Question Bank
24MCAT231 - CLOUD COMPUTING

Course Type	Course Nature	CA Conduct	System	L	T	P	Credits	CA Total	CA Pass	SEE Total	SEE Pass	Total Pass
Elective	5	End Semester	Mark	3	1	0	4	50	0	50	20	50

Question Bank Summary

Sect. Part A	Sect. Part B	Easy	Med.	Chall.	Th.	Appli.
60	60	50	52	18	15	105

Part A

#	Unit	Question	COS	Categorized
1	1.1	A city library plans to digitize its records and offer an online catalog with search and reservation features. Using your understanding of cloud deployment models, discuss which model (public, private, hybrid, or community) would best meet their operational needs and explain why.	CO1	Easy - Understanding - A
2	1.1	A startup offering online tutoring services needs to handle sudden surges in users during examination months. Based on the scalability concepts, explain how cloud elasticity could address this challenge.	CO1	Easy - Understanding - T
3	1.1	A small business wants to test a new web application without investing in hardware. Relating to the cloud service models, describe which model would be the most suitable for this requirement.	CO1	Easy - Understanding - T
4	1.1	Analyze the decision-making factors for a city library planning to migrate its physical catalog to a cloud-based searchable platform, considering data confidentiality, scalability, and community access.	CO1	Challenging - Analysing - A
5	1.1	An online tutoring startup experiences unpredictable spikes in traffic during national exam seasons. Evaluate the role of cloud elasticity in preventing performance degradation without incurring excessive costs.	CO1	Medium - Evaluating - T
6	1.1	A mobile app developer with limited hardware resources wants to launch a global service in six months. Justify why a PaaS solution might be the most effective choice over IaaS or SaaS.	CO1	Easy - Evaluating - A
7	1.1	A regional bank is migrating customer services to the cloud while staying compliant with strict data residency laws. Assess how deployment model choice impacts both legal compliance and operational agility.	CO1	Easy - Evaluating - A
8	1.1	A ticketing platform hosting international sports events needs sub-second response times for global buyers. Recommend a cloud-based network and caching approach that minimizes latency worldwide.	CO1	Medium - Analysing - A
9	1.1	A research team has been awarded a two-month grant to run high-volume climate simulations. Propose a cloud resource pooling plan that balances cost efficiency with computational speed.	CO1	Challenging - Analysing - A
10	1.1	An e-commerce retailer wants to safeguard transaction records against server crashes. Evaluate the suitability of a cloud-based disaster recovery model to maintain business continuity.	CO1	Easy - Evaluating - A
11	1.1	A private clinic wants to enable secure cloud-based sharing of X-ray images between doctors and patients. Formulate a minimum viable security plan including encryption, authentication, and access control.	CO1	Medium - Analysing - A
12	1.1	A video streaming startup sees spikes in usage during movie premieres. Analyze how a fault-tolerant cloud architecture could sustain service availability during such demand peaks.	CO1	Medium - Analysing - A

13	2.1	An e-commerce cloud deployment is experiencing frequent controller node downtime due to single points of failure. Analyze how implementing an asymmetric clustering model in OpenStack could maintain database availability and API responsiveness without adding significant hardware overhead.	CO2	Easy - Analysing - T
14	2.1	A global SaaS platform serving customers across three continents is deciding between symmetric and asymmetric clustering. Evaluate which model better supports consistent load handling and failover in their multi-region deployment.	CO2	Easy - Evaluating - T
15	2.1	Two enterprises are merging, each with its own Keystone identity service. Justify the adoption of Keystone federated identity integration to enable seamless cross-cloud authentication while preserving existing user roles and permissions.	CO2	Medium - Evaluating - A
16	2.1	A mid-sized enterprise cloud is experiencing latency in routing and load balancing functions. Assess the performance trade-offs of deploying dedicated network workers for these services.	CO1	Medium - Evaluating - T
17	2.1	A public cloud provider hosts hundreds of tenants and must choose between PKI tokens and Fernet tokens for authentication. Analyze the security, scalability, and operational implications of each.	CO2	Easy - Analysing - T
18	2.2	A research institute frequently runs short-lived, compute-intensive simulations. Propose a Nova-scheduler configuration optimized to rapidly assign workloads to the most suitable compute nodes while reducing idle time.	CO2	Medium - Evaluating - T
19	2.2	An organization is deploying Glance to serve VM images from SSD-backed storage. Formulate the most appropriate image storage backend configuration to leverage the low-latency hardware.	CO2	Medium - Evaluating - T
20	2.2	A university private cloud is facing resource misuse by unauthorized provisioning. Evaluate how role-based access control (RBAC) in Horizon can prevent policy violations while maintaining operational efficiency.	CO2	Easy - Evaluating - T
21	2.2	An online gaming platform wants to preemptively scale during peak usage hours. Justify the implementation of telemetry alarms to trigger proactive resource allocation.	CO2	Medium - Evaluating - A
22	2.2	A financial services provider needs to handle both authentication and Nova scheduling at scale. Propose an optimized database cluster architecture for the OpenStack controller.	CO2	Challenging - Analysing - A
23	2.2	Compute nodes in a large OpenStack cluster were directly querying the database, leading to performance bottlenecks. Assess how implementing Nova-conductor improves both security and efficiency.	CO2	Easy - Evaluating - T
24	2.2	A hospital cloud infrastructure requires uninterrupted access to patient records even during NIC failures. Recommend a NIC(Network Interface Card) bonding strategy in OpenStack that maximizes fault tolerance and throughput.	CO2	Medium - Analysing - A
25	3.1	A banking application is storing its transaction logs on ephemeral storage, but the logs are lost whenever the VM is terminated. From the perspective of persistent vs. ephemeral storage in OpenStack, analyze how the use of Cinder persistent volumes could have prevented this loss.	CO3	Challenging - Analysing - A
26	3.1	A financial company is running several critical VMs for transaction processing. Recently, one compute node failed, which disrupted the services running on it. Referring to OpenStack's compute architecture, analyze how separating compute nodes from controllers increases the overall fault tolerance and minimizes service disruption.	CO3	Easy - Analysing - A
27	3.1	A data analytics firm wants to deploy high-performance workloads that require efficient CPU and memory utilization. They are comparing hypervisors supported by OpenStack. Evaluate why KVM, a Type-1 hypervisor, is often preferred in enterprise OpenStack clouds over Type-2 hypervisors such as VMware Workstation.	CO3	Medium - Evaluating - A
28	3.1	A startup building cloud-native applications wants lightweight deployment environments to avoid the heavy resource overhead of traditional virtual machines. Justify why containers (like Docker) are more efficient than hypervisors in this scenario, highlighting performance and scalability advantages.	CO3	Easy - Evaluating - A
29	3.1	A logistics company wants to deploy and manage thousands of microservices in its private cloud environment. The IT team is considering OpenStack Magnum for this purpose. Assess how Magnum, when integrated with Kubernetes, enables automated container orchestration across the infrastructure.	CO3	Easy - Evaluating - T
30	3.1	An e-commerce company wants to ensure that mission-critical workloads continue functioning even if an entire rack of servers fails. Recommend how OpenStack's Availability Zones can be configured to segregate workloads, thereby increasing reliability and high availability.	CO3	Medium - Evaluating - A

31	3.1	A university private cloud runs both student project workloads and faculty research workloads, which have very different requirements. Propose how Host Aggregates can be configured to segregate resources for these workloads, improving performance and fairness in resource allocation.	CO3	Easy - Evaluating - A
32	3.1	A hospital cloud environment experiences database crashes that affect Nova services. The IT administrator wants to ensure quick recovery with minimal downtime. Evaluate how OpenStack's backup-manager supports faster service recovery in such scenarios.	CO3	Medium - Evaluating - A
33	3.2	A media company stores temporary video cache files for a few hours before deletion. They are considering persistent storage or ephemeral storage in OpenStack. Evaluate which option fits best for this short-lived workload.	CO3	Medium - Evaluating - A
34	3.2	A banking application needs fast, consistent, and low-latency storage for its transaction logs. The IT team is confused between OpenStack Cinder block storage and Swift object storage. Analyze which storage type is more suitable and why.	CO3	Easy - Analysing - A
35	3.2	A research team stores scientific datasets in Swift across multiple data centers. During one node failure, they want data to remain accessible. Justify how Swift's replication ensures durability and availability in this situation.	CO3	Medium - Analysing - A
36	3.2	A startup is launching web applications that boot directly from cloud storage. They are confused about whether to use block storage or object storage for VM boot volumes. Based on storage characteristics in OpenStack, evaluate which model is more appropriate and why.	CO3	Medium - Evaluating - A
37	4.1	In a multi-tenant OpenStack cloud, the Computer Science department launches two VMs (Virtual Machines) in the same subnet. They communicate successfully, but when a VM is moved to another subnet, communication fails. The admin suspects that the Neutron L3 (Layer-3) service plugin is not configured. Identify the Neutron element that would restore inter-subnet communication.	CO4	Medium - Analysing - A
38	4.1	A new VM (Virtual Machine) is created by a student project team, but the instance shows "No IP address assigned." On checking, the DHCP (Dynamic Host Configuration Protocol) namespace is missing from the network node. Point out the Neutron agent that should have been active to provide IP leases.	CO4	Easy - Analysing - A
39	4.1	In a university cloud, each department has its own subnet for isolation, but all departments require shared internet access. Identify the Neutron construct that provides this shared gateway while maintaining isolation.	CO4	Easy - Evaluating - A
40	4.1	A three-tier application (web, app, DB) is deployed in OpenStack. Each tier is placed in a separate subnet for isolation. Identify the Neutron L3 (Layer-3) service plugin that interconnects these subnets.	CO4	Easy - Analysing - A
41	4.1	A tenant prefers using Horizon (OpenStack Dashboard) instead of CLI (Command Line Interface) to create networks and routers. Identify the OpenStack component that enables this interaction.	CO4	Easy - Analysing - A
42	4.2	A cloud provider uses VLANs (Virtual Local Area Networks) for tenant isolation. A research group requests 20,000 isolated networks for IoT (Internet of Things) devices, but the system cannot allocate beyond 4094 VLAN IDs. Highlight the tunneling mechanism such as VXLAN (Virtual Extensible LAN) that addresses this scalability gap.	CO4	Challenging - Evaluating - A
43	4.2	A startup attaches a floating IP to its VM (Virtual Machine) to make it accessible to customers. However, external users cannot reach it because the DNAT (Destination Network Address Translation) rules are missing in the router namespace. Identify the Neutron service plugin that ensures DNAT is applied for external accessibility.	CO4	Medium - Analysing - A
44	4.2	During a VM (Virtual Machine) migration from one compute node to another, the instance loses connectivity because the OVS (Open vSwitch) bridge on the new node is not updated. Identify the Neutron agent that restores consistent networking.	CO4	Medium - Analysing - A
45	4.2	A company wants to securely connect its OpenStack cloud to a remote branch office over the internet. Identify the Neutron VPN (Virtual Private Network) agent that provides this service.	CO4	Easy - Evaluating - A
46	4.2	A financial institution enforces strict firewall rules at the router boundary to block unauthorized access. Identify the Neutron FWaaS (Firewall-as-a-Service) feature that applies these rules.	CO4	Easy - Evaluating - A
47	4.2	A VM (Virtual Machine) in VLAN 20 cannot reach another VM in VLAN 30. Identify the Neutron L3 (Layer-3) service plugin that enables routing between these VLANs.	CO4	Easy - Analysing - A
48	4.2	A tenant requests millions of isolated networks for IoT (Internet of Things) devices. Identify the tunneling protocol supported by Neutron such as VXLAN (Virtual Extensible LAN) that fulfills this requirement.	CO4	Challenging - Evaluating - A

#	Unit	Question	COS	Categorized
49	5.1	A financial company wants to deploy multiple VMs (Virtual Machines) with consistent configurations across projects. The admin uses a Heat Orchestration Template (HOT) written in YAML (YAML Ain't Markup Language). Identify the Heat component that interprets this template and provisions the resources.	CO5	Easy - Analysing - A
50	5.1	A university IT team spends weeks manually setting up servers, networks, and storage. After adopting Heat, the setup time reduces to hours. Identify the orchestration feature that enabled this acceleration.	CO5	Easy - Analysing - A
51	5.1	A healthcare provider wants to ensure that if one VM (Virtual Machine) hosting patient records fails, another is automatically launched to maintain service continuity. Which Heat feature, integrated with Ceilometer (Telemetry Service), supports this auto-scaling?	CO5	Easy - Evaluating - A
52	5.1	A developer submits a HOT (Heat Orchestration Template) that provisions a network and a VM. Heat ensures that the network is created first before the VM is launched. Identify the orchestration mechanism that manages such dependencies.	CO5	Easy - Analysing - A
53	5.1	A software company wants to reuse the same Heat template across testing, staging, and production environments without rewriting it each time. Identify the orchestration benefit that allows this consistency.	CO5	Medium - Evaluating - A
54	5.1	A DevOps team is comparing Heat (YAML/JSON templates) with Terraform (HCL – HashiCorp Configuration Language). Assess the suitability of each tool for managing multi-cloud deployments where resources span AWS, OpenStack, and Azure.	CO5	Easy - Evaluating - A
55	5.1	A cloud operator uses Terraform to preview infrastructure changes before applying them. Analyze how the "plan" phase contributes to safer and more predictable deployments.	CO5	Easy - Analysing - T
56	5.1	A university cloud configures MySQL with Galera multi-master replication for HA (High Availability). Evaluate how this approach ensures synchronous replication and fault tolerance when one database node fails.	CO5	Medium - Evaluating - A
57	5.1	A RabbitMQ (Message Queue) cluster is deployed with mirrored queues across three nodes. Break down how message delivery continues seamlessly when one node fails and clients remain connected.	CO5	Medium - Analysing - A
58	5.1	A government data center promises 99.999% uptime (five nines) in its SLA (Service Level Agreement). Calculate the maximum downtime allowed per year under this commitment.	CO5	Easy - Analysing - A
59	5.1	A cloud provider configures HAProxy (High Availability Proxy) to distribute requests across multiple servers. Evaluate the effectiveness of the "least connections" algorithm in balancing workloads during peak traffic.	CO5	Easy - Evaluating - A
60	5.1	A healthcare system requires SLA compliance with downtime limited to ~5.25 minutes per year. Infer the availability level (in "nines") that corresponds to this requirement.	CO5	Medium - Analysing - A

Part B

#	Unit	Question	COS	Categorized
1	1.1	A government agency is tasked with launching an integrated citizen portal for tax filing, healthcare, and land registration. Design a secure, scalable, and cost-effective cloud deployment model addressing authentication, uptime, and disaster recovery.	CO1	Challenging - Creating - A
2	1.1	A multinational retailer wants to unify customer purchase data across continents for centralized analytics. Formulate a cloud architecture that ensures high availability, low latency, and compliance with multiple regional data laws.	CO1	Medium - Evaluating - A
3	1.1	A consortium of research universities wants to share massive datasets and computation power for joint AI projects. Propose a deployment model and governance strategy that balances cost, accessibility, and security across institutions.	CO1	Challenging - Evaluating - A
4	1.1	A startup is building a global voice translation app for tourists. Construct a dynamic cloud resource allocation plan to maintain low-latency processing regardless of location and seasonal user spikes.	CO1	Easy - Creating - A

5	1.1	An online education platform aims to deliver real-time personalized learning recommendations using student activity data. Design a cloud analytics pipeline integrating data ingestion, processing, and AI-driven content delivery.	CO1	Easy - Creating - A
6	1.1	A financial technology company processes millions of sensitive transactions daily. Develop a zero-trust cloud security framework incorporating encryption, multi-factor authentication, and compliance auditing.	CO1	Challenging - Creating - A
7	1.1	A manufacturing firm wants to integrate IoT sensors on production lines to monitor efficiency and predict failures. Design a cloud-based real-time analytics dashboard with automated alerts.	CO1	Easy - Creating - A
8	1.1	A disaster relief NGO (Non-Governmental Organizations) requires a mobile-ready command center to coordinate emergency aid during floods. Develop a rapid-provisioning cloud framework ensuring real-time communication, data sharing, and failover resilience.	CO1	Medium - Creating - A
9	1.1	A national healthcare provider plans to roll out a telemedicine platform handling sensitive patient data. Recommend a system architecture that combines HIPAA(Health Insurance Portability and Accountability Act)-compliant storage, encrypted streaming, and high-availability infrastructure.	CO1	Medium - Analysing - A
10	1.1	A media production company wants to store 4K video archives for decades while making them instantly accessible to editors. Formulate a hybrid storage strategy using cloud tiers and CDN(Content Delivery Network) integration.	CO1	Medium - Analysing - A
11	1.1	A software vendor wants to offer its ERP(Enterprise resource planning) application as a mobile app, web app, and via APIs to partners. Recommend an optimal mix of SaaS (Software as a Service), PaaS (Platform as a Service), and IaaS (Infrastructure as a Service). to maximize scalability and minimize redundancy.	CO1	Medium - Evaluating - A
12	1.1	A space research lab needs 100 GPU (Graphics Processing Units) nodes for satellite image processing during three project phases per year. Propose a reserved/on-demand hybrid cloud instance strategy to optimize both cost and performance.	CO1	Challenging - Evaluating - A
13	2.1	A stock trading company needs an OpenStack deployment capable of millisecond-level response during trading hours and full failover resilience. Design an architecture integrating asymmetric clustering, Keystone federation, and telemetry alarms to ensure both speed and uptime.	CO2	Medium - Creating - A
14	2.1	A hospital network requires zero downtime for both compute and network resources across multiple branches. Formulate a combined load balancing and failover strategy in OpenStack to guarantee high availability for mission-critical services.	CO2	Challenging - Evaluating - A
15	2.1	A global media streaming provider needs to regularly update and distribute high-resolution VM templates. Evaluate the suitability of different Glance backends (e.g., Swift, Ceph, File system) in terms of speed, scalability, and operational overhead.	CO2	Medium - Evaluating - A
16	2.1	A multi-tenant OpenStack cloud is vulnerable to cross-tenant data exposure. Recommend a secure network service design that isolates tenants while allowing advanced routing and load balancing.	CO2	Medium - Analysing - A
17	2.1	A banking cloud platform must decide between symmetric and asymmetric clustering for mission-critical workloads. Evaluate the trade-offs in fault tolerance, resource utilization, and complexity.	CO2	Easy - Evaluating - T
18	2.1	A government OpenStack deployment needs department-specific dashboards for finance, public works, and healthcare. Propose a Horizon customization strategy to create role-based dashboards without affecting core functionality.	CO2	Easy - Evaluating - A
19	2.1	A consortium of universities is building a shared OpenStack cloud for research projects across campuses. Propose a federated identity and RBAC(Role-Based Access Control) model that ensures secure cross-campus collaboration while maintaining local autonomy.	CO2	Easy - Analysing - A
20	2.2	A big data analytics company must place VMs dynamically based on CPU load, storage proximity, and power usage. Analyze how Nova-scheduler filters, affinity/anti-affinity rules, and telemetry metrics can be combined for optimal placement.	CO2	Medium - Analysing - A
21	2.2	A tech conference needs to provision and manage thousands of ephemeral instances for a 48-hour hackathon. Design an operational workflow leveraging Nova-conductor, message queues, and Horizon to streamline provisioning and teardown.	CO2	Medium - Creating - A
22	2.2	A travel booking platform experiences sharp seasonal traffic surges. Formulate a telemetry-driven auto-scaling policy using Ceilometer, Aodh, and Gnocchi to handle demand with minimal wasted resources.	CO2	Challenging - Evaluating - A

23	2.2	A manufacturing company's controller node failed, disrupting operations. Design a disaster recovery plan integrating Keystone, Glance, and Neutron to restore services within minimal recovery time objectives (RTOs).	CO2	Medium - Creating - A
24	2.2	A public cloud provider is planning to separate network control plane API(Application Programming Interface) services from compute API functions. Analyze how this separation could improve scalability, isolation, and fault containment.	CO2	Challenging - Analysing - A
25	3.1	A multinational bank is designing its compute infrastructure using OpenStack to host critical applications. The bank must ensure high availability, fault isolation, and support for compute-intensive workloads. Design a deployment model that separates controllers, compute nodes, and networking services, showing how this architecture ensures both reliability and scalability.	CO3	Medium - Creating - A
26	3.1	A telecom provider is migrating thousands of workloads to OpenStack. The decision now is between hypervisors such as KVM, Xen, VMware ESXi, and Hyper-V. Formulate a decision framework that compares these options in terms of performance, licensing costs, and ease of integration with Nova, recommending the best fit for a large-scale deployment.	CO3	Challenging - Evaluating - A
27	3.1	A SaaS startup plans to deliver its applications as microservices, requiring orchestration across multiple regions. The team is exploring OpenStack Magnum with Kubernetes. Propose an orchestration strategy using Magnum, explaining how concepts such as Bays, BayModels, and Pods enable flexible scaling and efficient container management.	CO3	Medium - Evaluating - A
28	3.1	A healthcare provider wants to ensure critical workloads are placed strategically so that hardware failures do not affect availability. Develop a scheduling plan that combines Host Aggregates, Availability Zones, and affinity/anti-affinity rules to guarantee resilience and continuity of services.	CO3	Medium - Creating - A
29	3.1	A cloud provider running thousands of compute nodes is facing performance bottlenecks because Nova services are overwhelming the central database and message queue. Analyze how Nova Cells architecture addresses these scalability challenges by distributing load and improving fault tolerance.	CO3	Easy - Analysing - A
30	3.1	A government agency wants to ensure that its critical applications can be recovered after hardware or node failures. Evaluate situations where internal non-shared storage would be beneficial and where external shared storage is preferable, illustrating the impact on performance and recovery.	CO3	Easy - Evaluating - A
31	3.1	A global e-learning platform must deliver video lectures to millions of students across regions. The challenge is to maintain low latency and handle massive scale. Formulate a Swift storage deployment plan that uses replication, multi-region clustering, and caching for seamless video streaming.	CO3	Medium - Analysing - A
32	3.2	A software startup is deploying developer tools such as Git and Jenkins for a large distributed team. Evaluate how Manila shared file systems would enhance team collaboration, enable version-controlled access, and reduce duplication of resources in this setup.	CO3	Easy - Evaluating - A
33	3.2	A university cloud gives students access to OpenStack for academic projects. Students frequently need to create, attach, snapshot, and delete storage volumes. Formulate how the Cinder volume lifecycle supports flexible storage usage while ensuring security and control in the learning environment.	CO3	Easy - Analysing - A
34	3.2	A government agency must design a cloud storage policy that ensures compliance with disaster recovery laws and cost-effective long-term storage. Develop a Swift storage plan using replication and erasure coding that balances resilience, compliance, and efficiency.	CO3	Easy - Creating - A
35	3.2	A biotech research lab requires two kinds of storage: fast temporary storage for genome computations and secure long-term archival for datasets. Propose a hybrid model that integrates ephemeral storage, Cinder persistent volumes, and Swift to handle both workloads effectively.	CO3	Medium - Analysing - A
36	3.2	A multinational bank requires two types of storage:(i) high-speed and reliable storage for databases, and (ii) long-term archival for compliance records. Design a solution combining Cinder block storage for databases and Swift object storage for archiving, showing how both requirements are met.	CO3	Easy - Creating - A
37	4.1	A VM (Virtual Machine) can ping others in the same subnet but fails to reach external websites. Break down the Neutron workflow step by step—from API server receiving the request, to the core plugin orchestration, to the L3 (Layer-3) agent configuring the router namespace—and analyze where the misconfiguration could occur.	CO4	Medium - Analysing - A
38	4.1	A tenant reports intermittent connectivity after VM (Virtual Machine) migration. Diagram the collaboration between the L2 (Layer-2) agent on compute nodes and the L3 (Layer-3) agent on the network node, and infer the missing synchronization that caused the issue.	CO4	Medium - Analysing - A

39	4.1	A tenant requires both firewalling and VPN (Virtual Private Network) services. Evaluate the trade-offs of implementing these through Neutron service plugins versus external hardware appliances, considering cost, flexibility, and integration.	CO4	Medium - Evaluating - A
40	4.1	A cloud provider considers ML2 (Modular Layer-2) with OVS (Open vSwitch) vs ML2 with Linux Bridge. Assess the performance, flexibility, and operational impact of each mechanism driver in a production cloud.	CO4	Medium - Evaluating - A
41	4.1	A university cloud wants to expose selected VMs (Virtual Machines) to the internet while keeping others private. Evaluate the effectiveness of floating IPs versus provider networks for this requirement.	CO4	Easy - Evaluating - T
42	4.1	A multi-tenant e-commerce platform requires load balancing for web servers, firewalling for database access, and VPN (Virtual Private Network) for secure admin access. Design a Neutron-based architecture that integrates these services seamlessly using service plugins.	CO4	Easy - Creating - A
43	4.1	A startup wants to automate network creation for new projects. Develop a Neutron API-based workflow that provisions networks, subnets, routers, and floating IPs dynamically, ensuring scalability and repeatability.	CO4	Challenging - Creating - A
44	4.2	A provider cloud uses VLANs (Virtual Local Area Networks) but faces broadcast storms that slow down the network. Analyze the redundant traffic patterns and illustrate how VLAN segmentation reduces CPU overhead on devices.	CO4	Medium - Analysing - A
45	4.2	A floating IP works for outbound traffic but fails for inbound access. Break down the DNAT (Destination Network Address Translation) process in the router namespace and identify the contradictory configuration that prevents external reachability.	CO4	Challenging - Analysing - A
46	4.2	A company debates between VLAN (Virtual Local Area Network)-based and VXLAN (Virtual Extensible LAN)-based segmentation for tenant networks. Compare both approaches in terms of scalability, performance, and overhead, and justify which is more suitable for a large multi-tenant cloud.	CO4	Medium - Evaluating - A
47	4.2	A research consortium wants to interconnect OpenStack clouds across three cities. Formulate a VXLAN (Virtual Extensible LAN)-based overlay design that ensures tenant isolation while spanning multiple datacenters.	CO4	Medium - Creating - A
48	4.2	A government cloud requires strict compliance with security policies. Create a layered security model using Neutron security groups, FWaaS (Firewall-as-a-Service), and NAT (Network Address Translation) to enforce controlled access at both port and router levels.	CO4	Easy - Creating - A
49	5.1	A university cloud deploys a HOT that provisions compute, network, and storage resources for a student portal. Break down the interactions between Heat, Nova (Compute), Neutron (Networking), and Cinder (Block Storage) during stack creation, showing how dependencies are resolved.	CO5	Medium - Analysing - A
50	5.1	A research lab configures Ceilometer alarms with Heat to auto-scale VMs for a simulation workload. Analyze the workflow from alarm creation, to triggering, to Heat applying the scaling policy, and infer how rollback is handled if scaling fails.	CO5	Easy - Analysing - A
51	5.1	A company modularizes its Heat templates into networking, web, and database stacks for an e-commerce platform. Break down how nested templates improve maintainability, reusability, and version control compared to a single monolithic template.	CO5	Medium - Analysing - A
52	5.1	A startup debates between Heat and Terraform for orchestrating its hybrid cloud infrastructure. Evaluate both tools in terms of language support, multi-cloud capability, state management, and ecosystem maturity, and conclude which is more suitable for their growth strategy.	CO5	Medium - Evaluating - A
53	5.1	A RabbitMQ cluster is configured with mirrored queues for a banking application. Analyze the sequence of events that ensures message continuity when the primary node fails and a secondary node takes over.	CO5	Medium - Analysing - A
54	5.1	A cloud provider considers MySQL master-slave replication versus Galera multi-master replication for database HA in its OpenStack deployment. Evaluate the trade-offs in terms of consistency, fault tolerance, and recovery time.	CO5	Medium - Evaluating - A
55	5.1	A telecom company requires SLA compliance of 99.99% uptime for its customer-facing services. Evaluate the operational challenges of achieving this target in an OpenStack environment with multiple interdependent services.	CO5	Easy - Evaluating - A
56	5.1	A web application is deployed behind HAProxy to serve millions of users. Evaluate the trade-offs between Layer-4 and Layer-7 load balancing in terms of flexibility, performance, and monitoring.	CO5	Easy - Evaluating - A

57	5.1	A multi-tier e-commerce application requires modular deployment with networking, web, and database stacks. Design a nested Heat template structure that supports scalability, reusability, and automated scaling, ensuring each tier can be updated independently.	CO5	Easy - Creating - A
58	5.1	A research consortium wants to deploy OpenStack across multiple datacenters with geo-redundancy for scientific workloads. Formulate an HA design pattern using failover, load balancing, and replication across sites to ensure continuous service delivery.	CO5	Medium - Creating - A
59	5.1	A government cloud requires RabbitMQ HA with seamless failover for secure messaging. Develop a configuration plan using HAProxy, mirrored queues, and a Virtual IP (VIP) for uninterrupted client connections.	CO5	Challenging - Creating - A
60	5.1	A healthcare provider requires strict SLA compliance with minimal downtime for its patient management system. Create a monitoring and failover strategy using Ceilometer (Telemetry), Heat (Orchestration), and HAProxy (Load Balancer) to ensure continuous service delivery.	CO5	Challenging - Creating - A