Dr. SNS RAJALAKSHMI COLLEGE OF ARTS AND SCIENCE (Autonomous)
Accredited by NAAC (Cycle-IV) with 'A+' Grade,
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Subject: DISCIPLINE CENTRIC CORE - 1: CLOUD SYSTEM AND VIRTUALIZATION TECHNOLOGIES **Code:** 25UCA508

QUESTION AND ANSWER
UNIT: 1

1. How do major cloud service providers such as AWS, Microsoft Azure, and Google Cloud conceptualize virtualization in cloud computing?(Google 2024)

2. What are the major components of a virtualization architecture in enterprise cloud platforms used by organizations like Microsoft and Google?(Microsoft 2023)

3. How are Type 1 and Type 2 hypervisors deployed differently in data center and development environments? (Oracle 2023)

4. As a data center architect, identify and classify any four business benefits of virtualization for large-scale enterprise data centers.(IBM 2023)

5. Illustrate how server virtualization is implemented in an enterprise cloud environment such as AWS EC2 or Microsoft Azure.(Microsoft 2024)

6. Explain how modern data centers in companies like Meta or Netflix apply storage virtualization to achieve scalability and fault tolerance.(Meta 2020)

7. Demonstrate how network virtualization technologies (VLAN, VXLAN, SDN) are used in enterprise cloud environments to isolate and manage traffic.(Google 2022)

8. Analyze how virtualization architecture and its components are designed in hyperscale cloud environments like Google Cloud.(Google 2024)

9. Examine how virtualization enables scalability and high availability in enterprise cloud platforms and mission-critical applications.(Amazon 2020)

10. Analyze real-world data center virtualization use cases adopted by large enterprises or cloud service providers.(Microsoft 2023)

11. Evaluate the effectiveness of virtualization in reducing operational and infrastructure costs for cloud service providers and enterprises.(Meta 2021)

12. Assess the suitability of server, storage, and network virtualization for large-scale enterprise and multi-cloud deployments.(Oracle 2023)

13. Design a virtualization architecture for an enterprise private cloud supporting business-critical workloads. (Microsoft 2023)

14. Propose a virtualization-based solution that an enterprise could adopt to improve scalability and resource utilization in its data center.(Microsoft 2022)

15. How do cloud service providers like AWS or Azure define virtualization architecture in their infrastructure? (Amazon 2024)

16. What is hardware-assisted virtualization (Intel VT-x / AMD-V) as used in modern enterprise servers? (Oracle 2024)

17. Explain the role of hypervisors in enabling multi-tenant cloud environments for cloud service providers.

18. Describe how server virtualization architecture is structured in enterprise data centers with reference to industry practices.(Oracle 2021)

19. Apply the concept of network virtualization to design a secure multi-tier cloud application for an enterprise. (Microsoft 2023)

20. How can desktop virtualization be applied to design a remote workforce strategy for a global IT company? (IBM 2022)

21. Demonstrate how DevOps teams use virtualization to improve agility and automation in CI/CD pipelines.

22. Compare server, storage, and network virtualization with suitable examples from enterprise cloud deployments.(Microsoft 2023)

23. Analyze how para-virtualization improves performance compared to full virtualization in cloud platforms. (TCS 2023)

24. Analyze the challenges faced by enterprises during large-scale virtualization deployment.(Microsoft 2023)

25. Evaluate the role of virtualization in disaster recovery and business continuity planning for enterprises. (Meta 2024)

26. Assess the effectiveness of virtualization in private cloud vs public cloud environments from an industry perspective.(TCS 2023)

27. Analyze the performance impact of CPU, memory, and I/O virtualization layers in a multi-tenant cloud environment.(Netflix 2024)

28. Create a virtualization-based disaster recovery solution for a banking data center. Include backup, replication, and failover strategies.(Google 2023)

29. Compare hardware-assisted virtualization and para-virtualization in terms of architecture, performance, OS support, and hypervisor compatibility.(Microsoft 2024)

30. Design a virtual network architecture using VLANs, virtual switches, and SDN for a cloud-based enterprise application.(Netflix 2024)

31. Evaluate major virtualization platforms (VMware, KVM, Hyper-V, Xen) and recommend the best one for a telecom cloud deployment.(Meta 2023)

32. Present a case study on virtualization adoption at Google, Amazon, or Microsoft, focusing on benefits, architecture, and operational improvements.(Microsoft 2023)

33. Scenario:A multinational enterprise similar to Microsoft plans to migrate from a traditional on-premises data center to a hybrid cloud model. Create a virtualization-based migration strategy. Propose use cases for virtualization in disaster recovery, testing, and scalability. Explain how virtualization reduces cost and improves agility.(Microsoft 2024)

34. Scenario:A large IT services company similar to TCS / Infosys manages cloud infrastructure for multiple enterprise clients. Design a standardized virtualization framework for multi-client environments. Propose virtualization use cases for server consolidation and disaster recovery. Recommend best practices for large-scale virtualization.(Amazon 2020)

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QUESTION AND ANSWER
UNIT: 2

1. Explain the difference between Type-1 and Type-2 hypervisors with examples.(Meta 2021)
2. State how SAN and NAS differ with respect to performance and scalability.(Google 2024)
3. Why are Type-2 hypervisors commonly used in development and testing?(Microsoft 2023)
4. Explain how storage virtualization addresses storage management needs in an enterprise environment. (Google 2024)
5. Demonstrate how storage provisioning is performed in a virtual storage pool environment.(Oracle 2023)
6. Choose a suitable storage type (SAN / NAS / Object) for a virtualized application and justify.(Amazon 2024)
7. Show how VM snapshots are used during patching or upgrade activities.(Amazon 2023)
8. Analyze the Analyze the different stages of a virtual machine lifecycle in a cloud environment.(Meta 2021)
9. Analyze the role of replication in enhancing reliability and data protection in virtualized storage systems. (Oracle 2023)
10. Assess the challenges of thin provisioning in enterprise environments.(Meta 2024)
11. What is disaster recovery (DR& Purpose of backup in storage virtualization.(Google 2024)
12. List any two popular distributed file systems used in virtualized data centers.(Microsoft 2021)
13. Evaluate a basic virtual storage pool architecture for performance and scalability.(Google 2024)
14. Develop a basic virtual machine backup strategy suitable for a small or medium enterprise.(Amazon 2023)
15. Design a virtualized enterprise cloud architecture that supports scalability, security, and high availability. (Infosys 2023)
16. Propose an industry-ready virtualization solution to optimize infrastructure utilization in a large IT organization.(Microsoft 2023)
17. Amazon Web Services (AWS) uses virtualization extensively in its EC2 service.Define server virtualization in the context of AWS EC2.(Amazon 2023)
18. VMware and Microsoft provide enterprise hypervisor solutions.List any two Type-1 hypervisors used by companies such as VMware or Microsoft.(Microsoft 2024)

19. Explain the difference between Type-1 (bare-metal) and Type-2 (hosted) hypervisors with company examples.(Microsoft 2023)

20. Google Cloud and IBM use storage virtualization to manage massive data.Describe the purpose of storage virtualization in large enterprise data centers environments.(Google 2024)

21. A cloud service provider like Microsoft Azure wants to reduce unused storage.How is thin provisioning applied in a virtual storage pool to solve this issue?(Microsoft 2023)

22. Oracle Corporation runs large transactional databases in a virtualized environment.Identify a suitable storage type (SAN/NAS/Object) for this scenario and justify your choice.(Oracle 2021)

23. During a system upgrade, TCS performs server maintenance without downtime.Show how VM snapshots are used during maintenance activities in such companies(TCS 2023)

24. Infosys manages thousands of virtual machines across global data centers.Analyze the stages involved in a virtual machine lifecycle in such an enterprise.(Infosys 2023)

25. Netflix and banking organizations use different storage architectures.Compare SAN and NAS in terms of performance and scalability for enterprise workloads.(Netflix 2023)

26. Facebook (Meta) uses distributed storage systems for high availability.Examine how distributed file systems support virtualized environments in such companies.(Meta 2021)

27. Amazon and Google rely on data replication across regions.Evaluate the effectiveness of replication in virtualized storage systems for business continuity.(Amazon 2020)

28. Identify the virtualization technologies used in a server consolidation case study.(TCS 2024)

29. Explain a full VM lifecycle management workflow for an organization using VMware/KVM. Include provisioning, monitoring, scaling, and decommissioning.(Wipro 2023)

30. Examine the interrelationship between backup, replication, and disaster recovery.(Infosys 2023)

31. Analyze thin provisioning vs thick provisioning. Propose a storage efficiency strategy for a cloud data center.(Netflix 2024)

32. Develop a case study on server consolidation in a large enterprise (e.g., banks, telecom, manufacturing). Discuss benefits, challenges, and outcomes.(TCS 2024)

33. Design a storage virtualization model using virtual pools, snapshots, and replication to support high-availability VM clusters.(Microsoft 2023)

34. Evaluate SAN, NAS, and Object Storage for a large-scale cloud deployment. Recommend the best option with justification.(Meta 2024)

35. Design a complete server virtualization architecture for a medium-sized enterprise using Type 1 hypervisors. Explain hardware, hypervisor, VM layout, and security layers.(TCS 2024)

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QUESTION AND ANSWER
UNIT: 3

1. State the meaning of Network Function Virtualization and mention two benefits.(Google 2024)
2. Apply the concepts of SDN to distinguish between the functions of the control plane and data plane.(Amazon 2024)
3. Cisco enterprise networks use logical segmentation techniques.Explain how VLANs segment traffic in enterprise networks.(Meta 2024)
4. Explain the container-based microservices architecture using Docker and Kubernetes..(Amazon 2023)
5. Amazon EKS is used to deploy enterprise applications.Apply Kubernetes concepts to design a 3-tier application deployment.(Amazon 2020)
6. Netflix deploys multiple services in containers.Compare Docker Compose and Kubernetes for multi-container deployments.(Meta 2021)
7. Google (2020) redesigned its cloud networking using SDN.Analyze how SDN enhances network programmability in Google Cloud.(Google 2024)
8. Large enterprises running containerized workloads require controlled access to services.Analyze the role of an Ingress Controller in Kubernetes.(Meta 2024)
9. Compare virtual switches and virtual routers used in enterprise virtualization.(Google 2023)
10. Examine how microservices architecture benefits containerized applications.(Amazon 2023)
11. Enterprises migrating from virtual machines to containers face orchestration challenges.Evaluate the suitability of Kubernetes over Docker Compose for enterprise-scale deployments.(Meta 2022)
12. Evaluate the advantages of Kubernetes vs OpenShift in enterprise environments.(Microsoft 2022)
13. Analyze how SDN and overlay networks help Google manage global-scale traffic.(Google 2023)
14. Case: Telecom NFV Deployment.Examine how NFV adoption helped telecom companies reduce CAPEX and OPEX.(Amazon 2023)
15. A startup using thin provisioning on VMware ESXi faces storage exhaustion.Assess the risks of over-allocating storage using thin provisioning in enterprise environments.(TCS 2023)
16. Wipro plans to virtualize its data center to improve performance and availability.Design a simple virtual storage architecture using SAN and NAS suitable for this company.(Wipro 2024)

17. Google uses Software Defined Networking (SDN) in its global data centers.Define SDN and state its main components.(Google 2024)

18. VMware NSX is widely adopted by enterprises for network virtualization.Explain how SDN differs from traditional networking with reference to VMware NSX.(TCS 2023)

19. Cisco and Fortinet provide secure remote connectivity solutions.Describe the purpose of VPNs in enterprise networks.(Cisco 2024)

20. Amazon Web Services (AWS) uses VLANs and overlay networks to isolate tenant traffic.Show how VLANs and overlay networks are applied in cloud environments..(Amazon 2024)

21. Netflix deploys containerized applications using Docker.Demonstrate how Docker containers support rapid application deployment.(Netflix 2024)

22. Microsoft Azure Kubernetes Service (AKS) runs thousands of containerized workloads.Apply Kubernetes networking and storage concepts in a cloud scenario.(Microsoft 2023)

23. Telecom companies like Ericsson and Nokia use NFV to virtualize network functions.Analyze the role of NFV in reducing hardware dependency.(Meta 2023)

24. VMware and Cisco use virtual switches and routers in software-defined data centers.Compare virtual switches and virtual routers used in enterprise virtualization.

25. Evaluate how containers reduce deployment time in CI/CD pipelines.(Netflix 2023)

26. Uber adopted microservices using containers.Examine how microservices architecture benefits containerized applications.

27. A telecom service provider has replaced traditional hardware-based routers and firewalls with SDN and NFV technologies to modernize its network.Define Software Defined Networking (SDN). Define Network Function Virtualization (NFV). List any four network functions that can be virtualized using NFV. Identify the main components of SDN architecture.(Microsoft 2023)

28. A large enterprise uses VLANs, VPNs, and overlay networks to separate departments and secure remote access. Questions:Explain how VLANs segment traffic within an enterprise network. Describe the purpose of VPNs for remote employees. Explain the concept of overlay networks in virtualized environments.(TCS 2023)

29. Evaluate the importance of persistent storage in containerized environments.(Microsoft 2023)

30. Google redesigned its global data center network using Software Defined Networking (SDN) to handle massive traffic and frequent configuration changes.Question:Analyze how SDN improves network programmability, traffic engineering, and scalability in Google Cloud environments.(Google 2023)

31. Evaluate SDN/NFV for data center modernization at companies like Infosys, TCS, or Wipro.(TCS 2023)

32. Develop an enterprise case study on how Netflix uses containerization, microservices, and virtualization tools for global streaming.(Netflix 2024)

33. Design a container storage architecture using Ceph, NFS, or cloud block storage for a banking application.(Netflix 2023)

34. Create a network virtualization architecture using VLANs, VPNs, and VXLAN for a hybrid cloud deployment.(Meta 2023)

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QUESTION AND ANSWER
UNIT: 4

1. List any two major security challenges in virtualized environments.(Microsoft 2023)
2. Define Identity and Access Management (IAM) in virtualized infrastructure.(Meta 2024)
3. Cloud service providers optimize VM and container performance.Explain performance optimization strategies for virtual machines and containers.(Google 2024)
4. Describe how IAM controls access to virtual resources.(Microsoft 2022)
5. Illustrate performance optimization techniques for virtual machines.(Amazon 2023)
6. Show how auto-scaling improves availability in a virtualized environment.(Amazon 2023)
7. IBM secures enterprise access to its virtual infrastructure.Apply IAM policies to control user access in a virtualized data center.(IBM 2022)
8. Compare manual scaling and auto-scaling in virtualized systems..(Amazon 2020)
9. VMware-based data centers face threats such as VM escape attacks.Analyze security risks in virtualized environments and their impact.(Amazon 2023)
10. Global enterprises rely on backups for business continuity.Analyze the role of backup and disaster recovery planning in virtualization.(Microsoft 2022)
11. Cloud providers implement multiple security layers.Assess best practices for secure virtualization deployment.(Google 2024)
12. Financial institutions host payment systems in virtualized environments.Evaluate the effectiveness of PCI-DSS compliance in securing virtual infrastructure.(Amazon 2023)
13. A multinational IT company plans to deploy a secure virtualized data center.Design a secure virtualization architecture incorporating IAM, isolation, and compliance.(Amazon 2023)
14. An e-commerce organization requires zero downtime and data protection.Propose a backup and disaster recovery strategy for a virtualized environment.(Microsoft 2022)
15. Banks and financial institutions adopt OpenShift for container orchestration.Evaluate the advantages of Kubernetes vs OpenShift in enterprise environments.(Infosys 2023)
16. Large enterprises migrated from monolithic to containerized systems.Assess the impact of container networking challenges on application performance.(Meta 2023)

17. Discuss performance tuning techniques for containers using cgroups.(Microsoft 2023)
18. TCS plans to modernize its data center using network virtualization.Design a network virtualization architecture using SDN, VLANs, and virtual switches.(Microsoft 2023)
19. Amazon or Flipkart wants to deploy a scalable e-commerce platform. Propose a container-based microservices architecture using Docker and Kubernetes..(Amazon 2025)
20. Google Cloud enforces strict access control in virtualized infrastructure.What is Identity and Access Management (IAM)?(Google 2024)
21. Define Identity and Access Management (IAM) and list its key components in virtualized infrastructure. (TCS 2023)
22. Describe the role of resource scheduling and load balancing in virtualized environments.(Microsoft 2023)
23. Explain how virtual machine isolation and sandboxing mechanisms help in maintaining security in virtualized systems(Infosys 2024)
24. Apply performance optimization strategies to improve the efficiency of VMs and containers in a data center. (Wipro 2023)
25. Show how auto-scaling mechanisms are implemented in virtualized or cloud environments.(TCS 2023)
26. Demonstrate the application of auto-scaling techniques to handle variable workloads in a virtualized environment.
27. Netflix faces performance issues in virtual machines during peak usage.Explain how CPU, memory, and I/O performance of VMs can be optimized in such scenarios.(Netflix 2025)
28. Google Cloud uses IAM to manage access to cloud resources.Explain how an IAM framework can be used to control access to VMs, containers, and hybrid cloud environments.(Google 2022)
29. Netflix experiences CPU and memory bottlenecks in its virtual machines.Apply performance optimization techniques to improve VM performance.(Google 2021)
30. Amazon Web Services (AWS) runs third-party workloads on shared infrastructure.Apply sandboxing and isolation techniques to securely run untrusted workloads.(Amazon 2020)
31. Microsoft Azure hosts multiple tenants on virtualized infrastructure.Analyze the security challenges involved in multi-tenant virtualized environments.(Microsoft 2023)
32. Google operates multi-region data centers.Discuss the importance of backup and disaster recovery planning in such environments.(Google 2022)
33. Enterprises adopting virtualization implement various security controls.Evaluate the effectiveness of monitoring and auditing mechanisms for security and compliance.(TCS 2023)
34. Netflix (2024) runs performance-critical workloads at large scale.Propose a resource scheduling model for optimizing performance in VMs and containers.(Meta 2023)

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QUESTION AND ANSWER
UNIT: 5

1. List any two emerging virtualization trends such as confidential computing or unikernels.(Microsoft 2023)
2. Define hybrid cloud virtualization and multi-cloud virtualization(Amazon 2024)
3. Explain the difference between hybrid cloud and multi-cloud virtualization strategies..(Amazon 2024)
4. Describe the role of virtualization in green computing and sustainability.(Amazon 2024)
5. An enterprise like IBM uses both on-premise and public cloud platforms.Apply a hybrid cloud virtualization strategy for workload deployment.(Meta 2022)
6. DevOps teams manage large virtualized infrastructures.Apply Infrastructure as Code (IaC) to automate VM and cloud resource management.(IBM 2022)
7. Show the use of virtualization in AI/ML and high-performance computing (HPC) workloads.(Amazon 2023)
8. Analyze how serverless computing differs from traditional VM-based virtualization in terms of scalability and cost.(Infosys 2024)
9. Analyze how serverless computing impacts resource utilization and scalability(Oracle 2021)
10. Evaluate the effectiveness of green computing practices in reducing energy consumption through virtualization.(Microsoft 2023)
11. Evaluate the effectiveness of edge virtualization compared to centralized cloud computing for IoT applications..(Amazon 2023)
12. Design a virtualization strategy combining hybrid cloud, edge computing, and IaC for a global enterprise. (IBM 2022)
13. A global enterprise like Google or Amazon operates across regions and clouds.Design a hybrid and multi-cloud virtualization strategy for such an organization..(Amazon 2024)
14. Propose a virtualization architecture to support AI/ML workloads using lightweight VMs or containers.
15. Categorize the impact of improper resource allocation on VM and container performance.(Microsoft 2023)
16. Analyze how improper resource allocation affects the performance and stability of virtual machines and containerized applications.(TCS 2023)

17. Analyze the security risks associated with multi-tenant virtualized environments and their possible impact on data confidentiality.

18. Evaluate the importance of compliance standards (ISO, GDPR, PCI-DSS) in securing virtualized infrastructures.(Microsoft 2023)

19. Assess the effectiveness of backup and disaster recovery planning in virtualized environment.(Amazon 2024)

20. Design a secure access control model using IAM for a virtualized data center.(Microsoft 2023)

21. Propose a set of best practices for secure virtualization deployment in an enterprise.(TCS 2023)

22. Google Cloud uses both on-premises and public cloud infrastructure.Define hybrid cloud virtualization and multi-cloud virtualization used in such enterprises.(Google 2022)

23. AWS Lambda is a popular serverless platform.Define serverless computing and state its relationship with virtualization..(Amazon 2024)

24. Cisco implements edge and fog computing in smart city solutions.Explain how edge virtualization and fog computing reduce latency and bandwidth usage.(Microsoft 2023)

25. Microsoft Azure supports Infrastructure as Code (IaC).Describe how IaC helps manage and automate virtualized environments.(Microsoft 2023)

26. Amazon operates applications across on-premises data centers and public cloud.Apply a hybrid cloud virtualization strategy for such an enterprise environment.(Amazon 2022)

27. Netflix uses virtualization to run AI-driven recommendation engines.Demonstrate the virtualization techniques to support AI/ML workloads efficiently.(Netflix 2024)

28. Tesla processes real-time data at the network edge.Analyze how edge virtualization supports real-time and mission-critical workloads.(Amazon 2020)

29. Google runs large-scale AI/ML workloads on virtualized infrastructure.Classify the role of virtualization in AI/ML and high-performance computing (HPC) workloads.(Google 2023)

30. Global enterprises adopt multi-cloud strategies for flexibility.Analyze the challenges and benefits of multi-cloud virtualization in enterprise environments.(TCS 2023)

31. Amazon uses automation to manage large-scale virtualized infrastructure.Apply Infrastructure as Code (IaC) to manage and deploy virtual machines and containers.(Amazon 2024)

32. Cloud providers are adopting new virtualization technologies.Evaluate the impact of confidential computing, unikernels, and lightweight VMs on future virtualization.(Amazon 2020)

33. IBM is experimenting with confidential computing and lightweight VMs.Evaluate the impact of emerging virtualization trends such as confidential computing, unikernels, and lightweight VMs.(IBM 2023)

34. A multinational AI company requires high performance and strong security.Propose a future-ready virtualization model for AI/ML and HPC workloads using emerging technologies.(Microsoft 2023)

35. A global enterprise like Accenture operates worldwide using cloud and edge infrastructure.Design a comprehensive virtualization strategy using hybrid cloud, edge computing, and IaC.(Microsoft 2023)

36. Google aims to support latency-sensitive applications such as autonomous systems and smart cities. Develop an edge–fog–cloud architecture using virtualization technologies. Explain:Role of edge, fog, and cloud layers Use of VMs, containers, and micro-VMs Data flow and workload orchestration Advantages over traditional centralized cloud models(Google 2024)

37. Netflix streams content globally with minimal latency.Design a multi-region virtualized deployment architecture to support this requirement.Explain: Load balancing strategies Virtual machine placement Scalability and fault tolerance (Netflix 2023)

38. Amazon’s cloud infrastructure must remain operational even during failures,Explain how virtualization enables fault tolerance and high availability in Amazon’s cloud environment.Illustrate with suitable examples and architectures.(Amazon 2020)

39. Propose a virtualization-based design for serverless event-driven applications at Amazon scale. Discuss: Underlying virtualization mechanisms Event flow and execution model Scalability and fault tolerance Cost optimization benefits(TCS 2023)

40. Design a hybrid and multi-cloud virtualization strategy for a global enterprise like Google.(Google 2023)

41. Develop an edge–fog–cloud architecture using virtualization technologies to support real-time global services(TCS 2023)

42. With companies like Google, Amazon, and Netflix adopting advanced virtualization, analyze the future trends in virtualization technologies. Discuss:Micro-VMs, serverless, and GPU virtualization Impact on cloud performance and cost Challenges for enterprises(Google 2024)

43. Google uses both containers and virtual machines for application deployment.Compare container-based virtualization and VM-based virtualization in the context of Google’s cloud services.Justify when each approach should be used.(Google 2024)