
| 4    | What is a System Call? Give two examples.        | L1            | GATE 2018                 |
| 5    | Define Multiprogramming.                         | L1            | Wipro                     |
| 6    | What is Time-sharing system?                     | L1            | GATE 2016                 |
| 7    | Mention two objectives of Operating System.      | L2            | Accenture                 |
| 8    | What is Batch Operating System?                  | L1            | GATE 2013                 |
| 9    | Define Real-Time Operating System.               | L1            | Capgemini                 |
| 10   | Differentiate between User Mode and Kernel Mode. | L2            | GATE 2020                 |
| 11   | List any two OS services.                        | L1            | TCS                       |
| 12   | What is a System Program? Give example.          | L2            | GATE 2017                 |
| 13   | Define Monolithic OS structure.                  | L1            | Wipro                     |
| 14   | What is Layered OS structure?                    | L2            | GATE 2015                 |
| 15   | Define Portability in OS design.                 | L2            | HCL                       |

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**PART B – 13 MARKS (10 Questions)**

**Bloom's Level 3 & 4**

| <b>Q.No</b> | <b>Question</b>  | <b>Bloom's Level</b> | <b>MNC / GATE Mapping (Year)</b> |
|-------------|--|----------------------|----------------------------------|
| 16          | Compare Batch, Multiprogramming and Time-sharing OS with examples.                           | L3                   | GATE 2012                        |
| 17          | Analyze Monolithic and Layered OS structures. Suggest suitable structure for banking system. | L4                   | TCS                              |
| 18          | Explain OS services and analyze their role in IT company infrastructure.                     | L3                   | Infosys                          |
| 19          | Explain System Calls with diagram and analyze security benefits.                             | L4                   | GATE 2019                        |
| 20          | Discuss evolution of OS from Batch to Distributed systems.                                   | L3                   | GATE 2011                        |
| 21          | Analyze objectives of OS in resource management in data centers.                             | L4                   | Capgemini                        |
| 22          | Explain OS structures and justify microkernel for secure applications.                       | L4                   | IBM                              |
| 23          | A company crashes due to memory protection failure. Analyze OS design issue.                 | L4                   | Wipro                            |
| 24          | Compare CLI and GUI interfaces. Analyze enterprise server suitability.                       | L3                   | GATE 2021                        |
| 25          | Analyze role of user mode and kernel mode in preventing malware attacks.                     | L4                   | Microsoft                        |

**PART C – 14 MARKS (5 Questions – Level 4 Case Study / Problem)**

| <b>Q.No</b> | <b>Question</b>  | <b>Bloom's Level</b> | <b>MNC / GATE Mapping (Year)</b> |
|-------------|--|----------------------|----------------------------------|
| <b>26</b>   | <b>Case Study: Design suitable OS structure for multinational banking system with high security.</b>   | <b>L4</b>            | <b>TCS</b>                       |
| <b>27</b>   | <b>Case Study: Improve CPU utilization in IT company data center using OS features.</b>                | <b>L4</b>            | <b>Infosys</b>                   |
| <b>28</b>   | <b>Case Study: Analyze improper system call handling causing cloud server crash. Suggest solution.</b> | <b>L4</b>            | <b>Amazon</b>                    |
| <b>29</b>   | <b>Problem: Redesign system where user processes directly access hardware to improve security.</b>     | <b>L4</b>            | <b>GATE 2018</b>                 |
| <b>30</b>   | <b>Case Study: Analyze portability challenges while migrating OS to new hardware architecture.</b>     | <b>L4</b>            | <b>IBM</b>                       |

## UNIT II – PROCESS MANAGEMENT

### ✔ PART A – 2 MARKS (15 Questions)

#### Bloom's Level 1 & 2

| Q.No | Question   | Bloom's Level | MNC / GATE Mapping (Year) |
|------|--|---------------|---------------------------|
| 1    | Define Process.                                      | L1            | GATE 2014                 |
| 2    | List components of Process Control Block (PCB).      | L1            | GATE 2018                 |
| 3    | Differentiate between Process and Program.           | L2            | TCS                       |
| 4    | What is Context Switching?                           | L1            | GATE 2016                 |
| 5    | Define Process Scheduling.                           | L1            | Infosys                   |
| 6    | What is Inter-Process Communication (IPC)?           | L1            | GATE 2017                 |
| 7    | Define Thread.                                       | L1            | Wipro                     |
| 8    | Differentiate between User thread and Kernel thread. | L2            | GATE 2020                 |
| 9    | What is Critical Section?                            | L1            | GATE 2013                 |
| 10   | Define Semaphore.                                    | L1            | GATE 2019                 |
| 11   | What is Mutex?                                       | L1            | Accenture                 |
| 12   | Define Deadlock.                                     | L1            | GATE 2015                 |
| 13   | List four necessary conditions for Deadlock.         | L2            | GATE 2012                 |
| 14   | What is Starvation in scheduling?                    | L2            | Capgemini                 |
| 15   | Define Multithreading.                               | L1            | IBM                       |

**PART B – 13 MARKS (10 Questions)**

**Bloom's Level 3 & 4 (Apply & Analyze)**

| <b>Q.No</b> | <b>Question</b>   | <b>Bloom's Level</b> | <b>MNC / GATE Mapping (Year)</b> |
|-------------|---|----------------------|----------------------------------|
| 16          | <b>Explain Process states with diagram and analyze state transitions.</b>                       | L3                   | GATE 2011                        |
| 17          | <b>Compare FCFS, SJF and Round Robin scheduling algorithms with example.</b>                    | L4                   | GATE 2019                        |
| 18          | <b>Analyze different IPC mechanisms and justify which is suitable for banking applications.</b> | L4                   | TCS                              |
| 19          | <b>Explain Multithreading models and analyze performance impact.</b>                            | L3                   | Infosys                          |
| 20          | <b>Analyze Critical Section problem and discuss hardware solutions.</b>                         | L4                   | GATE 2017                        |
| 21          | <b>Explain Semaphores with example and analyze synchronization issues.</b>                      | L3                   | GATE 2018                        |
| 22          | <b>Discuss Classical Synchronization Problems (Producer-Consumer / Dining Philosophers).</b>    | L3                   | GATE 2014                        |
| 23          | <b>Analyze Deadlock prevention and avoidance techniques with example.</b>                       | L4                   | GATE 2021                        |
| 24          | <b>Explain Deadlock detection and recovery methods.</b>   | L3                   | Wipro                            |
| 25          | <b>Analyze thread scheduling challenges in multi-core processors.</b>                           | L4                   | Microsoft                        |

**PART C – 14 MARKS (5 Questions – Level 4 Problem / Case Study Based)**

| <b>Q.No</b> | <b>Question</b>  | <b>Bloom's Level</b> | <b>MNC / GATE Mapping (Year)</b> |
|-------------|--|----------------------|----------------------------------|
| <b>26</b>   | <b>Problem: Given arrival and burst times of processes, construct Gantt chart for FCFS and SJF. Compute waiting and turnaround time.</b> | <b>L4</b>            | <b>GATE 2018</b>                 |
| <b>27</b>   | <b>Case Study: A banking server experiences deadlock frequently. Analyze causes and propose prevention strategy.</b>                     | <b>L4</b>            | <b>TCS</b>                       |
| <b>28</b>   | <b>Problem: Apply Banker's Algorithm to determine safe sequence for given allocation matrix.</b>   | <b>L4</b>            | <b>GATE 2020</b>                 |
| <b>29</b>   | <b>Case Study: A multi-threaded web server shows race condition errors. Analyze synchronization flaws and redesign solution.</b>         | <b>L4</b>            | <b>Amazon</b>                    |
| <b>30</b>   | <b>Problem: Given time quantum and process data, compute performance of Round Robin scheduling.</b>                                      | <b>L4</b>            | <b>GATE 2016</b>                 |

**UNIT III – MEMORY MANAGEMENT, FILE SYSTEM & I/O**

**PART A – 2 MARKS (15 Questions)**

**Bloom's Level 1 & 2**

| <b>Q.No</b> | <b>Question</b>                                | <b>Bloom's Level</b> | <b>MNC / GATE Mapping (Year)</b> |
|-------------|--|----------------------|----------------------------------|
| 1           | Define Main Memory.                            | L1                   | GATE 2014                        |
| 2           | What is Swapping?                              | L1                   | GATE 2016                        |
| 3           | Define External Fragmentation.                 | L1                   | GATE 2013                        |
| 4           | Differentiate between Paging and Segmentation. | L2                   | GATE 2018                        |
| 5           | What is Page Table?                            | L1                   | Infosys                          |
| 6           | Define Virtual Memory.                         | L1                   | GATE 2017                        |
| 7           | What is Demand Paging?                         | L1                   | GATE 2019                        |
| 8           | Define Page Fault.                             | L1                   | GATE 2020                        |
| 9           | What is Thrashing?                             | L2                   | GATE 2015                        |
| 10          | Define FIFO Page Replacement.                  | L1                   | TCS                              |
| 11          | What is File Allocation Table (FAT)?           | L1                   | Wipro                            |
| 12          | Define Directory Structure.                    | L2                   | GATE 2012                        |
| 13          | What is Disk Scheduling?                       | L1                   | GATE 2011                        |
| 14          | Define Seek Time.                              | L1                   | Accenture                        |
| 15          | What is I/O Interrupt?                         | L2                   | IBM                              |

**PART B – 13 MARKS (10 Questions)****Bloom's Level 3 & 4 (Apply & Analyze)**

| <b>Q.No</b> | <b>Question</b>  | <b>Bloom's Level</b> | <b>MNC / GATE Mapping (Year)</b> |
|-------------|--|----------------------|----------------------------------|
| 16          | Explain Contiguous Memory Allocation techniques with example.          | L3                   | GATE 2014                        |
| 17          | Analyze Paging mechanism with logical to physical address translation. | L4                   | GATE 2019                        |
| 18          | Compare Paging and Segmentation with advantages and disadvantages.     | L3                   | Infosys                          |
| 19          | Explain Demand Paging and analyze causes of Page Fault.                | L3                   | GATE 2018                        |
| 20          | Compare FIFO, LRU and Optimal Page Replacement algorithms.             | L4                   | GATE 2021                        |
| 21          | Analyze Thrashing and suggest methods to control it.                   | L4                   | GATE 2016                        |
| 22          | Explain File Allocation Methods (Contiguous, Linked, Indexed).         | L3                   | TCS                              |
| 23          | Discuss Directory implementation and protection mechanisms.            | L3                   | Wipro                            |
| 24          | Compare Disk Scheduling algorithms (FCFS, SSTF, SCAN).                 | L4                   | GATE 2017                        |
| 25          | Analyze I/O subsystem structure and interrupt handling.                | L4                   | Microsoft                        |

**PART C – 14 MARKS (5 Questions – Level 4 Problem / Case Study Based)**

| <b>Q.No</b> | <b>Question</b>  | <b>Bloom's Level</b> | <b>MNC / GATE Mapping (Year)</b> |
|-------------|--|----------------------|----------------------------------|
| <b>26</b>   | <b>Problem: Given page reference string and frame size, compute page faults using FIFO and LRU.</b>  | <b>L4</b>            | <b>GATE 2018</b>                 |
| <b>27</b>   | <b>Problem: Translate logical address to physical address using given page table.</b>  | <b>L4</b>            | <b>GATE 2020</b>                 |
| <b>28</b>   | <b>Case Study: A cloud server suffers heavy thrashing. Analyze causes and propose solution using working set model.</b>                        | <b>L4</b>            | <b>Amazon</b>                    |
| <b>29</b>   | <b>Problem: Given disk request sequence and head position, compute total seek time using SCAN and SSTF.</b>                                    | <b>L4</b>            | <b>GATE 2019</b>                 |
| <b>30</b>   | <b>Case Study: A multinational company faces file corruption due to improper allocation method. Analyze and redesign file system strategy.</b> | <b>L4</b>            | <b>IBM</b>                       |

## UNIT IV – VIRTUALIZATION

### PART A – 2 MARKS (15 Questions)

#### Bloom's Level 1 & 2

| Q.No | Question   | Bloom's Level | MNC / GATE Mapping (Year) |
|------|--|---------------|---------------------------|
| 1    | Define Virtualization.   | L1            | GATE 2021                 |
| 2    | What is Hardware Emulation?  | L1            | IBM                       |
| 3    | Define Full Virtualization.  | L1            | VMware                    |
| 4    | What is Binary Translation?  | L2            | GATE 2019                 |
| 5    | Define Hardware-assisted Virtualization.                           | L1            | Intel                     |
| 6    | What is OS Virtualization?   | L1            | Red Hat                   |
| 7    | Define Para-virtualization.  | L1            | GATE 2018                 |
| 8    | Differentiate between Full Virtualization and Para-virtualization. | L2            | TCS                       |
| 9    | What is Hypervisor?  | L1            | GATE 2017                 |
| 10   | Define Virtual Machine (VM).                                       | L1            | Microsoft                 |
| 11   | What is Guest OS?  | L2            | Infosys                   |
| 12   | Define Host Machine.   | L1            | Wipro                     |
| 13   | What is Resource Virtualization?                                   | L2            | Capgemini                 |
| 14   | Define Server Consolidation.                                       | L2            | IBM                       |
| 15   | What is Virtual Machine Monitor (VMM)?                             | L1            | GATE 2016                 |

**PART B – 13 MARKS (10 Questions)****Bloom's Level 3 & 4 (Apply & Analyze)**

| <b>Q.No</b> | <b>Question</b>   | <b>Bloom's Level</b> | <b>MNC / GATE Mapping (Year)</b> |
|-------------|---|----------------------|----------------------------------|
| 16          | Explain different types of Virtualization with neat diagram.                | L3                   | GATE 2020                        |
| 17          | Compare Full Virtualization and Para-virtualization with suitable examples. | L4                   | VMware                           |
| 18          | Analyze Hardware-assisted Virtualization and its advantages.                | L4                   | Intel                            |
| 19          | Explain OS-level Virtualization and justify its industrial usage.           | L3                   | Red Hat                          |
| 20          | Analyze performance overhead in virtualization.                             | L4                   | Amazon                           |
| 21          | Explain Binary Translation technique in virtualization.                     | L3                   | GATE 2019                        |
| 22          | Compare Hardware Emulation and Virtualization.                              | L4                   | IBM                              |
| 23          | Discuss role of Hypervisor in cloud computing.                              | L3                   | Microsoft                        |
| 24          | Analyze benefits of Server Virtualization in MNC infrastructure.            | L4                   | TCS                              |
| 25          | Explain Virtualization security challenges and mitigation strategies.       | L4                   | Accenture                        |

**PART C – 14 MARKS (5 Questions – Level 4 Problem / Case Study Based)**

| <b>Q.No</b> | <b>Question</b>   | <b>Bloom's Level</b> | <b>MNC / GATE Mapping (Year)</b> |
|-------------|---|----------------------|----------------------------------|
| <b>26</b>   | <b>Case Study: A multinational company wants to reduce hardware cost using virtualization. Design suitable virtualization strategy.</b> | <b>L4</b>            | <b>IBM</b>                       |
| <b>27</b>   | <b>Case Study: Analyze performance comparison between Hardware-assisted and Para-virtualization for cloud deployment.</b>               | <b>L4</b>            | <b>Amazon</b>                    |
| <b>28</b>   | <b>Problem: Design virtualization architecture for data center hosting 100+ VMs.</b>  | <b>L4</b>            | <b>VMware</b>                    |
| <b>29</b>   | <b>Case Study: Security breach occurs in virtualized environment. Analyze vulnerabilities and suggest mitigation.</b>                   | <b>L4</b>            | <b>Microsoft</b>                 |
| <b>30</b>   | <b>Problem: Evaluate server consolidation benefits using virtualization in enterprise IT infrastructure.</b>                            | <b>L4</b>            | <b>GATE 2021</b>                 |

## UNIT V – HYPERVISOR & CONTAINERS

### PART A – 2 MARKS (15 Questions)

#### Bloom's Level 1 & 2

| Q.No | Question  | Bloom's Level | MNC / GATE Mapping (Year) |
|------|---|---------------|---------------------------|
| 1    | Define Hypervisor.                                  | L1            | GATE 2021                 |
| 2    | Differentiate between Type 1 and Type 2 Hypervisor. | L2            | VMware                    |
| 3    | What is Type 1 Hypervisor?                          | L1            | Microsoft                 |
| 4    | Define Type 2 Hypervisor.                           | L1            | Oracle                    |
| 5    | What is Para-virtualization?                        | L1            | GATE 2018                 |
| 6    | Define Server Virtualization.                       | L1            | IBM                       |
| 7    | What is Desktop Virtualization?                     | L1            | TCS                       |
| 8    | Define Virtual Machine Snapshot.                    | L2            | VMware                    |
| 9    | What is VM Cloning?                                 | L2            | Infosys                   |
| 10   | Define Template in Virtualization.                  | L1            | Wipro                     |
| 11   | What is OVF (Open Virtualization Format)?           | L2            | GATE 2019                 |
| 12   | Define Hot Cloning.                                 | L1            | Microsoft                 |
| 13   | Define Cold Cloning.                                | L1            | IBM                       |
| 14   | What is Container?                                  | L1            | Red Hat                   |
| 15   | Define Docker.                                      | L1            | GATE 2020                 |

**PART B – 13 MARKS (10 Questions)****Bloom's Level 3 & 4 (Apply & Analyze)**

| <b>Q.No</b> | <b>Question</b>   | <b>Bloom's Level</b> | <b>MNC / GATE Mapping (Year)</b> |
|-------------|---|----------------------|----------------------------------|
| 16          | <b>Explain Type 1 and Type 2 Hypervisors with architecture diagram.</b> | <b>L3</b>            | <b>GATE 2021</b>                 |
| 17          | <b>Compare Server Virtualization and Desktop Virtualization.</b>        | <b>L4</b>            | <b>TCS</b>                       |
| 18          | <b>Analyze advantages of Snapshots and Cloning in enterprise IT.</b>    | <b>L4</b>            | <b>VMware</b>                    |
| 19          | <b>Explain OVF standard and its importance in VM portability.</b>       | <b>L3</b>            | <b>GATE 2019</b>                 |
| 20          | <b>Analyze security features of Hypervisors in cloud environment.</b>   | <b>L4</b>            | <b>Microsoft</b>                 |
| 21          | <b>Explain concept of Containers and compare with Virtual Machines.</b> | <b>L4</b>            | <b>Red Hat</b>                   |
| 22          | <b>Discuss Docker architecture and components.</b>                      | <b>L3</b>            | <b>GATE 2020</b>                 |
| 23          | <b>Analyze benefits of Lightweight Virtual Machines in DevOps.</b>      | <b>L4</b>            | <b>Amazon</b>                    |
| 24          | <b>Explain Hot Cloning and Cold Cloning with industrial example.</b>    | <b>L3</b>            | <b>IBM</b>                       |
| 25          | <b>Analyze VM portability challenges in multi-cloud environments.</b>   | <b>L4</b>            | <b>Accenture</b>                 |

**PART C – 14 MARKS (5 Questions – Level 4 Problem / Case Study Based)**

| <b>Q.No</b> | <b>Question</b>  | <b>Bloom's Level</b> | <b>MNC / GATE Mapping (Year)</b> |
|-------------|--|----------------------|----------------------------------|
| <b>26</b>   | <b>Case Study: A cloud service provider must choose between Type 1 and Type 2 Hypervisor. Analyze and justify selection.</b> | <b>L4</b>            | <b>Microsoft</b>                 |
| <b>27</b>   | <b>Case Study: Design virtualization solution for banking sector ensuring high availability using snapshots and cloning.</b> | <b>L4</b>            | <b>TCS</b>                       |
| <b>28</b>   | <b>Problem: Compare performance overhead of VM and Container-based deployment for 500 applications.</b>                      | <b>L4</b>            | <b>Amazon</b>                    |
| <b>29</b>   | <b>Case Study: Company migrating workloads across data centers using OVF. Analyze portability issues.</b>                    | <b>L4</b>            | <b>IBM</b>                       |
| <b>30</b>   | <b>Design lightweight container-based architecture using Docker for microservices deployment.</b>                            | <b>L4</b>            | <b>Red Hat</b>                   |